Apex Town Council Meeting

Tuesday, December 17, 2019

Jacques K. Gilbert, Mayor
Nicole L. Dozier, Mayor Pro Tempore
Brett D. Gantt, Audra M. Killingsworth, Cheryl F. Stallings, and Terry Mahaffey, Council Members
Drew Havens, Town Manager
Shawn Purvis, Assistant Town Manager
Marty Stone, Assistant Town Manager
Donna B. Hosch, MMC, NCCMC, Town Clerk
Laurie L. Hohe, Town Attorney

The Regular Meeting of the Apex Town Council scheduled for Tuesday, December 17, 2019, at 7:00 PM will be held in the Council Chamber of Apex Town Hall, 73 Hunter Street. The meeting will adjourn when all business is concluded or at 11:00 p.m., whichever comes first.

COMMENCEMENT

Call to Order : Invocation : Pledge of Allegiance

PRESENTATIONS

PR1 Keith McGee

Introduction of Assistant Fire Chief Jeff Harrison to Town Council.

PR2 Mayor Jacques K. Gilbert

Presentation to the Apex Cougars Pop Warner PeeWee football 2019 team.

CONSENT AGENDA

All Consent Agenda items are considered routine, to be enacted by one motion with the adoption of the Consent Agenda, and without discussion. If a Council Member requests discussion of an item, the item may be removed from the Consent Agenda and considered separately. The Mayor will present the Consent Agenda to be set prior to taking action on the following items:

CN1 Donna Hosch, Town Clerk

Motion to approve Minutes of the December 3, 2019 Organizational Meeting of the Apex Town Council

CN2 Mayor Jacques K. Gilbert

Motion to make appointments to the Planning Board, Board of Adjustment, Environmental Advisory Board, and Bee City Committee.

CN3 Dianne Khin, Planning Director

Motion to adopt a Resolution Directing the Town Clerk to Investigate Petition Received, to accept the Certificate of Sufficiency by the Town Clerk, and to adopt a Resolution Setting Date of Public Hearing on the Question of Annexation – Apex Town Council's intent to annex Crescent Apex, LLC (Linden Subdivision) property containing 4.513 acres located at Linden Grove Drive & Olive Chapel Road, Annexation #679 into the Town's corporate limits.

CN4 Dianne Khin, Planning Director

Motion to adopt a Resolution Directing the Town Clerk to Investigate Petition Received, to accept the Certificate of Sufficiency by the Town Clerk, and to adopt a Resolution Setting Date of Public Hearing on the Question of Annexation – Apex Town Council's intent to annex James and Jennifer Davis, Charles Catlette Jr., Martha B. Catlette Revocable Trust and Jennifer Davis (Courtyards on Holt) property containing 26.897 acres located at 0, 1337 and 1345 Holt Road, 305 and 313 Catlette Street, Annexation #680 into the Town's corporate limits.

CN5 Matt Echols, Utilities Engineer

Motion to award a sewer rehabilitation contract to Insituform Technologies, LLC and to authorize the Town Manager to execute the contract on behalf of the town.

CN6 Dennis Brown

Motion to approve and authorize the town manager to execute contract with Construction Manager at Risk, J M Thompson, in amount of $181,710.00 (for the pre-construction fee only) for the new Pleasant Park Project. Guaranteed Maximum Price (GMP) will be developed and added to this contract by an amendment after subcontractor bidding is completed.

CN7 Vance Holloman, Finance Director & Dennis Brown, Construction Project Manager

A motion to approve Capital Project Ordinance Amendment No. 2020-8 and Contract Amendment #1 for the construction of the Apex Senior Center and authorize the Town Manager to execute same.

CN8 Jose Martinez, Public Work & Transportation Director

Motion to purchase the implementation of software in current fiscal year (FY 19/20) and to authorize the Town Manager to execute the contract on behalf of the town.

CN9 Russell H. Dalton, PE, Senior Transportation Engineer

Motion to approve an Ordinance amending Section 20-164 with the addition of subsection (36) to enforce a No Parking restriction along the south side of Olive Street from S Elm Street to S Hughes Street.

CN10 Marty Stone, Assistant Town Manager

Motion to adopt a Resolution to "*Abandon portions of Existing Public Utility Easements*" as shown on its attached plat

CN11 Marty Stone, Assistant Town Manager

Motion to adopt a Resolution authorizing the *"Contract Between the State of North Carolina and the Towns of Apex and Cary for Water Supply storage in B. Everett Jordan Lake"* and authorizing the Town Manager to execute an agreement substantially like the Contract and to provide such notices and take such actions as Contract contemplates.

CN12 Drew Havens, Town Manager

Motion to allow the Apex Farmers' Market to utilize a portion of their Town appropriation in FY 2019-20 for management services.

REGULAR MEETING AGENDA

Mayor Gilbert will call for additional Agenda items from Council or Staff and set the Agenda prior to taking action

PUBLIC FORUM

Public Forum allows the public an opportunity to address the Town Council. The speaker is requested not to address an item that appears as a Public Hearing scheduled on the Regular Agenda. The Mayor will recognize those who would like to speak at the appropriate time. Large groups are asked to select a representative to speak for the entire group. Comments must be limited to 3 minutes to allow others the opportunity to speak.

PUBLIC HEARINGS

PH1 Amanda Morrell, Landscape Architect - Stantec with Shannon Cox, Long Range Planning Manager – Town of Apex

Public Hearing and possible motion regarding adoption of the Downtown Plan.

PH2 Lauren Staudenmaier, Planner I

Public Hearing and possible motion on Rezoning Application #19CZ20 2708 Blazing Trail Drive. The applicant, Jones & Cnossen Engineering, PLLC., seeks to rezone approximately 2.00 acres located at 2708 Blazing Trail Drive from Rural Residential (RR) to Medium Density-Conditional Zoning (MD-CZ).

PH3 Liz Loftin, Senior Planner

Public Hearing and possible motion to remove the Historic Landmark status for the property located at 4525 Green Level West Road in compliance with North Carolina General Statute 160A-400.4 through 160A-400.15.

PH4 Liz Loftin, Senior Planner

Public Hearing and possible motion to designate the property located at 2708 Olive Chapel Road a Historic Landmark in compliance with North Carolina General Statute 160A-400.4 through 160A-400.15.

PH5 Shelly Mayo, Planner II

Public hearing and possible motion to approve and adopt by resolution the *2020-2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan.*

PH6 Dianne Khin, Planning Director

Public Hearing and possible motion to adopt an Ordinance on the Question of Annexation – Apex Town Council's intent to annex Tim and Lauren Medlin property containing 1.929 acres located at 6517 Roosondall Court, Annexation #681 into the Town's corporate limits.

PH7 Shawn Purvis, Assistant Town Manager

Public Hearing to receive citizen input regarding the formulation of the Fiscal Year 2020-2021 Annual Budget.

OLD BUSINESS

UNFINISHED BUSINESS

NEW BUSINESS

CLOSED SESSION

WORK SESSION

ADJOURNMENT

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: PRESENTATION

Meeting Date: December 17, 2019

Item Details

Presenter(s): Keith McGee

Department(s): Fire

Requested Motion

Introduction of Assistant Fire Chief Jeff Harrison to Town Council.

Approval Recommended?

N/A

Item Details

Formally introduce Assistant Chief Jeff Harrison to Town Council.

Attachments

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for consideration by the Apex Town Council

Item Type: PRESENTATION

Meeting Date: December 17, 2019

Item Details

Presenter(s): Mayor Jacques K. Gilbert

Department(s): Governing Body

Requested Motion

Presentation to the Apex Cougars Pop Warner PeeWee football 2019 team.

Approval Recommended?

Yes

Item Details

Apex Cougars Pop Warner PeeWee football team repeated as the CFF Conference Champion on October 26, 2019 and the Mid-South Regional Champion on November 30, 2019; making them the best PeeWee football team in North Carolina, South Carolina, and Virginia. This team is special in the sense that it only returned one player from last year and was able to be back to back champions.

This effort and team unity represented our community well. Therefore, all members should be recognized. The team is coached by Clint Rogers, a native of Apex who volunteers a lot of his time to provide mentorship to many of our youth in the community through recreational football.

Attachments

- Letter to Cougars Team

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for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Donna Hosch, Town Clerk

Department(s): Administration

Requested Motion

Motion to approve Minutes of the December 3, 2019 Organizational Meeting of the Apex Town Council

Approval Recommended?

Yes

Item Details

N/A

Attachments

- Minutes of the December 3, 2019 Organizational Meeting

Apex Town Council Meeting

Tuesday, December 03, 2019

Lance Olive, Mayor
Jacques K. Gilbert, Mayor Elect
Nicole L. Dozier, Mayor Pro Tempore
William S. Jensen, Wesley M. Moyer, Audra M. Killingsworth, and Brett D. Gantt, Council Members
Cheryl F. Stallings and Terry Mahaffey, Council Members Elect
Drew Havens, Town Manager
Shawn Purvis, Assistant Town Manager
Marty Stone, Assistant Town Manager
Donna B. Hosch, MMC, NCCMC, Town Clerk
Laurie L. Hohe, Town Attorney

The Regular Meeting of the Apex Town Council scheduled for Tuesday, December 03, 2019, at 7:00 PM was held in the Council Chamber of Apex Town Hall, 73 Hunter Street

In attendance were Mayor Lance Olive, Mayor Pro Tem Nicole L. Dozier, and Council Members William S. Jensen, Wesley M. Moyer, Audra M. Killingsworth and Brett D. Gantt
Also in attendance were Town Manager Drew Havens, Assistant Town Manager Marty Stone, Town Clerk Donna B. Hosch, and Town Attorney Laurie L. Hohe
Additionally in attendance were Jacques K. Gilbert, Mayor Elect, and Cheryl F. Stallings, Council Member Elect and Terry Mahaffey, Council Member Elect

COMMENCEMENT

Mayor Olive called the meeting to order, Dr. Zeb Cook, Pastor of Apex Baptist Church gave the Invocation, and Mayor Olive led the Pledge of Allegiance.

Mayor Olive recognized the following attendees: Greg Ford, Chairman, Wake County Board of Commissioners; TJ Cawley, Mayor, Morrisville; Vickie Adamson, Vice Chair, Wake County Board of Commissioners; Julie Von Haefen, NC House of Representatives; Bill Sutton, former Apex Mayor, Town Manager, and Council Member; Denise Wilkie, former Apex Council Member; and Bruce Radford, former Apex Town Manager.

PRESENTATIONS

Mayor Olive called forward the dais Savannah Morel and her parents, Jim and Sarah. Mayor Olive read a letter of honor to Ms. Morel who saved a three year old todder from drowning. This is the kind of thing

we should strive to, stated Mayor Olive. We should look at our fellow human beings with compassion no matter what. Sometimes the truth comes from a child.

Mark Blatchford, graduate of the 2019 Apex Peak Academy, addressed Council. He spoke about the in-depth, exciting, and fun look at the inner workings of the Town of Apex, this being much more than a 30,000 foot view. He overviewed what they experienced in each of the sessions. There were three chief takeaways for them: how incredibly how complex it is to run a town like this, the people they met who are all dedicated to making this town run, and the tax dollars are being carefully managed and well invested.

On behalf of the graduating class, Mr. Blatchford read and presented Mayor Olive with a plaque of appreciation. He stated he hoped that this program would continue.

CONSENT AGENDA

CN1 Dianne Khin, Planning Director

Resolution Directing the Town Clerk to Investigate Petition Received, Certificate of Sufficiency by the Town Clerk, and Resolution Setting Date of Public Hearing on the Question of Annexation – Apex Town Council's intent to annex Tim and Lauren Medlin property containing 1.929 acres located at 6517 Roosondall Court, Annexation #681 into the Town's corporate limits.

CN2 Sarah Rayfield, Senior Planner

Statement of the Town Council for Rezoning Case #19CZ02, Morris Acres PUD, Kaplan Residential/Edith S. Morris/ Jason Barron, Morningstar Law Group petitioners for the property located at 0, 7208 and 7208B Morris Acres Road.

CN3 Liz Loftin, Senior Planner

Statement of the Town Council and Ordinance for Rezoning Case #19CZ18, Maureen Hughes, petitioner, for the property located on 113 West Street.

CN4 Amanda Bunce, Current Planning Manager

Statement of the Town Council for Rezoning Case #19CZ19, Michael Pfeifer & Jennifer Crank, petitioners for the properties located at 3605 & 3700 Old US 1 Hwy.

CN5 Amanda Bunce, Current Planning Manager

Statement of the Apex Town Council pursuant to G.S. 160A-383 addressing action on the various Unified Development Ordinance (UDO) Amendments of November 17, 2019.

CN6 Lauren Staudenmaier, Planner I

Set Public Hearing for the December 17, 2019 Town Council Meeting regarding Rezoning Application #19CZ20 2708 Blazing Trail Drive. The applicant, Jones & Cnossen Engineering, PLLC., seeks to rezone approximately 2.00 acres located at 2708 Blazing Trail Drive from Rural Residential (RR) to Medium Density-Conditional Zoning (MD-CZ).

CN7 Liz Loftin, Senior Planner

Set the Public Hearing on December 17, 2019 to designate the property located at 2708 Olive Chapel Road a Historic Landmark in compliance with North Carolina General Statute 160A-400.4

CN8 Liz Loftin, Senior Planner

Set the Public Hearing on December 17, 2019 to de-landmark the property located at 4525 Green Level West Road a Historic Landmark in compliance with North Carolina General Statute 160A-400.4

CN9 Joanna Helms, Economic Development Director

Budget amendment for Economic Development for economic development incentive payment

CN10 Angela Reincke, Parks and Greenways Planner

Construction contract in the amount of $303,415.82 with Bridge Point Civil, LLC for construction of a portion of Phase II of the Middle Creek Greenway from Reunion Pointe to Straywhite Avenue in Miramonte and to authorize the Town Manager to execute all necessary documents for the project.

CN11 John M. Brown, Director Parks Recreation and Cultural Resources

Property deed restrictions for Salem Pond Park and authorize Town Manager to sign any associated documents to complete the transaction

CN12 Laurie Hohe

Settlement agreement and release between the Town of Apex and MREC KLP STILLWATER, LLC related to a dispute concerning reimbursement for the cost of construction of a multi-use path as part of the Stillwater development and authorize the Town Manager to execute same and approve Budget Ordinance Amendment No. 7 appropriating funds for the settlement.

CN13 Donna Hosch, Town Clerk

Minutes of the November 19, 2019 Regular Meeting and Closed Session Minutes of June 18, July 16, August 6, August 20, September 3, September 17, October 1, October 15, November 6, and November 19, 2019 (Closed Session Minutes recorded separately)

CN14 Marty Stone, P.E., Assistant Town Manager

Master Services Agreement, valid through June 30, 2022, with Ellington Contractors, Inc. and authorization for the Town Manager to execute same for pumping, hauling, pipe cleaning, and video inspection services on an as needed basis.

CN15 Shawn Purvis, Assistant Town Manager

Set a Public Hearing for Tuesday, December 17, 2019 at 7:00 pm to receive citizen input regarding the formulation of the Fiscal Year 2020-2021 Annual Budget.

Mayor Olive called for a motion to approve the Consent Agenda. Council Member Moyer made the motion; Council Member Killingsworth seconded the motion. The motion carried by a 5-0 vote.

REGULAR MEETING AGENDA

Mayor Olive called for a motion to approve the Regular Agenda. Council Member Dozier made the motion; Council Member Gantt seconded the motion. The motion carried by a 5-0 vote.

PUBLIC FORUM

Kimberly Pierson spoke about Buckhorn Preserve. She addressed Council earlier about the electric operations center which will be built in the area. She was wondering what neighbor concerns had been mitigated. She continued to be concerned about the safety in the area.

PUBLIC HEARINGS

There were no Pubic Hearings.

OLD BUSINESS

There were no Old Business items.

UNFINISHED BUSINESS

There were no Unfinished Busness items.

CLOSED SESSION

There were no Closed Session items.

WORK SESSION

There were no Work Session items.

NEW BUSINESS

NB1 Recognition of Outgoing Council Members

Lance Olive, William S. Jensen, and Wesley M. Moyer will be recognized for their service with the Town

Mayor Olive expressed appreciation to Council Member Moyer for his four years of service and presented him with a plaque. Council Member Moyer stated it was his pleasure to serve and he thanked the citizens of Apex for the opportunity. Council Member Moyer retired his seat.

Mayor Olive expressed apprecation to Council Member Jensen for his twenty years of service and presented him with a plaque. Council Member Jensen stated that Mayor Olive had done an outstanding job and had been extremely fair with this committee and board appointments. He stated his appreciation to the Town Manager, adding that he is an honorable man. Town staff is outstanding, and everyone here should be proud of the work being done. Council Member Jensen retired his seat.

Mayor Pro Tem Dozier expressed words of apprecation to Mayor Olive before reading and presenting him with a plaque which included the gavel he's been using the past four years.

SINE DIE

Mayor Olive adjourned the meeting Sine Die.

ORGANIZATIONAL PROCEEDINGS

After a brief recess, Mayor Pro Tem Dozier reconvened the meeting to begin the Organizational Proceedings.

Administering of Oaths

Jacques K. Gilbert, surrounded by his immediate family, was sworn in as Mayor by Town Clerk Donna B. Hosch. Mayor Gilbert thanked his family, his parents, his siblings including his sister who was watching on livestream, his grandmother, and all those who helped him along the way. He spoke about unity being the driving force of moving Apex forward. He thanked Mayor Olive for carrying the baton well, and he thanked Council for their efforts. Mayor Gilbert encouraged everyone to stay united because we are all in this together.

Mayor Gilbert brought forward Rev. James Taylor, the Pastor of St. Mary AME Church, who has been the Mayor's Pastor for a good part of his life. He also brought forward Senior Pastor Rodney Finch, Sr. of Calvary Chapel Cary who helped shape his life. Each Pastor presented brief comments before covering Mayor Gilbert prior to his taking his seat on the dais.

Mayor Gilbert continued with the ceremonial proceedings.

Cheryl F. Stallings, accompanied by her husband and family members, was sworn in as Council Member by Mayor Pro Tem Nicole L. Dozier. Council Member Stallings stated she was honored, humble, and blessed for being able to serve on the Council. Apex is an amazing town and this is about getting better through a collective effort. She thanked her family for being in attendance. Council Member Stallings recommitted to her campaign promises, and complimented staff for being dedicated and committed. She stated she is not a politician; she is a public servant, and she is here to serve the people. Council Member Stallings took her seat on the dais.

Terry Mahaffey, accompanied by his immediate family, was sworn in as Council Member by Greg Ford, Chair of the Wake County Board of Commissioners. Council Member Mahaffey thanked his family and several individuals who helped him along the way. He thanked staff and expressed his excitement for working with Mayor Gilbert and the rest of Council.

Selection of Mayor Pro Tempore

Mayor Gilbert stated the duties of Mayor Pro Tempore according to Town Ordinances. Mayor Gilbert called for a nomination.

Council member Killingsworth nominated and made the motion to appoint Council Member Dozier as Mayor Pro Tem; Council Member Stallings seconded the motion.

Council Member Killingsworth spoke about Council Member Dozier's six year tenure on the Council. She presented some of her accomplishments: Council Member Dozier created Think Apex; she is the founder of the Environmental Committee; as chair of the Personnel Committee, she introduced paid family leave and expanded the definition of family under FMLA for Town Employees. She has worked towards a more diverse and equitable environment for Town employees.

Council Member Dozier accepted the nomination. She thanked Council for their support and stated she is proud to serve Apex.

The motion carried by a 5-0 vote.

With Mayor Gilbert by her side, Council Member Dozier was sworn in as Mayor Pro Tempore by Town Clerk Donna B. Hosch.

Mayor Gilbert stated Mayor Pro Tem Dozier is vested here, and has done so much for the community. He thanked her for all her work done for the community and for encouraging him.

Appointments of Standing Committees and Liaisons

Mayor Gilbert made the following appointments:

Committees:

Finance – Council Member Killingsworth, Chair; Council Member Stallings
Personnel – Council Member Dozier, Chair; Mayor Gilbert
Planning – Council Member Gantt, Chair; Council Member Mahaffey
Environmental – Council Member Dozier, Chair; Council Member Gantt
Economic Development – Mayor Gilbert, Chair; Council Member Stallings

Liaisons:

Apex Chamber of Commerce – Mayor Gilbert, Primary; Council Member Dozier
Triangle J Council of Governments – Council Member Gantt, Primary; Council Member Killingsworth

Executive Board of CAMPO – Mayor Gilbert, Primary; Council Member Mahaffey

Downtown Business Association – Council Member Mahaffey, Primary; Mayor Gilbert

The Parks, Recreation, and Cultural Rescources Committee and Commission were eliminated.

NEW BUSINESS

NB1 Donna Hosch, Town Clerk

Calendar of Town Council meetings for 2020 and 2021, setting the start time of the meetings, and setting the location of the meeting.

Mayor Gilbert stated the Town Ordinance related to Council meetings. Council Member Mahaffey stated it was clear there needed to be more talk about the meetings. Discussions should be held with staff and discussion should continue in, for example, a workshop.

Council Member Mahaffey made the motion to approve Option A of the calendar for 2020 [for Council to meet the first and third Tuesdays] and Option B for 2021 [for Council to meet the second and fourth Tuesdays].

Council Member Mahaffey presented other changes he wished to be considered and discussed at a later date.

Council Member Killingsworth wished to amend the motion for a start time of 6:00 p.m. and ending time of 10:00 p.m. Council Member Dozier wished to see a hard stop of 10:00 p.m. At 9:30 there could be a temperature check to determine if Council wished to push through. Mayor Gilbert stated he wished input from staff as to the effect of the time changes.

Reiteration of the motion: to approve Option A of the calendar for 2020 for Council [to meet the first and third Tuesdays] and Option B for 2021 [for Council to meet the second and fourth Tuesdays] amended to include a meeting start time of 6:00 p.m. with a hard stop at 10:00 p.m.

Council Member Killingsworth seconded the motion.

Council stated she wished cancellation of the following meetings in order to provide longer breaks for staff: June 16, July 7, and December 15 for 2020. For 2021, June 15, July 6, November 2, and December 21. These could be discussed at a later date in a workshop.

Council stated she wished consideration of the November 3 meeting being cancelled or moved to November 4.

After some discussion about the hard stop time, there was no opposition to reconsidering this if there are late comers who do not have the opportunity to sign up for Public Forum.

The motion carried by a 5-0 vote.

NB2 Audra Killingsworth, Council Member
Discussion regarding Town Council Resolutions

Council stated she'd sent an email regarding resolutions for the coming year. It would be great if most of them were proclamations. Her preference is to have a more thorough discussion at an upcoming workshop to discuss details.

ADJOURNMENT

Mayor Gilbert thanked everyone for coming out to what was a big moment for Council and the Town. With there being no further business and without objection from Council, Mayor Gilbert adjourned the meeting.

_____
Donna B. Hosch, MMC, NCCMC
Town Clerk

ATTEST:

_____
Jacques K. Gilbert, Mayor

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for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Mayor Jacques K. Gilbert

Department(s): Governing Body

Requested Motion

Motion to make appointments to the Planning Board, Board of Adjustment, Environmental Advisory Board, and Bee City Committee.

Approval Recommended?

Yes

Item Details

The following appointments are recommended:

Planning Board

1.	Keith Braswell	01/01/2020 – 12/31/2022	(Bills seat)
2.	Tommy Pate	01/01/2020 – 12/31/2022	(Bedotto seat)
3.	Michael Marks	01/01/2020 – 12/31/2020	Chair
4.	Beth Godfrey	01/01/2020 – 12/31/2020	Vice-Chair

Board of Adjustment

1.	Ross Stocks	01/01/2020 – 12/31/2022	(Smith seat)
2.	Michael Wilson	01/01/2020 – 12/31/2022	(Wilson seat)
3.	Lisa Carley	01/01/2020 – 12/31/2022	(Carley seat)
4.	Bryan D. Johnson	01/01/2020 – 12/31/2020	(Alternate #1; Stocks seat)
5.	Tracy Taylor	01/01/2020 – 12/31/2021	(Alternate #2; Johnson seat)
6.	Umesh Pai	01/01/2020 – 12/31/2022	(Alternate #3; Taylor seat)
7.	Michael Wilson	01/01/2020 – 12/31/2020	Chair
8.	Lisa Carley	01/01/2020 – 12/31/2020	Vice-Chair

Environmental Advisory Board

1.	Ted Williams	01/01/2020 – 12/31/2022
2.	Jessica Wilkerson	01/01/2020 – 12/31/2022
3.	Harold Lagerbach	01/01/2020 – 12/31/2022
4.	John Garrison	01/01/2020 – 12/31/2021
5.	Marilee Szczerbala (ETJ)	01/01/2020 – 12/31/2021
6.	Katie Schaaf	01/01/2020 – 12/31/2021
7.	Mike Rusher	01/01/2020 – 12/31/2020
8.	Laura Duggan	01/01/2020 – 12/31/2020
9.	*Vacant (development comm.)*	01/01/2020 – 12/31/2020

Bee City Committee

1.	Kaitlin Hartman	01/01/2020 – 12/31/2020
2.	Michael Erana	01/01/2020 – 12/31/2020
3.	Heidi Deja	01/01/2020 – 12/31/2020
4.	Guy Loeffler	01/01/2020 – 12/31/2020
5.	Jennifer Springer	01/01/2020 – 12/31/2020

Attachments

- None

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for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Dianne Khin, Planning Director

Department(s): Planning

Requested Motion

Motion to adopt a Resolution Directing the Town Clerk to Investigate Petition Received, to accept the Certificate of Sufficiency by the Town Clerk, and to adopt a Resolution Setting Date of Public Hearing on the Question of Annexation – Apex Town Council's intent to annex Crescent Apex, LLC (Linden Subdivision) property containing 4.513 acres located at Linden Grove Drive & Olive Chapel Road, Annexation #679 into the Town's corporate limits.

Approval Recommended?

Planning Department recommends approval.

Item Details

The Town Clerk certifies to the investigation of said annexation. Adoption of the Resolution authorizes the Town Clerk to advertise said public hearing by electronic means and on the Town of Apex's website. The Public Hearing would be scheduled for the January 7, 2020 Town Council meeting.

Attachments

- Annexation Petition
- Legal Description
- Vicinity Map
- Resolution Directing the Town Clerk to Investigate Petition
- Certificate of Sufficiency by the Town Clerk
- Resolution Setting Date of Public Hearing

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: 679 Submittal Date: 11/8/19

Fee Paid $ 200 Check # 2975

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
2. The area to be annexed is ☒ contiguous, ☐ non-contiguous (satellite) to the Town of Apex, North Carolina and the boundaries are as contained in the metes and bounds description attached hereto.
3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

Crescent Apex LLC	0722602549
Owner Name (Please Print)	Property PIN or Deed Book & Page #
919-247-4970	mbarron@drbgroup.com
Phone	E-mail Address
Owner Name (Please Print)	Property PIN or Deed Book & Page #
Phone	E-mail Address
Owner Name (Please Print)	Property PIN or Deed Book & Page #
Phone	E-mail Address

Surveyor Information

Surveyor: McAdams

Phone: 919-361-5000 Fax:

E-mail Address: yokley@mcadamsco.com

Annexation Summary Chart

Total Acreage to be annexed:	4.513	Reason for annexation: (select one)	
Population of acreage to be annexed:	0	Receive Town Services	X
Existing # of housing units:	10	Other (please specify)	
Zoning District*:	PUD-CZ		

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: 679 Submittal Date: 11/8/19

COMPLETE IF IN A LIMITED LIABILITY COMPANY

In witness whereof, CRESCENT APEX, LLC a limited liability company, caused this instrument to be executed in its name by a member/manager pursuant to authority duly given, this the 5th day of November, 2019.

Name of Limited Liability Company CRESCENT APEX, LLC

By: _____
Signature of Member/Manager

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Amanda L Martinez a Notary Public for the above State and County, this the 5th day of, November, 2019.

Amanda L Martinez
Notary Public

SEAL

AMANDA L MARTINEZ
Notary Public, North Carolina
Wake County
My Commission Expires
August 13, 2024

My Commission Expires: 8-13-24

COMPLETE IF IN A PARTNERSHIP

In witness whereof, _____, a partnership, caused this instrument to be executed in its name by a member/manager pursuant to authority duly given, this the _____ day of _____, 20_____.

Name of Partnership _____

By: _____
Signature of General Partner

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____ day of _____, 20____.

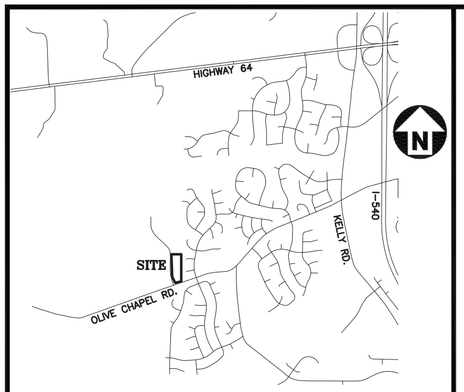
_____
Notary Public

SEAL

My Commission Expires: _____

0 LINDEN GROVE LANE ANNEXATION

BEGINNING AT AN EXISTING IRON PIPE, SAID IRON PIPE BEING THE NORTH EASTERN MOST CORNER OF 0 LINDEN GROVE LANE; THENCE SOUTH 00°14'03" WEST, 761.18 FEET TO AN EXISTING IRON PIPE; THENCE SOUTH 79°17'16" WEST, 115.98 FEET TO AN EXISTING IRON PIPE; THENCE SOUTH 70°49'15" WEST, 34.84 FEET TO AN EXISTING IRON PIPE; THENCE WITH A CURVE TO THE RIGHT WITH AN ARC LENGTH OF 37.09 FEET, WITH A RADIUS OF 25.00 FEET, WITH A CHORD BEARING OF NORTH 66°40'45" WEST, WITH A CHORD LENGTH OF 33.78 FEET TO AN EXISTING IRON PIPE; THENCE NORTH 24°10'45" WEST, 100.75 FEET TO AN EXISTING IRON PIPE; THENCE WITH A CURVE TO THE RIGHT WITH AN ARC LENGTH OF 142.05 FEET, WITH A RADIUS OF 370.00 FEET, WITH A CHORD BEARING OF NORTH 13°10'50" WEST, WITH A CHORD LENGTH OF 141.18 FEET TO AN EXISTING IRON PIPE; THENCE NORTH 02°10'55" WEST, 553.08 FEET TO AN EXISTING IRON PIPE; THENCE SOUTH 89°44'26" EAST, 275.51 FEET TO THE POINT AND PLACE OF BEGINNING CONTAINING 4.513 ACRES, 196573 SQUARE FEET.



VACINITY MAP
NOT TO SCALE

GENERAL NOTES

1. THIS IS A SURVEY OF AN EXISTING PARCEL(S) OF LAND. THIS IS AN ANNEXATION PLAT.
2. BEARINGS FOR THIS SURVEY ARE BASED ON NAD 83 (2011).
3. ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES.
4. ZONING: PUD-CZ
5. AREA BY COORDINATE GEOMETRY.
6. FLOOD NOTE: THIS PROPERTY IS NOT LOCATED IN A SPECIAL FLOOD HAZARD ZONE. IT IS LOCATED IN ZONE "X" AS DEFINED BY F.E.M.A F.I.R.M MAP NUMBER #3720072200J DATED MAY 2, 2006.
7. UTILITY STATEMENT
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8. NO GRID MONUMENTS FOUND WITHIN 2000' OF SITE.

LEGEND(UNLESSS OTHERWISE NOTED)

⊙	EXISTING IRON PIPE
— — — —	ADJOINER
———	BOUNDARY
	PUBLIC STORM DRAINAGE EASEMENT
	WETLAND AREA
——— — — ———	RIGHT OF WAY
——— TCE ——— TCE ———	TEMPORARY CONSTRUCTION EASEMENT
— — — — — —	UTILITY EASEMENT
	ANNEXATION

TYPE OF PLAT

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_____
PROFESSIONAL LAND SURVEYOR

SURVEYOR'S CERTIFICATE

I, JAMES S. ARMSTRONG, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (DEED DESCRIPTION RECORDED IN BOOK ____, PAGE ____); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND IN BOOK ____, PAGE ____ ; THAT THE RATIO OF PRECISION OR POSITIONAL ACCURACY AS CALCULATED IS _____+; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER AND SEAL THIS _____ DAY OF _____, A.D., _____.

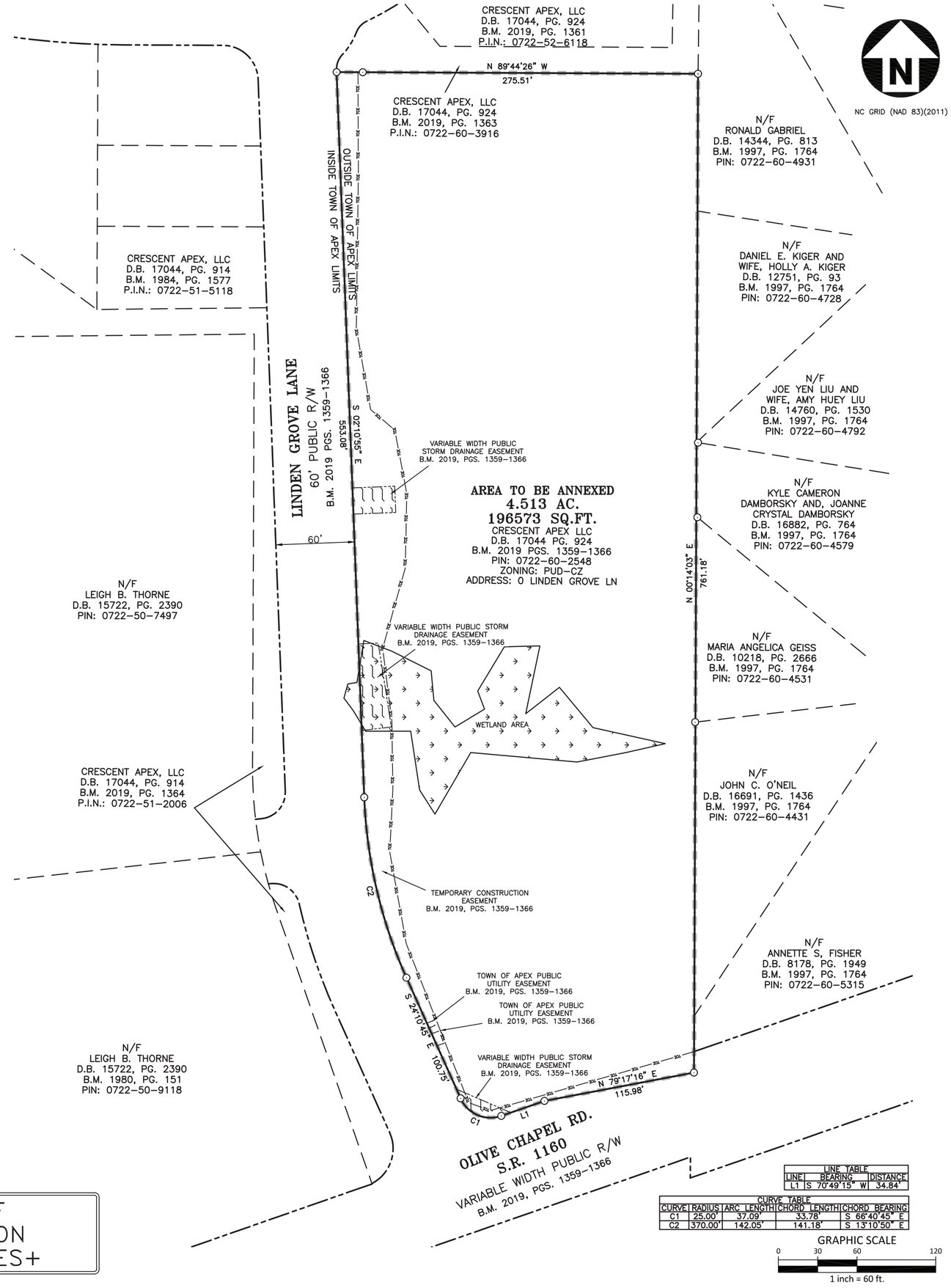
_____
JAMES S. ARMSTRONG, PROFESSIONAL LAND SURVEYOR L-4411

CERTIFICATE OF ANNEXATION

ANNEXATION # _____.
I, DONNA B. HOSCH, MMC, NCCMC, TOWN CLERK, APEX, NORTH CAROLINA CERTIFY THIS A TRUE AND EXACT MAP OF ANNEXATION ADOPTED THE _____ DAY OF _____, 20____, BY THE TOWN COUNCIL. I SET MY HAND AND SEAL OF THE TOWN OF APEX,
_____.
DAY/MONTH/YEAR

_____
DONNA B. HOSCH, MMC, NCCMC, TOWN CLERK

AREA OF ANNEXATION
4.513 ACRES+



LINE TABLE		
LINE	BEARING	DISTANCE
L1	S 70°49'15" W	34.84'

CURVE TABLE				
CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING
C1	25.00'	37.09'	33.78'	S 66°40'45" E
C2	370.00'	142.05'	141.18'	S 13°10'50" E

GRAPHIC SCALE
0 30 60 120
1 inch = 60 ft.

McADAMS
The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

CRESCENT APEX, LLC
227 WEST TRADE STREET
SUITE 1000
CHARLOTTE, NC 28202

LINDEN
CONTIGUOUS ANNEXATION
0 LINDEN GROVE LANE
APEX, NC, 27502

NORTH CAROLINA PROFESSIONAL SEAL L-4411 LAND SURVEYOR JAMES S. ARMSTRONG

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	DRB-19010
FILENAME	DRB-19010-A1
CHECKED BY	JSA
DRAWN BY	CBF
SCALE	1"=60'
DATE	10. 16. 2019

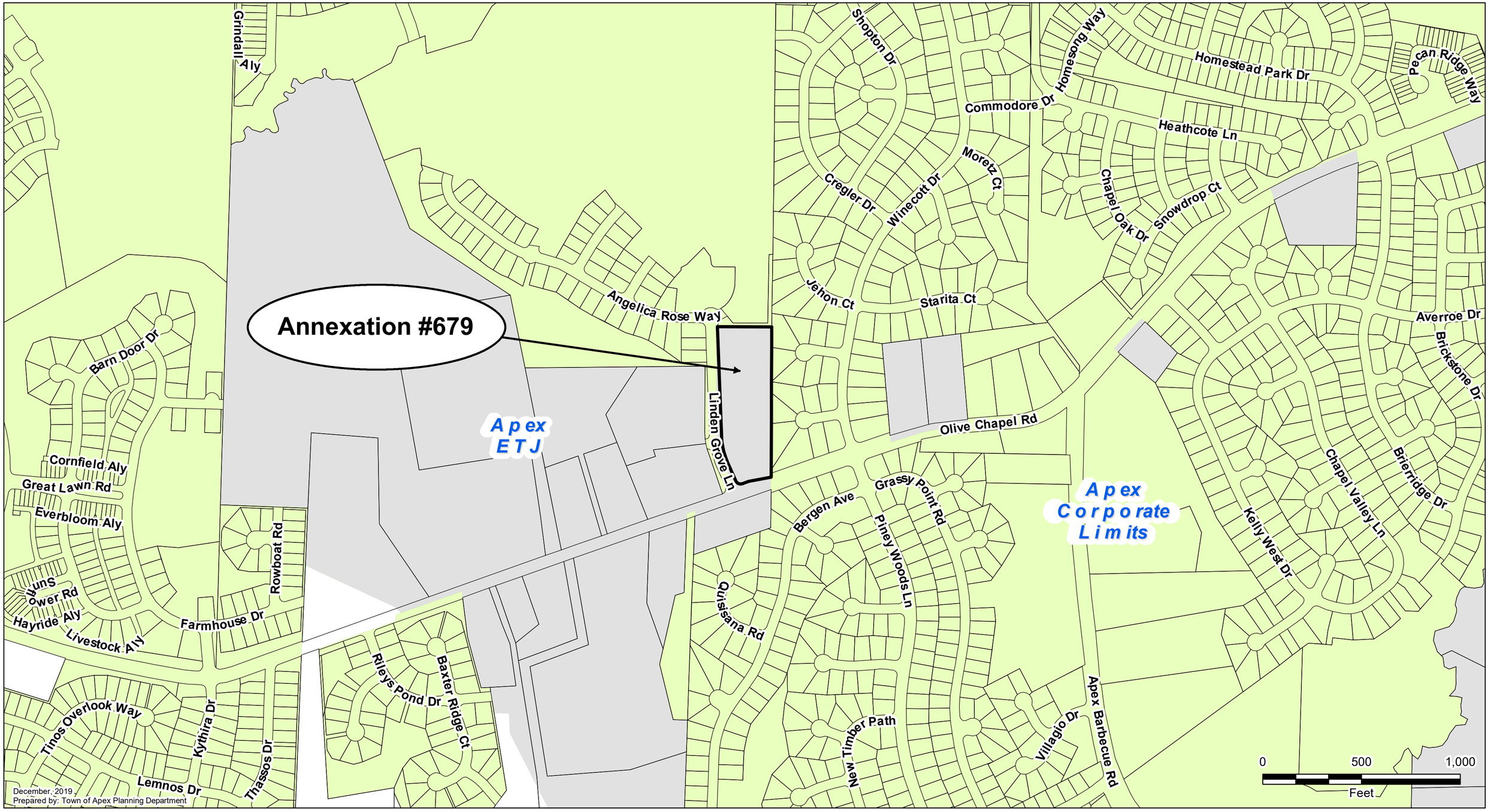
SHEET

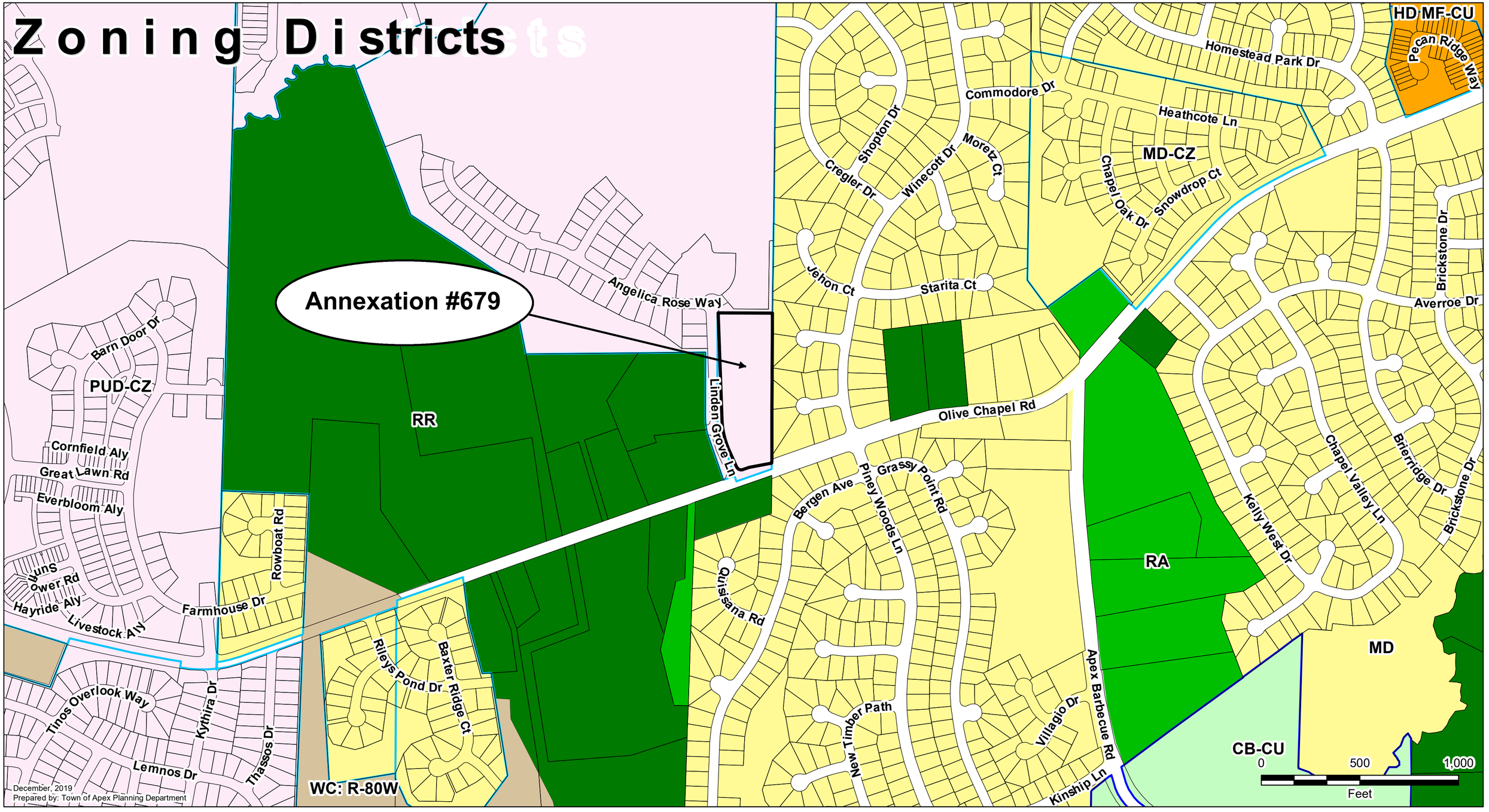
SHEET TITLE

1-1

X:\Projects\DRB\DRB-19010\Geomatics\Survey\Plats\DRB19010-A1.dwg, 10/30/2019 11:22:20 AM, Mersinger, Timothy


Annexation #679
PRICEWOOD LN
Linden
JEHON CT
STARITA CT
Woodridge
SIMCA CT
WINECOTT DR
Lucas Farms
TAMORA CT
OLIVE CHAPEL RD
GRASSY POINT RD
ATKINSON CT
BERGEN AVE
PINEY WOODS LN
Hollands Crossing
ALICE CT
Holland Cove
December, 2019
November 2019 Aerial Photography
Prepared by: Town of Apex Planning Department
0
250
500
Feet


Annexation #679
Apex ETJ
Apex Corporate Limits
Grindall Aly
Shopton Dr
Homesong Way
Homestead Park Dr
Pecan Ridge Way
Commodore Dr
Heathcote Ln
Moretz Ct
Cregler Dr
Winecott Dr
Chapel Oak Dr
Snowdrop Ct
Angelica Rose Way
Jehon Ct
Starita Ct
Averroe Dr
Brickstone Dr
Barn Door Dr
Linden Grove Ln
Olive Chapel Rd
Cornfield Aly
Great Lawn Rd
Everbloom Aly
Bergen Ave
Grassy Point Rd
Piney Woods Ln
Chapel Valley Ln
Briermidge Dr
Kelly West Dr
Rowboat Rd
Sunflower Rd
Hayride Aly
Livestock Aly
Farmhouse Dr
Quisisana Rd
Riley's Pond Dr
Baxter Ridge Ct
Tinos Overlook Way
Kythira Dr
Thassos Dr
Lemnos Dr
New Timber Path
Villagio Dr
Apex Barbecue Rd
0
500
1,000
Feet
December, 2019
Prepared by: Town of Apex Planning Department


Zoning Districts
Annexation #679
HD MF-CU
Pecan Ridge Way
Homestead Park Dr
Commodore Dr
Heathcote Ln
MD-CZ
Shopton Dr
Cregler Dr
Winecott Dr
Moretz Ct
Chapel Oak Dr
Snowdrop Ct
Brickstone Dr
Averroe Dr
Jehon Ct
Starita Ct
Angelica Rose Way
Barn Door Dr
PUD-CZ
RR
Linden Grove Ln
Olive Chapel Rd
Cornfield Aly
Great Lawn Rd
Everbloom Aly
Rowboat Rd
Sunset Ower Rd
Hayride Aly
Livestock Aly
Farmhouse Dr
Bergen Ave
Piney Woods Ln
Grassy Point Rd
Quisisana Rd
Chapel Valley Ln
Brierridge Dr
Brickstone Dr
Kelly West Dr
RA
MD
Apex Barbecue Rd
Villagio Dr
New Timber Path
Kinship Ln
CB-CU
Tinos Overlook Way
Kythira Dr
Thassos Dr
Lemnos Dr
Riley's Pond Dr
Baxter Ridge Ct
WC: R-80W
0
500
1,000
Feet
December, 2019
Prepared by: Town of Apex Planning Department

RESOLUTION DIRECTING THE TOWN CLERK
TO INVESTIGATE PETITION RECEIVED UNDER G.S.§ 160A-31

Annexation Petition #679
Linden MSP

WHEREAS, G.S. §160-A 31 provides that the sufficiency of the petition shall be investigated by the Town Clerk before further annexation proceedings may take place; and

WHEREAS, the Town Council of the Town of Apex deems it advisable to proceed in response to this request for annexation;

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Apex, that the Town Clerk is hereby directed to investigate the sufficiency of the above-described petition and to certify to the Town Council the result of her investigation.

This the 17th day of December 2019.

_____
Jacques K. Gilbert
Mayor

ATTEST:

_____
Donna B. Hosch, MMC, NCCMC
Town Clerk

CERTIFICATE OF SUFFICIENCY BY THE TOWN CLERK

Annexation Petition #679
Linden MSP

To: The Town Council of the Town of Apex, North Carolina

I, Donna B. Hosch, Town Clerk, do hereby certify that I have investigated the annexation petition attached hereto, and have found, as a fact, that said petition is signed by all owners of real property lying in the area described therein, in accordance with G.S.§ 160A-31, as amended.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Town of Apex, North Carolina this 17th day of December 2019.

_____
Donna B. Hosch, MMC, NCCMC
Town Clerk

(Seal)

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: 679 Submittal Date: 11/8/19

Fee Paid $ 200 Check # 2975

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
2. The area to be annexed is ☒ contiguous, ☐ non-contiguous (satellite) to the Town of Apex, North Carolina and the boundaries are as contained in the metes and bounds description attached hereto.
3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

Crescent Apex LLC	0722602549
Owner Name (Please Print)	Property PIN or Deed Book & Page #
919-247-4970	mbarron@drbgroup.com
Phone	E-mail Address
Owner Name (Please Print)	Property PIN or Deed Book & Page #
Phone	E-mail Address
Owner Name (Please Print)	Property PIN or Deed Book & Page #
Phone	E-mail Address

Surveyor Information

Surveyor: McAdams

Phone: 919-361-5000 Fax:

E-mail Address: yokley@mcadamsco.com

Annexation Summary Chart

Total Acreage to be annexed:	4.513	Reason for annexation: (select one)	
Population of acreage to be annexed:	0	Receive Town Services	X
Existing # of housing units:	10	Other (please specify)	
Zoning District*:	PUD-CZ		

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: 679 Submittal Date: 11/8/19

COMPLETE IF IN A LIMITED LIABILITY COMPANY

In witness whereof, CRESCENT APEX, LLC a limited liability company, caused this instrument to be executed in its name by a member/manager pursuant to authority duly given, this the 5th day of November, 2019.

Name of Limited Liability Company CRESCENT APEX, LLC

By: _____
Signature of Member/Manager

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Amanda L Martinez a Notary Public for the above State and County, this the 5th day of, November, 2019.

Amanda L Martinez
Notary Public

SEAL

AMANDA L MARTINEZ
Notary Public, North Carolina
Wake County
My Commission Expires
August 13, 2024

My Commission Expires: 8-13-24

COMPLETE IF IN A PARTNERSHIP

In witness whereof, _____, a partnership, caused this instrument to be executed in its name by a member/manager pursuant to authority duly given, this the _____ day of _____, 20_____.

Name of Partnership _____

By: _____
Signature of General Partner

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____ day of _____, 20____.

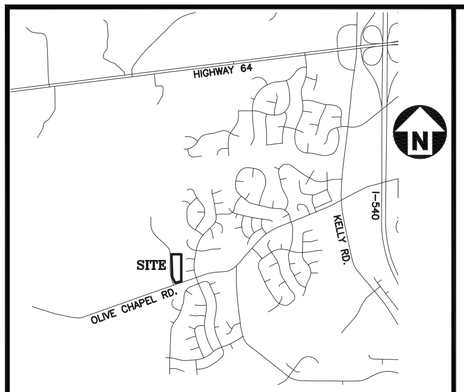
_____
Notary Public

SEAL

My Commission Expires: _____

0 LINDEN GROVE LANE ANNEXATION

BEGINNING AT AN EXISTING IRON PIPE, SAID IRON PIPE BEING THE NORTH EASTERN MOST CORNER OF 0 LINDEN GROVE LANE; THENCE SOUTH 00°14'03" WEST, 761.18 FEET TO AN EXISTING IRON PIPE; THENCE SOUTH 79°17'16" WEST, 115.98 FEET TO AN EXISTING IRON PIPE; THENCE SOUTH 70°49'15" WEST, 34.84 FEET TO AN EXISTING IRON PIPE; THENCE WITH A CURVE TO THE RIGHT WITH AN ARC LENGTH OF 37.09 FEET, WITH A RADIUS OF 25.00 FEET, WITH A CHORD BEARING OF NORTH 66°40'45" WEST, WITH A CHORD LENGTH OF 33.78 FEET TO AN EXISTING IRON PIPE; THENCE NORTH 24°10'45" WEST, 100.75 FEET TO AN EXISTING IRON PIPE; THENCE WITH A CURVE TO THE RIGHT WITH AN ARC LENGTH OF 142.05 FEET, WITH A RADIUS OF 370.00 FEET, WITH A CHORD BEARING OF NORTH 13°10'50" WEST, WITH A CHORD LENGTH OF 141.18 FEET TO AN EXISTING IRON PIPE; THENCE NORTH 02°10'55" WEST, 553.08 FEET TO AN EXISTING IRON PIPE; THENCE SOUTH 89°44'26" EAST, 275.51 FEET TO THE POINT AND PLACE OF BEGINNING CONTAINING 4.513 ACRES, 196573 SQUARE FEET.



VACINITY MAP
NOT TO SCALE

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———	BOUNDARY
	PUBLIC STORM DRAINAGE EASEMENT
	WETLAND AREA
——— — — ———	RIGHT OF WAY
——— TCE ——— TCE ———	TEMPORARY CONSTRUCTION EASEMENT
— — — — — —	UTILITY EASEMENT
	ANNEXATION

TYPE OF PLAT

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_____
PROFESSIONAL LAND SURVEYOR

SURVEYOR'S CERTIFICATE

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_____
JAMES S. ARMSTRONG, PROFESSIONAL LAND SURVEYOR L-4411

CERTIFICATE OF ANNEXATION

ANNEXATION # _____.
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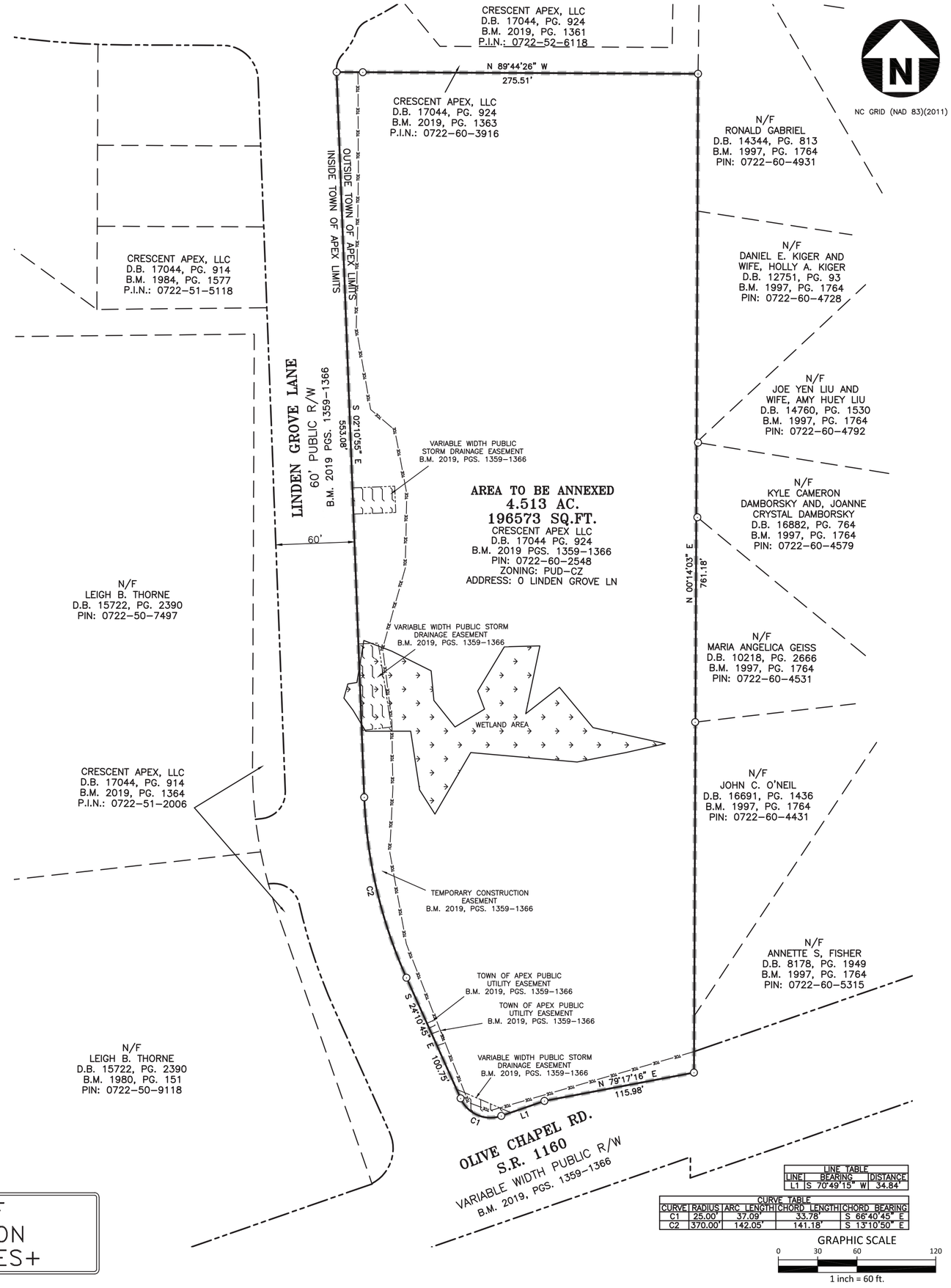
_____.
DAY/MONTH/YEAR

_____
DONNA B. HOSCH, MMC, NCCMC, TOWN CLERK

AREA OF ANNEXATION
4.513 ACRES+



LINE TABLE		
LINE	BEARING	DISTANCE
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GRAPHIC SCALE
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1 inch = 60 ft.

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phone 919. 361. 5000
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license number: C-0293, C-187

www.mcadamsco.com

CLIENT

CRESCENT APEX, LLC
227 WEST TRADE STREET
SUITE 1000
CHARLOTTE, NC 28202

LINDEN
CONTIGUOUS ANNEXATION
0 LINDEN GROVE LANE
APEX, NC, 27502

NORTH CAROLINA PROFESSIONAL SEAL L-4411 LAND SURVEYOR JAMES S. ARMSTRONG

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	DRB-19010
FILENAME	DRB-19010-A1
CHECKED BY	JSA
DRAWN BY	CBF
SCALE	1"=60'
DATE	10. 16. 2019

SHEET

SHEET TITLE

1-1

X:\Projects\DRB\DRB-19010\Geomatics\Survey\Plats\DRB19010-A1.dwg, 10/30/2019 11:22:20 AM, Mersinger, Timothy

Home

Wake County Real Estate Data
Account Summary

iMaps
Tax Bills

Account Search
Go!

Real Estate ID **0469005** PIN # **0722602548**

Location Address
0 LINDEN GROVE LN

Property Description
LINDEN UNNUMBERED LOT PH1 BM2019-01362

Pin/Parcel History Search Results New Search

Account | Buildings | Land | Deeds | Notes | Sales | Photos | Tax Bill | Map

Property Owner	Owner's Mailing Address	Property Location Address
CRESCENT APEX LLC (Use the Deeds link to view any additional owners)	**227 W TRADE ST STE 1000** **CHARLOTTE NC 28202-1664**	**0 LINDEN GROVE LN** **APEX NC -**

Administrative Data		**Transfer Information**		**Assessed Value**	
Old Map #	**620--**				
Map/Scale	**0722 04**	Deed Date	**2/14/2018**	Land Value Assessed	**$84,000**
VCS	**20AP167**	Book & Page	**17044 0924**	Bldg. Value Assessed	
City	**APEX**	Revenue Stamps			
Fire District		Pkg Sale Date			
Township	**WHITE OAK**	Pkg Sale Price		Tax Relief	
Land Class	**VACANT**	Land Sale Date			
ETJ	**AP**	Land Sale Price		Land Use Value	
Spec Dist(s)				Use Value Deferment	
Zoning	**RR**	**Improvement Summary**		Historic Deferment	
History ID 1				Total Deferred Value	
History ID 2		Total Units	**0**		
Acreage	**4.51**	Recycle Units	**0**		
Permit Date		Apt/SC Sqft		Use/Hist/Tax Relief	
Permit #		Heated Area		Assessed	
				Total Value Assessed*	**$84,000**

*Wake County assessed building and land values reflect the market value as of January 1, 2016, which is the date of the last county-wide revaluation. Any inflation, deflation or other economic changes occurring after this date does not affect the assessed value of the property and cannot be lawfully considered when reviewing the value for adjustment.

The January 1, 2016 values will remain in effect until the next county-wide revaluation. Until that time, any real estate accounts created or new construction built is assessed according to the 2016 Schedule of Values.

For questions regarding the information displayed on this site, please contact the Department of Tax Administration at Taxhelp@wakegov.com or call 919-856-5400.

RESOLUTION SETTING DATE OF PUBLIC HEARING
ON THE QUESTION OF ANNEXATION PURSUANT TO G.S.§ 160A-31 AS AMENDED

Annexation Petition #679
Linden MSP

WHEREAS, a petition requesting annexation of the area described herein has been received; and

WHEREAS, the Town Council of Apex, North Carolina has by Resolution directed the Town Clerk to investigate the sufficiency thereof; and

WHEREAS, Certification by the Town Clerk as to the sufficiency of said petition has been made;

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Apex, North Carolina that:

Section 1. A public hearing on the question of annexation of the area described herein will be held at the Apex Town Hall at 6:00 o'clock p.m. on the 7th day of January 2020.

Section 2. The area proposed for annexation is described as attached.

Section 3. Notice of said public hearing shall be published on the Town of Apex Website, www.apexnc.org, Public Notice, at least ten (10) days prior to the date of said public hearing.

This the 17th day of December 2019.

_____
Jacques K. Gilbert, Mayor

ATTEST:

_____
Donna B. Hosch, MMC, NCCMC, Town Clerk

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Dianne Khin, Planning Director

Department(s): Planning

Requested Motion

Motion to adopt a Resolution Directing the Town Clerk to Investigate Petition Received, to accept the Certificate of Sufficiency by the Town Clerk, and to adopt a Resolution Setting Date of Public Hearing on the Question of Annexation – Apex Town Council's intent to annex James and Jennifer Davis, Charles Catlette Jr., Martha B. Catlette Revocable Trust and Jennifer Davis (Courtyards on Holt) property containing 26.897 acres located at 0, 1337 and 1345 Holt Road, 305 and 313 Catlette Street, Annexation #680 into the Town's corporate limits.

Approval Recommended?

Planning Department recommends approval.

Item Details

The Town Clerk certifies to the investigation of said annexation. Adoption of the Resolution authorizes the Town Clerk to advertise said public hearing by electronic means and on the Town of Apex's website. The Public Hearing would be scheduled for the January 7, 2020 Town Council meeting.

Attachments

- Annexation Petition
- Legal Description
- Vicinity Map
- Resolution Directing the Town Clerk to Investigate Petition
- Certificate of Sufficiency by the Town Clerk
- Resolution Setting Date of Public Hearing

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: 680 Submittal Date: 11/1/19

Fee Paid $ 200 Check # 3425

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
2. The area to be annexed is ■ contiguous, ☐ non-contiguous (satellite) to the Town of Apex, North Carolina and the boundaries are as contained in the metes and bounds description attached hereto.
3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

Owner Name (Please Print) | Property PIN or Deed Book & Page #

Phone | E-mail Address

James & Jennifer Davis | 0743-22-9676 (1.730 acres)

Owner Name (Please Print) | Property PIN or Deed Book & Page #

Phone | E-mail Address

Owner Name (Please Print) | Property PIN or Deed Book & Page #

Phone | E-mail Address

Surveyor Information

Surveyor: Advanced Civil Design - James Whitacre, PLS

Phone: (919) 481-6290 Fax: (919) 336-5127

E-mail Address: jwhitacre@advancedcivildesign.com

Annexation Summary Chart

Total Acreage to be annexed: _____

Population of acreage to be annexed: 1

Existing # of housing units: 4

Zoning District*: PUD-CZ

Reason for annexation: (select one)

Receive Town Services _____

Other (please specify) XX

Construction Document approval

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: _____ Submittal Date: _____

COMPLETE IF SIGNED BY INDIVIDUALS:

All individual owners must sign. (If additional signatures are necessary, please attach an additional sheet.)

Jennifer Davis
Please Print

Jennifer Davis
Signature

James W. and Jennifer Davis
Please Print

James W. Davis
Signature

_____
Please Print

_____
Signature

_____
Please Print

_____
Signature

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Darlene S Keith, a Notary Public for the above State and County, this the 4 day of November, 2019.

Darlene S Keith
Notary Public

SEAL

DARLENE S KEITH NOTARY PUBLIC WAKE COUNTY, NC

My Commission Expires: 8-5-2022

COMPLETE IF A CORPORATION:

In witness whereof, said corporation has caused this instrument to be executed by its President and attested by its Secretary by order of its Board of Directors, this the _____ day of _____, 20_____.

Corporate Name _____

SEAL

By: _____
President (Signature)

Attest:

_____
Secretary (Signature)

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____day of _____, 20____.

_____
Notary Public

SEAL

My Commission Expires: _____

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: _____ Submittal Date: _____

Fee Paid $ _____ Check # _____

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
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3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

Charles Catlette Jr. — Owner Name (Please Print)

0743-22-5750 (1.781 acres) — Property PIN or Deed Book & Page #

Phone

E-mail Address

Owner Name (Please Print)

Property PIN or Deed Book & Page #

Phone

E-mail Address

Owner Name (Please Print)

Property PIN or Deed Book & Page #

Phone

E-mail Address

Surveyor Information

Surveyor: Advanced Civil Design - James Whitacre, PLS

Phone: (919) 481-6290 Fax: (919) 336-5127

E-mail Address: jwhitacre@advancedcivildesign.com

Annexation Summary Chart

Total Acreage to be annexed: 4

Population of acreage to be annexed: _____

Existing # of housing units: _____

Zoning District*: PUD-CZ

Reason for annexation: (select one)

Receive Town Services _____

Other (please specify) XX

Construction Document approval

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: _____ Submittal Date: _____

COMPLETE IF SIGNED BY INDIVIDUALS:

All individual owners must sign. (If additional signatures are necessary, please attach an additional sheet.)

Charles Catlette Jr — Please Print
Charles Catlette Jr — Signature

_____ Please Print
_____ Signature

_____ Please Print
_____ Signature

_____ Please Print
_____ Signature

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Darlene S. Keith, a Notary Public for the above State and County, this the 19 day of November, 2019.

Darlene S Keith
Notary Public

SEAL — DARLENE S KEITH NOTARY PUBLIC WAKE COUNTY, NC

My Commission Expires: 8.5.2022

COMPLETE IF A CORPORATION:

In witness whereof, said corporation has caused this instrument to be executed by its President and attested by its Secretary by order of its Board of Directors, this the _____ day of _____, 20_____.

Corporate Name _____

SEAL

By: _____
President (Signature)

Attest:

_____
Secretary (Signature)

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____day of _____, 20____.

_____
Notary Public

SEAL

My Commission Expires: _____

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: _____ Submittal Date: _____

Fee Paid $ _____ Check # _____

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
2. The area to be annexed is ■ contiguous, ☐ non-contiguous (satellite) to the Town of Apex, North Carolina and the boundaries are as contained in the metes and bounds description attached hereto.
3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

Martha B. Catlette Revocable Trust — Owner Name (Please Print)

0743-23-4100 (20.244 acres) — Property PIN or Deed Book & Page #

Phone _____ E-mail Address _____

Owner Name (Please Print) _____ Property PIN or Deed Book & Page # _____

Phone _____ E-mail Address _____

Owner Name (Please Print) _____ Property PIN or Deed Book & Page # _____

Phone _____ E-mail Address _____

Surveyor Information

Surveyor: Advanced Civil Design - James Whitacre, PLS

Phone: (919) 481-6290 Fax: (919) 336-5127

E-mail Address: jwhitacre@advancedcivildesign.com

Annexation Summary Chart

Total Acreage to be annexed: _____ Reason for annexation: (select one)

Population of acreage to be annexed: _____ Receive Town Services _____

Existing # of housing units: _____ Other (please specify) XX

Zoning District*: PUD-CZ Construction Document approval

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: _____ Submittal Date: _____

COMPLETE IF SIGNED BY INDIVIDUALS:

All individual owners must sign. (If additional signatures are necessary, please attach an additional sheet.)

Charles Catlette Jr Trustee — Charles Catlette Jr Trustee

Please Print — Signature

_____ _____

Please Print — Signature

_____ _____

Please Print — Signature

_____ _____

Please Print — Signature

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Darlene S. Keith, a Notary Public for the above State and County, this the 1 day of November, 2019.

DARLENE S KEITH NOTARY PUBLIC WAKE COUNTY, NC

SEAL

Darlene S Keith
Notary Public

My Commission Expires: 8-5-2022

COMPLETE IF A CORPORATION:

In witness whereof, said corporation has caused this instrument to be executed by its President and attested by its Secretary by order of its Board of Directors, this the _____ day of _____, 20_____.

Corporate Name _____

SEAL

By: _____
President (Signature)

Attest:

_____
Secretary (Signature)

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____day of _____, 20____.

_____
Notary Public

SEAL

My Commission Expires: _____

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: _____ Submittal Date: _____

Fee Paid $ _____ Check # _____

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
2. The area to be annexed is ☒ contiguous, ☐ non-contiguous (satellite) to the Town of Apex, North Carolina and the boundaries are as contained in the metes and bounds description attached hereto.
3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

Jennifer Davis — Owner Name (Please Print)
0743-23-7810 (1.497 acres) — Property PIN or Deed Book & Page #
Phone
E-mail Address

Jennifer Davis — Owner Name (Please Print)
0743-23-6975 (1.578 acres) — Property PIN or Deed Book & Page #
Phone
E-mail Address

Owner Name (Please Print)
Property PIN or Deed Book & Page #
Phone
E-mail Address

Surveyor Information

Surveyor: Advanced Civil Design - James Whitacre, PLS

Phone: (919) 481-6290 Fax: (919) 336-5127

E-mail Address: jwhitacre@advancedcivildesign.com

Annexation Summary Chart

Total Acreage to be annexed: —

Population of acreage to be annexed:

Existing # of housing units:

Zoning District*: PUD-CZ

Reason for annexation: (select one)

Receive Town Services

Other (please specify) XX

Construction Document approval

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: _____ Submittal Date: _____

COMPLETE IF SIGNED BY INDIVIDUALS:

All individual owners must sign. (If additional signatures are necessary, please attach an additional sheet.)

Please Print	Signature
Jennifer Davis	Jennif Da

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Darlene S Keith, a Notary Public for the above State and County, this the 1 day of, November, 20 19.

DARLENE S KEITH NOTARY PUBLIC WAKE COUNTY, NC

SEAL

Darlene S Keith
Notary Public

My Commission Expires: 8-5-2022

COMPLETE IF A CORPORATION:

In witness whereof, said corporation has caused this instrument to be executed by its President and attested by its Secretary by order of its Board of Directors, this the _____ day of _____, 20_____.

Corporate Name _____

SEAL

By: _____
President (Signature)

Attest:

_____
Secretary (Signature)

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____day of _____, 20____.

_____
Notary Public

SEAL

My Commission Expires: _____

Annexation Legal Description
26.897 Acres

Situated in the State of North Carolina, County of Wake, Town of Apex, and consisting of a 1.578 acre tract conveyed to Jennifer Davis of record in Deed Book 16696, Page 205, a 1.497 acre tract conveyed to Jennifer Davis of record in Deed Book 9853, Page 528, a 18.475 acre remainder tract conveyed to Martha B. Catlette Revocable Trust of record in Deed Book 11630, Page 1220, a 1.769 acre tract conveyed to Martha B. Catlette Revocable Trust of record in Deed Book 11630, Page 1220, a 1.781 acre tract conveyed to Charles Catlette Jr. of record in Deed Book 8517, Page 1219, and a 1.730 acre tract conveyed to James and Jennifer Davis of record in Deed Book 16569, Page 883, and being more particularly bounded and described as follows:

Beginning at an iron pipe found at the northeast corner of said 1.578 acre Davis tract; said point also being on the southerly right-of-way of Holt Road (S.R. 1612), having North Carolina State Plane Coordinates (NAD 83—2011 Adjustment): Northing 734135.474, Easting 2042751.8500;

Thence along the southern right-of-way of said Holt Road, the northerly line of said 1.578 acre Davis tract the following two (2) courses;

S 75° 40’ 50” E, a distance of **20.05 feet** to an iron pipe set;

S 74° 33’ 14” E, a distance of **109.20 feet** to an iron pipe set;

Thence, with a curve to the right, having a chord bearing and distance of **S 66° 24’ 11" E, 155.71 feet**, a radius of **549.14 feet**, a central angle of **16° 18' 06**", and an arc length of **156.24 feet** along the southern right-of-way of said Holt Road, the northerly line of said 1.578 acre Davis tract, the northerly line of said 1.497 Davis Tract to an iron pipe found;

Thence, with a curve to the right, having a chord bearing and distance of **S 30° 31’ 37" E, 510.96 feet**, a radius of **549.14 feet**, a central angle of **55° 27' 02**", and an arc length of **531.46 feet** along the southern right-of-way of said Holt Road, the northeasterly line of said 18.475 acre Catlette tract to an iron pipe found at the northeast corner of a 2.009 acre tract conveyed to James and Jennifer Davis of record in Deed Book 16569, Page 887;

Thence, along the northern and western line of said 2.009 acre Davis tract, the eastern line of said 18.475 Catlette tract, and the western and southern line of a 4.93 acre tract conveyed to Kenneth Grimley of record in Deed Book 2225, Page 693 the following eight (8) courses:

S 89° 07’ 06” W, a distance of **421.89 feet** to an iron pipe found;

S 05° 34’ 45” E, a distance of **147.91 feet** to an iron pipe set;

S 60° 44’ 16” W, a distance of **183.49 feet** to an iron pipe found;

S 37° 08’ 50” E, a distance of **321.30 feet** to an iron pipe found;

S 10° 25’ 20” E, a distance of **174.93 feet** to an iron pipe found;

S 79° 09’ 20” E, a distance of **104.65 feet** to an iron pipe set;

S 47° 25’ 20” E, a distance of **173.95 feet** to an iron pipe set;

N 86° 18’ 10” E, a distance of **73.52 feet** to an iron pipe set in the westerly right-of-way of said Holt Road;

Thence, across said Holt Road right-of-way the following three (3) courses;

N 86° 18’ 10” E, a distance of **11.73 feet** to a point;

S 04° 01’ 55” W, a distance of **181.48 feet** to a point;

N 89° 17’ 25” W, a distance of **24.88 feet** to an iron pipe set in the westerly right-of-way of said Holt Road, also being the northeast corner of Open Space 1 of the Subdivision titled Middleton Phase 1A of record in Book of Maps 2016, Page 1755, also being the southeast corner of said 1.73 acre Davis tract;

Thence, **N 89° 17’ 25” W**, a distance of **1243.68 feet** along the northerly line of said Open Space 1, the northerly line of Open Space 1 ot the Subdivision titled Middleton Remainder of Phase 1B of record in Book of Maps 2017, Page 2170, the southerly line of said 1.730 acre Davis tract, the southerly line of said 1.781 acre Catlette Jr. tract, the southerly line of said 1.769 acre Catlette tract to an iron pipe set;

Thence, **N 03° 07’ 58” E**, a distance of **204.30 feet** along the westerly line of said 1.769 acre Catlette tract, the easterly line of a 4.0 acre tract conveyed to Charles and Shirly Hamlett in Deed Book 3293, Page 697, to an iron pipe set at the southwest corner of said 18.475 acre Catlette tract;

Thence, **N 03° 11’ 00” E**, a distance of **387.01 feet** along the westerly line of said 18.475 acre Catlette tract, the easterly line of said 4.0 acre Hamlett tract, and the easterly line of a 1.75 acre tract conveyed to Wayne Riddle in Deed Book 2317, Page 394 to an iron pipe found at the northeast corner of said 1.75 acre Riddle Tract and the southeast corner of a 3.32 acre tract conveyed to Dennis and Cathy Rae Bixby in Deed Book 15822, Page 2205;

Thence, **N 03° 09’ 27” E**, a distance of **213.94 feet** along the westerly line of said 18.475 acre Catlette tract and the easterly line of said 3.32 acre Bixby tract to an iron pipe found at the southwest corner of a 5.89 acre tract conveyed to Deloris Gibson in Deed Book 12602, Page 846;

Thence, along the northerly and westerly lines of said 18.475 acre Catlette tract and the southerly and easterly lines of said 5.89 acre Gibson tract the following two courses:

S 88° 00’ 05” E, a distance of **455.89 feet** to an iron pipe found;

N 02° 00’ 55” E, a distance of **188.48 feet** to an iron pipe found at the southwest corner of said 1.497 acre Davis tract;

Thence, along the westerly line of said 1.497 acre Davis tract, the westerly line of said 1.578 acre Davis, the easterly line of said 5.89 acre Gibson tract and the easterly line of a 3.6 acre tract conveyed to Rosa Jackyra in Deed Book 8720 Page 1827 the following two (2) courses;

N 07° 40’ 26” E, a distance of **331.37 feet** to an iron pipe set;

N 48° 51’ 17” E, a distance of **304.52 feet** to the **Point of Beginning**, and containing **26.897 acres** of land, more or less, as calculated by the above courses.

All deed references contained herein can be found at the Wake County Register of Deeds. The above description was prepared by James D. Whitacre, P.L.S. L-5273 on November 14, 2019.



LOCATION MAP
SCALE: 1" = 1,000'

I, James D. Whitacre, certify as to one of the following:

- ☐ A. That the survey creates a subdivision of land within the area of a county or municipality that has an ordinance that regulates parcels of land.
- ☐ B. That the survey is located in a portion of a county or municipality that is unregulated as to an ordinance that regulates parcels of land.
- ☐ C. That the survey is of an existing parcel or parcels of land, and does not create or change an existing street.
- ■ D. That the survey is of another category, such as the recombination of existing parcels, a court-ordered survey, or other exception to the definition of subdivision.
- ☐ E. That the information available to this surveyor is such that I am unable to make a determination to the best of my professional ability as to the provisions contained in A through D above.

Existing Town of Cary Corp. Limits

Control Corner
NC Grid Coordinates
N: 734135.4740
E: 2042751.8500
(NAD83 2011)

MONTFORD HALL CT.
Variable Width Public R/W
Δ=16°18'06"
R=549.14'
ArcL=156.24'
ChB=S66°24'11"E
ChD=155.71'

N/F
Daniel O'Brien &
Ann Cochran
PIN: 0743-34-1175
D.B. 8517, Pg. 998
Use: Single Family

IPF S74°33'14"E 109.20' IPS
S75°40'50"E 20.05'

N/F
Rosa Jackyra
PIN: 0743-24-3061
D.B. 8720, Pg. 1827
3.6 Ac.
Use: Single Family

N48°51'17"E 304.52'

Tract 3
Jennifer Davis
1345 Holt Rd, Apex, NC
PIN: 0743-23-6975
D.B. 16696, Pg. 205
B.M. 1994, Pg. 1689
1.578 Ac.

HOLT RD (S.R. 1612)
60' Width Public R/W

N7°40'26"E 331.37'

Tract 2
Jennifer Davis
0 Holt Rd, Apex, NC
PIN: 0743-23-7810
D.B. 9853, Pg. 528
B.M. 2001, Pg. 1794
1.497 Ac.

Δ=55°27'02"
R=549.14'
ArcL=531.46'
ChB=S30°31'37"E
ChD=510.96'

N/F
Daniel O'Brien &
Ann Cochran
PIN: 0743-33-4884
D.B. 8100, Pg. 144
USE: Single Family

N/F
Siva & Veena Palakodety
PIN: 0743-33-6607
D.B. 17012, Pg. 490
Use: Single Family

IPF S89°07'06"W 421.89' IPS

N2°00'55"E 188.48'

S5°34'45"E 147.91'

Tract 1
James & Jennifer Davis
1313 Holt Rd, Apex, NC
PIN: 0743-33-0590
D.B. 16569, Pg. 887
B.M. 2001, Pg. 1794
2.009 Ac.

Existing Town of Apex Corp. Limits

N/F
John Arnold &
Tina Arnold Trustees
PIN: 0743-33-5427
D.B. 16882, Pg. 2072
USE: Single Family

N/F
Deloris Gibson
PIN: 0743-123-2647
D.B. 12602, Pg. 846
5.89 Ac.
Use: Single Family

IPF S88°00'05"E 455.89'

S60°44'16"W 183.49'

N/F
Debra Cattano
PIN: 0743-33-4370
D.B. 13172, Pg. 2470
Use: Single Family

N/F
Dennis & Cathy Rae Bixby
PIN: 0743-13-8411
D.B. 15822, Pg. 2205
3.32 Ac.
Use: Single Family

N3°09'27"E 213.94'

S37°08'50"E 321.30'

Annexation Area
1,171,637 S.F.
26.897 AC.

N/F
Kenneth Grimley
PIN: 0743-33-1106
D.B. 2225, Pg. 693
4.93 Ac.
Use: Single Family

N/F
Shaohua & Biying Huang
PIN: 0743-33-4069
D.B. 13966, Pg. 2742
Use: Single Family

Existing Town of Apex Corp. Limits

Tract 6
Martha B Catlette Revocable Trust
1337 Holt Rd, Apex, NC
PIN: 0743-23-4100
D.B. 11630, Pg. 1220
18.475 Ac. (Remaining)

S10°25'20"E 174.93'

HOLT RD (S.R. 1612)
60' Width Public R/W

N/F
Charles & Shirley Hamlett
PIN: 0743-12-7874
D.B. 3293, Pg. 697
4.0 Ac.
Use: Single Family

N3°11'00"E 387.01'

S79°09'20"E 104.65'

HOWELL RD (S.R. 3064)
Variable Width Public R/W

N86°18'10"E 73.52'

S4°25'20"E 173.95'

N86°18'10"E 11.73'

CATLETTE ST
60' Private Road Easement
B.M. 1982, Pg.285

Part of Tract 6
Martha B Catlette Revocable Trust
1337 Holt Rd, Apex, NC
D.B. 11630, Pg. 1220
PIN: 0743-23-4100
B.M. 1982, Pg. 285
1.769 Ac.

Tract 5
Charles Catlette Jr.
313 Catlette St, Apex, NC
PIN: 0743-22-5750
D.B. 8517, Pg. 1219
B.M. 1982, Pg. 285
1.781 Ac.

Tract 4
James & Jennifer Davis
305 Catlette St, Apex, NC
PIN: 0743-22-9679
D.B. 16569, Pg. 883
B.M. 1982, Pg. 285
1.730 Ac.

S4°01'55"W 181.48'

N89°17'25"W 24.88'

N/F
Keith & Jamie Horil
PIN: 0743-12-7573
D.B. 9066, Pg. 1398
Use: Single Family

N3°07'58"E 204.30'

GILWOOD DR
50' Public R/W

N89°17'25"W 1243.68'

OPEN SPACE 1 | OPEN SPACE 1 | OPEN SPACE 1

92 | 75 | 74 | 73 | 72 | 70 | 69 | 68 | 59 | 58 | 57

MIDDLETON REMAINDER PHASE 1B BM 2017, PG 2170

Existing Town of Apex Corp. Limits

MIDDLETON PHASE 1A BM 2016, PG 1755

Recorded in Book of Maps 2019, Page _____, Wake County Registry.

Annexation #_____

I, Donna B. Hosch, MMC, NCCMC, Town Clerk, Apex, North Carolina certify this is a true and exact map of annexation adopted the ____ day of _____, 20__, by the Town Council. I set my hand and seal of the Town of Apex, _____, _____, _____
Day Month Year

Donna B. Hosch, MMC, NCCMC, Town Clerk

LEGEND

- Iron Pipe Found
- Iron Pin Found
- Mag Nail Found
- Iron Pipe Set
- Railroad Spike
- Computed Point
- Existing Town of Apex Corporation Limits

Owners:
Jennifer Davis
Martha B. Catlette Revocable Trust
Charles Catlette Jr.
James Davis & Jennifer Davis

GRAPHIC SCALE

0 50 100 200
1 inch = 100 feet

NC Grid NAD 83 (2011 Adjustment)

GENERAL NOTES:

1) Areas calculated by coordinate geometry.
2) All distances are horizontal ground distances.
3) All bearings are based on the North Carolina State Plan Coordinate System (NAD83)
4) At the time of survey a title was not provided and therefore an accurate depiction of any easements has not been shown on this plat. Easements may or may not be present on this site.
5) This site is not in a FEMA flood hazard zone per map 3720074300J, dated May 2, 2006.
6) Boundary information shown hereon was prepared from an actual field survey and from existing records as referenced hereon.
7) Zoned: PUD-CZ

I, James D. Whitacre, a surveyor licensed under the provisions of Chapter 89C of the North Carolina General Statutes, do hereby certify that this Plat was drawn under my supervision from an actual survey made under my supervision from references as noted on said plat. That the ratio of precision as calculated from coordinates is 1/10,000, that the boundaries not surveyed are shown as broken lines plotted from cited references, and that this plat was prepared in accordance with G.S. 47-30 as amended.

I further certify that this survey is of another category, such as the recombination of existing parcels, a court-ordered survey, or other exception to the definition of subdivision.

Witness my hand and official seal this ____, day of _____, 20__.

NORTH CAROLINA PROFESSIONAL SEAL L-5273 LAND SURVEYOR JAMES D. WHITACRE

PRELIMINARY

Professional Surveyor L-5273

FIRM # C-2798
ADVANCED CIVIL DESIGN ENGINEERS SURVEYORS
51 Kilmayne Drive Suite 105
Cary, North Carolina 27511
ph 919.481.6290
fax 919.336.5127

ANNEXATION MAP
FOR
TOWN OF APEX
HOLT ROAD, APEX, NC 27523
WHITE OAK TOWNSHIP, WAKE COUNTY, APEX, NORTH CAROLINA

Revisions:

Date: 11/14/2019

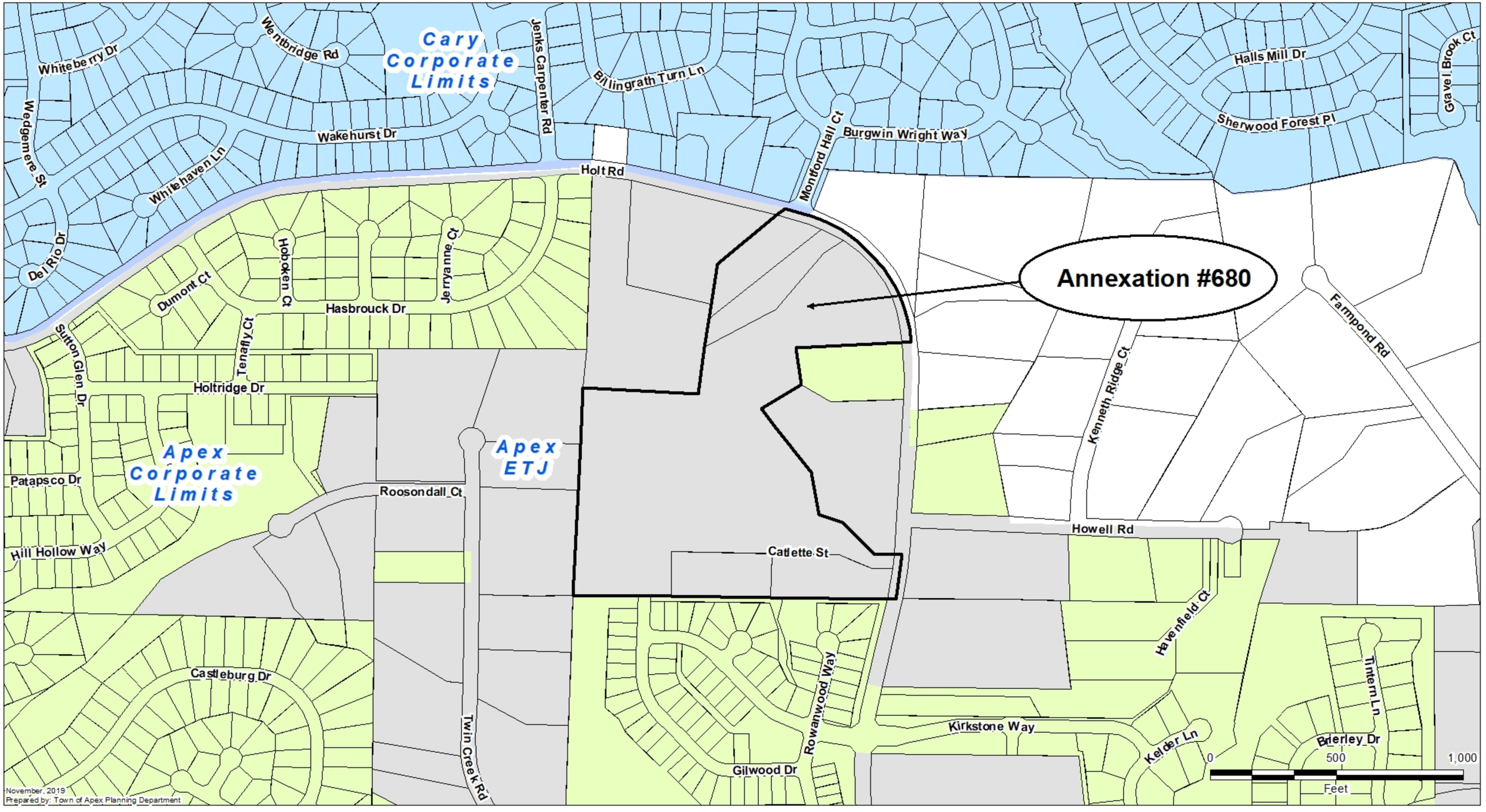
Drawn By:	Scale:
JRR	1" = 100'

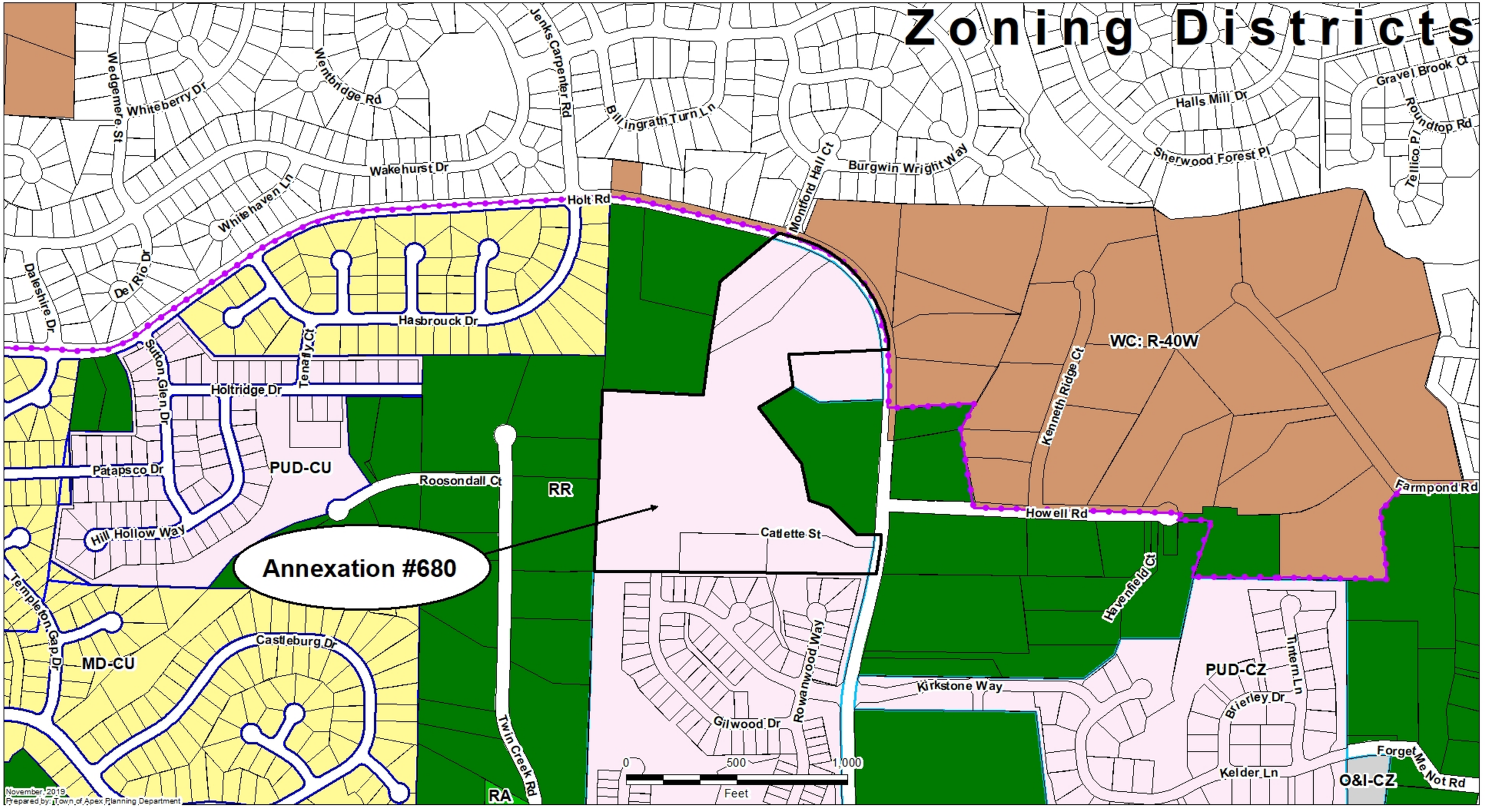
Project Number: 18-0009-27

Sheet Number: 1/1

0:\18-0009-27NC\DWG\Production Drawings\SURVEY\0009-27-Annexation Plat.dwg Annexation Plat Nov 14, 2019 - 4:30:00pm jroyal


Annexation #680
Holt Rd
Sir Brennan Ct
Jerryanne Ct
Montclair
Hasbrouck Dr
Sutton Place
Holtridge Dr
Roosondall Ct
Twin Creek Rd
Charleston Village
Catlette St
Middleton
Howell Rd
Kenneth Ridge Ct
0
250
500
Feet
November, 2019
November, 2019 Aerial Photography
Prepared by: Town of Apex Planning Department


Cary Corporate Limits
Apex Corporate Limits
Apex ETJ
Annexation #680
Whiteberry Dr
Wentbridge Rd
Jenks Carpenter Rd
Billingrath Turn Ln
Halls Mill Dr
Gravel Brook Ct
Wedgemere St
Wakehurst Dr
Whitehaven Ln
Montford Hall Ct
Burgwin Wright Way
Sherwood Forest Pl
Holt Rd
Del Rio Dr
Hoboken Ct
Jerryanne Ct
Dumont Ct
Hasbrouck Dr
Sutton Glen Dr
Tenafly Ct
Holtridge Dr
Kenneth Ridge Ct
Farmpond Rd
Patapsco Dr
Roosondall Ct
Howell Rd
Catlette St
Hill Hollow Way
Havenfield Ct
Castleburg Dr
Twin Creek Rd
Rowanwood Way
Kirkstone Way
Tintern Ln
Kelder Ln
Brierley Dr
Gilwood Dr
0
500
1,000
Feet
November, 2019
Prepared by: Town of Apex Planning Department


Zoning Districts
Annexation #680
WC: R-40W
PUD-CU
PUD-CZ
MD-CU
RR
RA
O&I-CZ
Holt Rd
Howell Rd
Farmpond Rd
Wakehurst Dr
Whiteberry Dr
Wedgemere St
Wentridge Rd
Jenks Carpenter Rd
Billingrath Turn Ln
Montford Hall Ct
Burgwin Wright Way
Halls Mill Dr
Sherwood Forest Pl
Gravel Brook Ct
Roundtop Rd
Tellico Pl
Whitehaven Ln
Del Rio Dr
Dalehire Dr
Hasbrouck Dr
Tenafly Ct
Sutton Glen Dr
Holtridge Dr
Patapsco Dr
Hill Hollow Way
Templeton Gap Dr
Castleburg Dr
Roosondall Ct
Catlette St
Twin Creek Rd
Gilwood Dr
Rowanwood Way
Kenneth Ridge Ct
Havenfield Ct
Kirkstone Way
Tintern Ln
Brierley Dr
Kelder Ln
Forget Me Not Rd
0
500
1,000
Feet
November 2019
Prepared by: Town of Apex Planning Department

RESOLUTION DIRECTING THE TOWN CLERK
TO INVESTIGATE PETITION RECEIVED UNDER G.S.§ 160A-31

Annexation Petition #680
The Courtyards on Holt

WHEREAS, G.S. §160-A 31 provides that the sufficiency of the petition shall be investigated by the Town Clerk before further annexation proceedings may take place; and

WHEREAS, the Town Council of the Town of Apex deems it advisable to proceed in response to this request for annexation;

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Apex, that the Town Clerk is hereby directed to investigate the sufficiency of the above-described petition and to certify to the Town Council the result of her investigation.

This the 17th day of December 2019.

_____
Jacques K. Gilbert
Mayor

ATTEST:

_____
Donna B. Hosch, MMC, NCCMC
Town Clerk



CERTIFICATE OF SUFFICIENCY BY THE TOWN CLERK

Annexation Petition #680
The Courtyards on Holt

To: The Town Council of the Town of Apex, North Carolina

I, Donna B. Hosch, Town Clerk, do hereby certify that I have investigated the annexation petition attached hereto, and have found, as a fact, that said petition is signed by all owners of real property lying in the area described therein, in accordance with G.S.§ 160A-31, as amended.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Town of Apex, North Carolina this 17th day of December 2019.

_____
Donna B. Hosch, MMC, NCCMC
Town Clerk

(Seal)

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: 680 Submittal Date: 11/1/19

Fee Paid $ 200 Check # 3425

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
2. The area to be annexed is ■ contiguous, ☐ non-contiguous (satellite) to the Town of Apex, North Carolina and the boundaries are as contained in the metes and bounds description attached hereto.
3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

Owner Name (Please Print) | Property PIN or Deed Book & Page #

Phone | E-mail Address

James & Jennifer Davis | 0743-22-9676 (1.730 acres)

Owner Name (Please Print) | Property PIN or Deed Book & Page #

Phone | E-mail Address

Owner Name (Please Print) | Property PIN or Deed Book & Page #

Phone | E-mail Address

Surveyor Information

Surveyor: Advanced Civil Design - James Whitacre, PLS

Phone: (919) 481-6290 Fax: (919) 336-5127

E-mail Address: jwhitacre@advancedcivildesign.com

Annexation Summary Chart

Total Acreage to be annexed: _____

Population of acreage to be annexed: 1

Existing # of housing units: 4

Zoning District*: PUD-CZ

Reason for annexation: (select one)

Receive Town Services _____

Other (please specify) XX

Construction Document approval

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: _____ Submittal Date: _____

COMPLETE IF SIGNED BY INDIVIDUALS:

All individual owners must sign. (If additional signatures are necessary, please attach an additional sheet.)

Jennifer Davis
Please Print

Jennifer Davis
Signature

James W. and Jennifer Davis
Please Print

James W. Davis
Signature

_____
Please Print

_____
Signature

_____
Please Print

_____
Signature

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Darlene S Keith, a Notary Public for the above State and County, this the 4 day of November, 2019.

Darlene S Keith
Notary Public

SEAL

DARLENE S KEITH NOTARY PUBLIC WAKE COUNTY, NC

My Commission Expires: 8-5-2022

COMPLETE IF A CORPORATION:

In witness whereof, said corporation has caused this instrument to be executed by its President and attested by its Secretary by order of its Board of Directors, this the _____ day of _____, 20_____.

Corporate Name _____

SEAL

By: _____
President (Signature)

Attest:

_____
Secretary (Signature)

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____day of _____, 20____.

_____
Notary Public

SEAL

My Commission Expires: _____

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: _____ Submittal Date: _____

Fee Paid $ _____ Check # _____

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
2. The area to be annexed is ■ contiguous, ☐ non-contiguous (satellite) to the Town of Apex, North Carolina and the boundaries are as contained in the metes and bounds description attached hereto.
3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

Charles Catlette Jr. — Owner Name (Please Print)

0743-22-5750 (1.781 acres) — Property PIN or Deed Book & Page #

Phone

E-mail Address

Owner Name (Please Print)

Property PIN or Deed Book & Page #

Phone

E-mail Address

Owner Name (Please Print)

Property PIN or Deed Book & Page #

Phone

E-mail Address

Surveyor Information

Surveyor: Advanced Civil Design - James Whitacre, PLS

Phone: (919) 481-6290 Fax: (919) 336-5127

E-mail Address: jwhitacre@advancedcivildesign.com

Annexation Summary Chart

Total Acreage to be annexed: 4

Population of acreage to be annexed: _____

Existing # of housing units: _____

Zoning District*: PUD-CZ

Reason for annexation: (select one)

Receive Town Services _____

Other (please specify) XX

Construction Document approval

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: _____ Submittal Date: _____

COMPLETE IF SIGNED BY INDIVIDUALS:

All individual owners must sign. (If additional signatures are necessary, please attach an additional sheet.)

Charles Catlette Jr — Please Print
Charles Catlette Jr — Signature

_____ Please Print
_____ Signature

_____ Please Print
_____ Signature

_____ Please Print
_____ Signature

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Darlene S. Keith, a Notary Public for the above State and County, this the 19 day of November, 2019.

Darlene S Keith
Notary Public

SEAL — DARLENE S KEITH NOTARY PUBLIC WAKE COUNTY, NC

My Commission Expires: 8.5.2022

COMPLETE IF A CORPORATION:

In witness whereof, said corporation has caused this instrument to be executed by its President and attested by its Secretary by order of its Board of Directors, this the _____ day of _____, 20_____.

Corporate Name _____

SEAL

By: _____
President (Signature)

Attest:

_____
Secretary (Signature)

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____day of _____, 20____.

_____
Notary Public

SEAL

My Commission Expires: _____

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: _____ Submittal Date: _____

Fee Paid $ _____ Check # _____

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
2. The area to be annexed is ■ contiguous, ☐ non-contiguous (satellite) to the Town of Apex, North Carolina and the boundaries are as contained in the metes and bounds description attached hereto.
3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

Martha B. Catlette Revocable Trust — Owner Name (Please Print)

0743-23-4100 (20.244 acres) — Property PIN or Deed Book & Page #

Phone _____ E-mail Address _____

Owner Name (Please Print) _____ Property PIN or Deed Book & Page # _____

Phone _____ E-mail Address _____

Owner Name (Please Print) _____ Property PIN or Deed Book & Page # _____

Phone _____ E-mail Address _____

Surveyor Information

Surveyor: Advanced Civil Design - James Whitacre, PLS

Phone: (919) 481-6290 Fax: (919) 336-5127

E-mail Address: jwhitacre@advancedcivildesign.com

Annexation Summary Chart

Total Acreage to be annexed: _____ Reason for annexation: (select one)

Population of acreage to be annexed: _____ Receive Town Services _____

Existing # of housing units: _____ Other (please specify) XX

Zoning District*: PUD-CZ Construction Document approval

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: _____ Submittal Date: _____

COMPLETE IF SIGNED BY INDIVIDUALS:

All individual owners must sign. (If additional signatures are necessary, please attach an additional sheet.)

Charles Catlette Jr Trustee — Charles Catlette Jr Trustee

Please Print — Signature

_____ _____

Please Print — Signature

_____ _____

Please Print — Signature

_____ _____

Please Print — Signature

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Darlene S. Keith, a Notary Public for the above State and County, this the 1 day of November, 2019.

DARLENE S KEITH NOTARY PUBLIC WAKE COUNTY, NC

SEAL

Darlene S Keith
Notary Public

My Commission Expires: 8-5-2022

COMPLETE IF A CORPORATION:

In witness whereof, said corporation has caused this instrument to be executed by its President and attested by its Secretary by order of its Board of Directors, this the _____ day of _____, 20_____.

Corporate Name _____

SEAL

By: _____
President (Signature)

Attest:

_____
Secretary (Signature)

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____day of _____, 20____.

_____
Notary Public

SEAL

My Commission Expires: _____

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: _____ Submittal Date: _____

Fee Paid $ _____ Check # _____

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
2. The area to be annexed is ☒ contiguous, ☐ non-contiguous (satellite) to the Town of Apex, North Carolina and the boundaries are as contained in the metes and bounds description attached hereto.
3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

Jennifer Davis — Owner Name (Please Print)
0743-23-7810 (1.497 acres) — Property PIN or Deed Book & Page #
Phone
E-mail Address

Jennifer Davis — Owner Name (Please Print)
0743-23-6975 (1.578 acres) — Property PIN or Deed Book & Page #
Phone
E-mail Address

Owner Name (Please Print)
Property PIN or Deed Book & Page #
Phone
E-mail Address

Surveyor Information

Surveyor: Advanced Civil Design - James Whitacre, PLS

Phone: (919) 481-6290 Fax: (919) 336-5127

E-mail Address: jwhitacre@advancedcivildesign.com

Annexation Summary Chart

Total Acreage to be annexed: —

Population of acreage to be annexed:

Existing # of housing units:

Zoning District*: PUD-CZ

Reason for annexation: (select one)

Receive Town Services

Other (please specify) XX

Construction Document approval

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: _____ Submittal Date: _____

COMPLETE IF SIGNED BY INDIVIDUALS:

All individual owners must sign. (If additional signatures are necessary, please attach an additional sheet.)

Please Print	Signature
Jennifer Davis	Jennif Da

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Darlene S Keith, a Notary Public for the above State and County, this the 1 day of, November, 20 19.

DARLENE S KEITH NOTARY PUBLIC WAKE COUNTY, NC

SEAL

Darlene S Keith
Notary Public

My Commission Expires: 8-5-2022

COMPLETE IF A CORPORATION:

In witness whereof, said corporation has caused this instrument to be executed by its President and attested by its Secretary by order of its Board of Directors, this the _____ day of _____, 20_____.

Corporate Name _____

SEAL

By: _____
President (Signature)

Attest:

_____
Secretary (Signature)

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____day of _____, 20____.

_____
Notary Public

SEAL

My Commission Expires: _____

Annexation Legal Description
26.897 Acres

Situated in the State of North Carolina, County of Wake, Town of Apex, and consisting of a 1.578 acre tract conveyed to Jennifer Davis of record in Deed Book 16696, Page 205, a 1.497 acre tract conveyed to Jennifer Davis of record in Deed Book 9853, Page 528, a 18.475 acre remainder tract conveyed to Martha B. Catlette Revocable Trust of record in Deed Book 11630, Page 1220, a 1.769 acre tract conveyed to Martha B. Catlette Revocable Trust of record in Deed Book 11630, Page 1220, a 1.781 acre tract conveyed to Charles Catlette Jr. of record in Deed Book 8517, Page 1219, and a 1.730 acre tract conveyed to James and Jennifer Davis of record in Deed Book 16569, Page 883, and being more particularly bounded and described as follows:

Beginning at an iron pipe found at the northeast corner of said 1.578 acre Davis tract; said point also being on the southerly right-of-way of Holt Road (S.R. 1612), having North Carolina State Plane Coordinates (NAD 83—2011 Adjustment): Northing 734135.474, Easting 2042751.8500;

Thence along the southern right-of-way of said Holt Road, the northerly line of said 1.578 acre Davis tract the following two (2) courses;

S 75° 40’ 50” E, a distance of **20.05 feet** to an iron pipe set;

S 74° 33’ 14” E, a distance of **109.20 feet** to an iron pipe set;

Thence, with a curve to the right, having a chord bearing and distance of **S 66° 24’ 11" E, 155.71 feet**, a radius of **549.14 feet**, a central angle of **16° 18' 06**", and an arc length of **156.24 feet** along the southern right-of-way of said Holt Road, the northerly line of said 1.578 acre Davis tract, the northerly line of said 1.497 Davis Tract to an iron pipe found;

Thence, with a curve to the right, having a chord bearing and distance of **S 30° 31’ 37" E, 510.96 feet**, a radius of **549.14 feet**, a central angle of **55° 27' 02**", and an arc length of **531.46 feet** along the southern right-of-way of said Holt Road, the northeasterly line of said 18.475 acre Catlette tract to an iron pipe found at the northeast corner of a 2.009 acre tract conveyed to James and Jennifer Davis of record in Deed Book 16569, Page 887;

Thence, along the northern and western line of said 2.009 acre Davis tract, the eastern line of said 18.475 Catlette tract, and the western and southern line of a 4.93 acre tract conveyed to Kenneth Grimley of record in Deed Book 2225, Page 693 the following eight (8) courses:

S 89° 07’ 06” W, a distance of **421.89 feet** to an iron pipe found;

S 05° 34’ 45” E, a distance of **147.91 feet** to an iron pipe set;

S 60° 44’ 16” W, a distance of **183.49 feet** to an iron pipe found;

S 37° 08’ 50” E, a distance of **321.30 feet** to an iron pipe found;

S 10° 25’ 20” E, a distance of **174.93 feet** to an iron pipe found;

S 79° 09’ 20” E, a distance of **104.65 feet** to an iron pipe set;

S 47° 25’ 20” E, a distance of **173.95 feet** to an iron pipe set;

N 86° 18’ 10” E, a distance of **73.52 feet** to an iron pipe set in the westerly right-of-way of said Holt Road;

Thence, across said Holt Road right-of-way the following three (3) courses;

N 86° 18’ 10” E, a distance of **11.73 feet** to a point;

S 04° 01’ 55” W, a distance of **181.48 feet** to a point;

N 89° 17’ 25” W, a distance of **24.88 feet** to an iron pipe set in the westerly right-of-way of said Holt Road, also being the northeast corner of Open Space 1 of the Subdivision titled Middleton Phase 1A of record in Book of Maps 2016, Page 1755, also being the southeast corner of said 1.73 acre Davis tract;

Thence, **N 89° 17’ 25” W**, a distance of **1243.68 feet** along the northerly line of said Open Space 1, the northerly line of Open Space 1 ot the Subdivision titled Middleton Remainder of Phase 1B of record in Book of Maps 2017, Page 2170, the southerly line of said 1.730 acre Davis tract, the southerly line of said 1.781 acre Catlette Jr. tract, the southerly line of said 1.769 acre Catlette tract to an iron pipe set;

Thence, **N 03° 07’ 58” E**, a distance of **204.30 feet** along the westerly line of said 1.769 acre Catlette tract, the easterly line of a 4.0 acre tract conveyed to Charles and Shirly Hamlett in Deed Book 3293, Page 697, to an iron pipe set at the southwest corner of said 18.475 acre Catlette tract;

Thence, **N 03° 11’ 00” E**, a distance of **387.01 feet** along the westerly line of said 18.475 acre Catlette tract, the easterly line of said 4.0 acre Hamlett tract, and the easterly line of a 1.75 acre tract conveyed to Wayne Riddle in Deed Book 2317, Page 394 to an iron pipe found at the northeast corner of said 1.75 acre Riddle Tract and the southeast corner of a 3.32 acre tract conveyed to Dennis and Cathy Rae Bixby in Deed Book 15822, Page 2205;

Thence, **N 03° 09’ 27” E**, a distance of **213.94 feet** along the westerly line of said 18.475 acre Catlette tract and the easterly line of said 3.32 acre Bixby tract to an iron pipe found at the southwest corner of a 5.89 acre tract conveyed to Deloris Gibson in Deed Book 12602, Page 846;

Thence, along the northerly and westerly lines of said 18.475 acre Catlette tract and the southerly and easterly lines of said 5.89 acre Gibson tract the following two courses:

S 88° 00’ 05” E, a distance of **455.89 feet** to an iron pipe found;

N 02° 00’ 55” E, a distance of **188.48 feet** to an iron pipe found at the southwest corner of said 1.497 acre Davis tract;

Thence, along the westerly line of said 1.497 acre Davis tract, the westerly line of said 1.578 acre Davis, the easterly line of said 5.89 acre Gibson tract and the easterly line of a 3.6 acre tract conveyed to Rosa Jackyra in Deed Book 8720 Page 1827 the following two (2) courses;

N 07° 40’ 26” E, a distance of **331.37 feet** to an iron pipe set;

N 48° 51’ 17” E, a distance of **304.52 feet** to the **Point of Beginning**, and containing **26.897 acres** of land, more or less, as calculated by the above courses.

All deed references contained herein can be found at the Wake County Register of Deeds. The above description was prepared by James D. Whitacre, P.L.S. L-5273 on November 14, 2019.



LOCATION MAP
SCALE: 1" = 1,000'

I, James D. Whitacre, certify as to one of the following:

- ☐ A. That the survey creates a subdivision of land within the area of a county or municipality that has an ordinance that regulates parcels of land.
- ☐ B. That the survey is located in a portion of a county or municipality that is unregulated as to an ordinance that regulates parcels of land.
- ☐ C. That the survey is of an existing parcel or parcels of land, and does not create or change an existing street.
- ■ D. That the survey is of another category, such as the recombination of existing parcels, a court-ordered survey, or other exception to the definition of subdivision.
- ☐ E. That the information available to this surveyor is such that I am unable to make a determination to the best of my professional ability as to the provisions contained in A through D above.

Existing Town of Cary Corp. Limits

Control Corner
NC Grid Coordinates
N: 734135.4740
E: 2042751.8500
(NAD83 2011)

MONTFORD HALL CT.
Variable Width Public R/W
Δ=16°18'06"
R=549.14'
ArcL=156.24'
ChB=S66°24'11"E
ChD=155.71'

N/F
Daniel O'Brien &
Ann Cochran
PIN: 0743-34-1175
D.B. 8517, Pg. 998
Use: Single Family

IPF S74°33'14"E 109.20' IPS
S75°40'50"E 20.05'

N/F
Rosa Jackyra
PIN: 0743-24-3061
D.B. 8720, Pg. 1827
3.6 Ac.
Use: Single Family

N48°51'17"E 304.52'

Tract 3
Jennifer Davis
1345 Holt Rd, Apex, NC
PIN: 0743-23-6975
D.B. 16696, Pg. 205
B.M. 1994, Pg. 1689
1.578 Ac.

HOLT RD (S.R. 1612)
60' Width Public R/W

N7°40'26"E 331.37'

Tract 2
Jennifer Davis
0 Holt Rd, Apex, NC
PIN: 0743-23-7810
D.B. 9853, Pg. 528
B.M. 2001, Pg. 1794
1.497 Ac.

Δ=55°27'02"
R=549.14'
ArcL=531.46'
ChB=S30°31'37"E
ChD=510.96'

N/F
Daniel O'Brien &
Ann Cochran
PIN: 0743-33-4884
D.B. 8100, Pg. 144
USE: Single Family

N/F
Siva & Veena Palakodety
PIN: 0743-33-6607
D.B. 17012, Pg. 490
Use: Single Family

IPF S89°07'06"W 421.89' IPS

N2°00'55"E 188.48'

S5°34'45"E 147.91'

Tract 1
James & Jennifer Davis
1313 Holt Rd, Apex, NC
PIN: 0743-33-0590
D.B. 16569, Pg. 887
B.M. 2001, Pg. 1794
2.009 Ac.

Existing Town of Apex Corp. Limits

N/F
John Arnold &
Tina Arnold Trustees
PIN: 0743-33-5427
D.B. 16882, Pg. 2072
USE: Single Family

N/F
Deloris Gibson
PIN: 0743-123-2647
D.B. 12602, Pg. 846
5.89 Ac.
Use: Single Family

IPF S88°00'05"E 455.89'

S60°44'16"W 183.49'

N/F
Debra Cattano
PIN: 0743-33-4370
D.B. 13172, Pg. 2470
Use: Single Family

N/F
Dennis & Cathy Rae Bixby
PIN: 0743-13-8411
D.B. 15822, Pg. 2205
3.32 Ac.
Use: Single Family

N3°09'27"E 213.94'

S37°08'50"E 321.30'

Annexation Area
1,171,637 S.F.
26.897 AC.

N/F
Kenneth Grimley
PIN: 0743-33-1106
D.B. 2225, Pg. 693
4.93 Ac.
Use: Single Family

N/F
Shaohua & Biying Huang
PIN: 0743-33-4069
D.B. 13966, Pg. 2742
Use: Single Family

Existing Town of Apex Corp. Limits

Tract 6
Martha B Catlette Revocable Trust
1337 Holt Rd, Apex, NC
PIN: 0743-23-4100
D.B. 11630, Pg. 1220
18.475 Ac. (Remaining)

S10°25'20"E 174.93'

HOLT RD (S.R. 1612)
60' Width Public R/W

N/F
Charles & Shirley Hamlett
PIN: 0743-12-7874
D.B. 3293, Pg. 697
4.0 Ac.
Use: Single Family

N3°11'00"E 387.01'

S79°09'20"E 104.65'

HOWELL RD (S.R. 3064)
Variable Width Public R/W

N86°18'10"E 73.52'

S4°25'20"E 173.95'

N86°18'10"E 11.73'

CATLETTE ST
60' Private Road Easement
B.M. 1982, Pg.285

Part of Tract 6
Martha B Catlette Revocable Trust
1337 Holt Rd, Apex, NC
D.B. 11630, Pg. 1220
PIN: 0743-23-4100
B.M. 1982, Pg. 285
1.769 Ac.

Tract 5
Charles Catlette Jr.
313 Catlette St, Apex, NC
PIN: 0743-22-5750
D.B. 8517, Pg. 1219
B.M. 1982, Pg. 285
1.781 Ac.

Tract 4
James & Jennifer Davis
305 Catlette St, Apex, NC
PIN: 0743-22-9679
D.B. 16569, Pg. 883
B.M. 1982, Pg. 285
1.730 Ac.

S4°01'55"W 181.48'

N89°17'25"W 24.88'

N/F
Keith & Jamie Horil
PIN: 0743-12-7573
D.B. 9066, Pg. 1398
Use: Single Family

N3°07'58"E 204.30'

GILWOOD DR
50' Public R/W

N89°17'25"W 1243.68'

OPEN SPACE 1 | OPEN SPACE 1 | OPEN SPACE 1

92 | 75 | 74 | 73 | 72 | 70 | 69 | 68 | 59 | 58 | 57

MIDDLETON REMAINDER PHASE 1B BM 2017, PG 2170

Existing Town of Apex Corp. Limits

MIDDLETON PHASE 1A BM 2016, PG 1755

Recorded in Book of Maps 2019, Page _____, Wake County Registry.

Annexation #_____

I, Donna B. Hosch, MMC, NCCMC, Town Clerk, Apex, North Carolina certify this is a true and exact map of annexation adopted the ____ day of _____, 20__, by the Town Council. I set my hand and seal of the Town of Apex, _____, _____, _____
Day Month Year

Donna B. Hosch, MMC, NCCMC, Town Clerk

LEGEND

- Iron Pipe Found
- Iron Pin Found
- Mag Nail Found
- Iron Pipe Set
- Railroad Spike
- Computed Point
- Existing Town of Apex Corporation Limits

Owners:
Jennifer Davis
Martha B. Catlette Revocable Trust
Charles Catlette Jr.
James Davis & Jennifer Davis

GRAPHIC SCALE

0 50 100 200
1 inch = 100 feet

NC Grid NAD 83 (2011 Adjustment)

GENERAL NOTES:

1) Areas calculated by coordinate geometry.
2) All distances are horizontal ground distances.
3) All bearings are based on the North Carolina State Plan Coordinate System (NAD83)
4) At the time of survey a title was not provided and therefore an accurate depiction of any easements has not been shown on this plat. Easements may or may not be present on this site.
5) This site is not in a FEMA flood hazard zone per map 3720074300J, dated May 2, 2006.
6) Boundary information shown hereon was prepared from an actual field survey and from existing records as referenced hereon.
7) Zoned: PUD-CZ

I, James D. Whitacre, a surveyor licensed under the provisions of Chapter 89C of the North Carolina General Statutes, do hereby certify that this Plat was drawn under my supervision from an actual survey made under my supervision from references as noted on said plat. That the ratio of precision as calculated from coordinates is 1/10,000, that the boundaries not surveyed are shown as broken lines plotted from cited references, and that this plat was prepared in accordance with G.S. 47-30 as amended.

I further certify that this survey is of another category, such as the recombination of existing parcels, a court-ordered survey, or other exception to the definition of subdivision.

Witness my hand and official seal this ____, day of _____, 20__.

NORTH CAROLINA PROFESSIONAL SEAL L-5273 LAND SURVEYOR JAMES D. WHITACRE

PRELIMINARY

Professional Surveyor L-5273

FIRM # C-2798
ADVANCED CIVIL DESIGN ENGINEERS SURVEYORS
51 Kilmayne Drive Suite 105
Cary, North Carolina 27511
ph 919.481.6290
fax 919.336.5127

ANNEXATION MAP
FOR
TOWN OF APEX
HOLT ROAD, APEX, NC 27523
WHITE OAK TOWNSHIP, WAKE COUNTY, APEX, NORTH CAROLINA

Revisions:

Date: 11/14/2019

Drawn By:	Scale:
JRR	1" = 100'

Project Number: 18-0009-27

Sheet Number: 1/1

0:\18-0009-27NC\DWG\Production Drawings\SURVEY\0009-27-Annexation Plat.dwg Annexation Plat Nov 14, 2019 - 4:30:00pm jroyal

Home

Wake County Real Estate Data
Account Summary

iMaps
Tax Bills

Account Search
Go!

Real Estate ID **0136769** PIN # **0743229679**

Location Address
305 CATLETTE ST

Property Description
PROP CHARLES & MARTHA CATLETTE

Pin/Parcel History Search Results New Search

Account | Buildings | Land | Deeds | Notes | Sales | Photos | Tax Bill | Map

Property Owner	Owner's Mailing Address	Property Location Address
DAVIS, JENNIFER DOLORES & JAMES W (Use the Deeds link to view any additional owners)	**305 CATLETTE ST** **APEX NC 27523-8221**	**305 CATLETTE ST** **APEX NC 27523-8221**

Administrative Data		**Transfer Information**		**Assessed Value**	
Old Map #	**569-00000-0141**				
Map/Scale	**0743 03**	Deed Date	**10/17/2016**	Land Value Assessed	**$179,600**
VCS	**20AP900**	Book & Page	**16569 0883**	Bldg. Value Assessed	**$90,914**
City		Revenue Stamps			
Fire District	**23**	Pkg Sale Date			
Township	**WHITE OAK**	Pkg Sale Price		Tax Relief	
Land Class	**R-<10-HS**	Land Sale Date			
ETJ	**AP**	Land Sale Price		Land Use Value	
Spec Dist(s)				Use Value Deferment	
Zoning	**RR**	**Improvement Summary**		Historic Deferment	
History ID 1				Total Deferred Value	
History ID 2		Total Units	**1**		
Acreage	**1.78**	Recycle Units	**1**		
Permit Date		Apt/SC Sqft		Use/Hist/Tax Relief Assessed	
Permit #		Heated Area	**2,992**	Total Value Assessed*	**$270,514**

*Wake County assessed building and land values reflect the market value as of January 1, 2016, which is the date of the last county-wide revaluation. Any inflation, deflation or other economic changes occurring after this date does not affect the assessed value of the property and cannot be lawfully considered when reviewing the value for adjustment.

The January 1, 2016 values will remain in effect until the next county-wide revaluation. Until that time, any real estate accounts created or new construction built is assessed according to the 2016 Schedule of Values.

For questions regarding the information displayed on this site, please contact the Department of Tax Administration at Taxhelp@wakegov.com or call 919-856-5400.

RESOLUTION SETTING DATE OF PUBLIC HEARING
ON THE QUESTION OF ANNEXATION PURSUANT TO G.S.§ 160A-31 AS AMENDED

Annexation Petition #680
The Courtyards on Holt

WHEREAS, a petition requesting annexation of the area described herein has been received; and

WHEREAS, the Town Council of Apex, North Carolina has by Resolution directed the Town Clerk to investigate the sufficiency thereof; and

WHEREAS, Certification by the Town Clerk as to the sufficiency of said petition has been made;

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Apex, North Carolina that:

Section 1. A public hearing on the question of annexation of the area described herein will be held at the Apex Town Hall at 6:00 o'clock p.m. on the 7th day of January 2020.

Section 2. The area proposed for annexation is described as attached.

Section 3. Notice of said public hearing shall be published on the Town of Apex Website, www.apexnc.org, Public Notice, at least ten (10) days prior to the date of said public hearing.

This the 17th day of December 2019.

_____
Jacques K. Gilbert, Mayor

ATTEST:

_____
Donna B. Hosch, MMC, NCCMC, Town Clerk

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Matt Echols, Utilities Engineer

Department(s): Water Resources

Requested Motion

Motion to award a sewer rehabilitation contract to Insituform Technologies, LLC and to authorize the Town Manager to execute the contract on behalf of the town.

Approval Recommended?

Yes

Item Details

The town received seven bids for the 2019 Priority Sewer Rehabilitation Project on November 19, 2019. Insituform Technologies, LLC of Chesterfield, Missouri, was the low bidder with a total bid price of $393,146.00. This project is funded in the FY19/20 departmental budget. The budgeted amount for the project was $500,000.00.

The town's engineering consultant for the project, Hydrostructures, PA, recommends awarding the contract to Insituform, and staff agrees with this recommendation.

Attachments

- Recommendation of Award
- Certified Bid Tab
- Notice of Award
- Insituform Bid Package
- Insituform Good Faith Efforts

HYDROSTRUCTURES®

November 26, 2019

Matt Echols, P.E.
Town of Apex Water Resources Department
105-B Upchurch Street
Apex, NC 27502

Re: Recommendation of Award
Priority Sewer Rehabilitation Project - 2019
Town of Apex, North Carolina

Dear Mr. Echols:

Sealed bids for the Priority Sewer Rehabilitation Project – 2019 were opened at 3 p.m. on November 19, 2019. Seven bids were received and are tabulated on the attached Certified Bid Tabulation. A summary of the bids follows:

BIDDER	TOTAL BID PRICE
Insituform Technologies, LLC	$ 393,146.00
Cajenn Construction & Rehabilitation Services, Inc.	$ 445,540.00
Granite In-Liner, LLC	$ 473,965.00
IPR Southeast, LLC	$ 477,179.00
Vortex Services, LLC	$ 484,920.00
Tri-State Utilities, LLC	$ 518,897.00
Gulf Coast Underground, LLC	$ 610,657.80

Insituform Technologies (NCGC# 42890) is currently licensed in North Carolina. The required submittals outlined in the bid proposal appear to be in order and contain no deviations. Insituform Technologies has performed satisfactory work on previous projects for the Town of Apex. Additionally, Hydrostructures has served as the engineer of record on several sewer rehabilitation projects where Insituform Technologies served as the contractor. In our experience, Insituform's workmanship and materials have always been satisfactory. Therefore, Hydrostructures recommends award of this project to Insituform Technologies, Inc. in the amount of $393,146.00.

126 Commerce Court • PO Box 1537 • Pittsboro, NC 27312
(p) 919.542.5002 • (f) 919.542.6835
www.hydrostructures.com

HYDROSTRUCTURES®

If you have any questions, please feel free to contact me.

Sincerely,
Hydrostructures, PA

Brandon A. Sykes, P.E.
Engineering Manager

Attachments: Certified Bid Tabulation

126 Commerce Court • PO Box 1537 • Pittsboro, NC 27312
(p) 919.542.5002 • (f) 919.542.6835
www.hydrostructures.com

CERTIFIED BID TABULATION

Priority Sewer Rehabilitation Project -2019
Town of Apex, North Carolina

Bid Date: November 19, 2019

	Contractor	Insituform Technologies, LLC	Cajenn Construction & Rehabilitation Services, Inc.	Granite In-Liner, LLC	IPR Southeast, LLC	Vortex Services, LLC	Tri-State Utilities, LLC	Gulf Coast Underground, LLC
	Address	17988 Edison Avenue, Chesterfield, MO 63005	P.O. Box 38, Hoboken, GA 31542	1441 Delta Drive, Gastonia, NC 28052	5207 Brer Rabbit Road, Stone Mountain, GA 30083	17 AD Asbury Rd. Greenville, SC 29605	2111 Smith Avenue, Chesapeake, VA 23320	5655 Middle Rd, Theodore, AL 36582
	Phone	636-530-8000	912-458-3747	704-504-8464	404-969-3073	713-750-9081	757-366-9505	251-725-0200
	License #	42890	63151	51977	73175	73099	32168	Not Identified
	Type	GC Unlimited	GC Unlimited	GC Unlimited	GC Unlimited	GC Unlimited	GC Unlimited	Not Identified

Item No.	Item Description	Estimated Quantity	Unit of Measure	Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost
1	CIPP Rehabilitation of 8" Sewer	8,020.0	LF	$26.50	$212,530.00	$32.00	$256,640.00	$34.50	$276,690.00	$33.00	$264,660.00	$31.50	$252,630.00	$32.25	$258,645.00	$39.75	$318,795.00
2	CIPP Rehabilitation of 10" Sewer	60.0	LF	$45.00	$2,700.00	$65.00	$3,900.00	$75.00	$4,500.00	$65.00	$3,900.00	$80.00	$4,800.00	$41.90	$2,514.00	$100.11	$6,006.60
3	Cut Intruding Services Using Robotic Cutter	3	EA	$300.00	$900.00	$250.00	$750.00	$900.00	$2,700.00	$300.00	$900.00	$250.00	$750.00	$279.00	$837.00	$500.00	$1,500.00
4	Reinstate Service Using Robotic Cutter and Brush Smooth	91	EA	$118.80	$10,810.80	$200.00	$18,200.00	$175.00	$15,925.00	$99.00	$9,009.00	$175.00	$15,925.00	$52.00	$4,732.00	$75.00	$6,825.00
5	Trim Host Pipe at Service Connection Prior to Installing CIPP Liner	1	EA	$1,000.00	$1,000.00	$250.00	$250.00	$900.00	$900.00	$350.00	$350.00	$500.00	$500.00	$334.00	$334.00	$500.00	$500.00
6	Install CIPP Service Lateral Seal with 8" to 10" Main Line Connection (including approx. 1-foot of lateral liner)	88	EA	$1,865.40	$164,155.20	$1,850.00	$162,800.00	$1,950.00	$171,600.00	$2,250.00	$198,000.00	$2,370.00	$208,560.00	$2,835.00	$249,480.00	$3,136.15	$275,981.20
7	Remove Concrete from Manhole Invert	3	EA	$350.00	$1,050.00	$1,000.00	$3,000.00	$550.00	$1,650.00	$120.00	$360.00	$585.00	$1,755.00	$785.00	$2,355.00	$350.00	$1,050.00
	TOTAL BID AMOUNT				**$393,146.00**		**$445,540.00**		**$473,965.00**		**$477,179.00**		**$484,920.00**		**$518,897.00**		**$610,657.80**

Bids Certified By: _____ Date: 11-26-2019

Brandon A. Sykes, PE
Hydrostructures, PA
126 Commerce Court
Pittsboro, NC, 27312
License # C-1895

NORTH CAROLINA PROFESSIONAL SEAL 033747 ENGINEER BRANDON A. SYKES

11-26-2019

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

NOTICE OF AWARD

Date of Issuance:

Owner: Town of Apex | Owner's Contract No.:

Engineer: Hydrostructures, PA | Engineer's Project No.:

Project: Priority Sewer Rehabilitation Project - 2019 | Contract Name: Priority Sewer Rehabilitation Project - 2019

Bidder: Insituform Technologies, Inc.

Bidder's Address: 17988 Edison Avenue, Chesterfield, MO 63005

TO BIDDER:

You are notified that Owner has accepted your Bid dated November 19, 2019 for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

Priority Sewer Rehabilitation Project – 2019

The Contract Price of the awarded Contract is: $ 393,146.00.

[4] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically.

☒ a set of the Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner [4] counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security *[e.g., performance and payment bonds]* and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any): None

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: Town of Apex
Authorized Signature

By: Drew Havens

Title: Town Manager

Copy: Engineer

Acceptance of Notice

Receipt of the above Notice of Award is hereby acknowledged by _____

this the _____ day of _____, 20___.

By:_____ Title:_____

BIDDER'S CHECKLIST

This checklist shall be included as the first page of the submitted bidding documents. As outlined in article 7 of the Bid Form the following items shall be included with the submitted bidding documents:

✓	-	Properly Executed Bid Form (Including the acknowledgement of all Addenda)
✓	A.	Required Bid security in the form of a Bid Bond (EJCDC No. C-430) or Certified Check (circle type of security provided); Bid Bond shall include an executed Power of Attorney.
✓	B1.	Identification of Minority Business Participation
✓	B2.	Affidavit A, Listing of Good Faith Efforts; or Affidavit B, Intent to Perform Contract with Own Workforce

BID FORM

Project: Priority Sewer Rehabilitation Project – 2019

Bid From: Insituform Technologies, LLC

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Article 6 – Time of Completion	3
Article 7 – Attachments to this Bid	4
Article 8 – Defined Terms	4
Article 9 – Bid Submittal	5

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

TOWN OF APEX
P.O. BOX 250, 73 HUNTER STREET
APEX, NC 27502-0250

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No.	Addendum, Date
1	11/14/19

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related

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reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

K. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

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4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the e execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
1	CIPP Rehabilitation of 8" Sewer	LF	8,020	26.50	$ 212,530.00
2	CIPP Rehabilitation of 10" Sewer	LF	60	45.00	$ 2,700.00
3	Cut Intruding Services Using Robotic Cutter	EA	3	300.00	$ 900.00
4	Reinstate Service Using Robotic Cutter and Brush Smooth	EA	91	118.80	$ 10,810.80
5	Trim Host Pipe at Service Connection Prior to Installing CIPP Liner	EA	1	1,000.	$ 1,000.00
6	Install CIPP Service Lateral Seal with 8" or 10" Main Line Connection (including approx. 1-foot of lateral liner)	EA	88	1,865.40	$ 164,155.20
7	Remove Concrete from Manhole Invert	EA	3.0	350.00	$ 1,050.00
Total of All Unit Price Bid Items					$ 393,146.00

Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

Total of Lump Sum and Unit Price Bids = Total Bid Price $ 393,146.00

Three hundred ninety three thousand one hundred forty six & 00/100 dollars

Time of Completion

5.02 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

5.03 Bidder accepts the provisions of the Agreement as to liquidated damages.

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ARTICLE 6 – ATTACHMENTS TO THIS BID

6.01 The following documents are submitted with and made a condition of this Bid. Failure to provide the documentation with the bid may be grounds for rejection of the bid.:

A. Required Bid security in the form of a Bid Bond (EJCDC No. C-430) or Certified Check (circle type of security provided).

B. In accordance with GS 143-128.2(c), Bidder shall identify on its bid the minority businesses that it will use on the project and the total dollar value of the bid that will be performed by the minority businesses and list the good faith efforts (Affidavit A) made to solicit participation. A Bidder that will perform all of the work with its own workforce may submit an Affidavit (B) to that effect in lieu of the affidavit (A) required above.

1. Identification of Minority Business Participation.

2. Affidavit A, Listing of Good Faith Efforts; or Affidavit B, Intent to Perform Contract with Own Workforce.

C. In accordance with GS 64-26(a), Bidders shall submit the E-Verify Affidavit to document that the work authorization of their employees has been verified through E-Verify. The Affidavit shall also document that the Bidders subcontractors comply with E-Verify.

D. In accordance with GS 143C-6A(a), Bidders shall submit the Iran Divestment Act Certification to document that the bidder affirms that they are not on the State Treasurer's Final Divestment List. The Certification shall also document that the Bidders subcontractors and vendors are in compliance.

E. Submit the Bidder's Checklist as provided in the bidding documents with the bid submittal. The Checklist shall be completed and included as the first page of the submittal.

F. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;

G. Contractor's License No.: 42890 **[or]** Evidence of Bidder's ability to obtain a State Contractor's License and a covenant by Bidder to obtain said license within the time for acceptance of Bids;

6.02 After the bid opening the Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder. Upon notification of being the apparent low Bidder, the Bidder shall then file within 72 hours of the notification of being the apparent lowest bidder, the following:

A. An Affidavit (C) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the goal established by the Owner and indicated in the Instruction to Bidders, paragraph Minority Participation Goals. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort; or

B. Affidavit (D) of its good faith effort to meet the goal. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

6.03 Bidder understands that if this Bid is accepted by the Owner, Bidder shall not substitute for the subcontractors named in the Bid Documents except as allowed in the Supplementary Conditions.

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ARTICLE 7 – DEFINED TERMS

7.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 8 – BID SUBMITTAL

Contractor's License

A. Number: 42890

B. Classification: PU (Water Lines & Sewer Lines)

C. Limitation: Unlimited

Employer's Tax ID No.: 13-3032158

BIDDER: *[Indicate correct name of bidding entity]*

Insituform Technologies, LLC

Telephone Number: (636) 530-8000

Fax Number: (636) 530-8701

Contact Name and e-mail address: Diane Partridge, Contracting and Attesting Officer

dpartridge@aegion.com

This Bid Submitted by:

An Individual

N/A

Name: _____
(Type or print)

By: _____
(Individual's Signature)

Doing Business As: _____
(Type or print)

A Partnership

N/A

Partnership Name: _____

The Organization and Internal Affairs of the Partnership are governed by the laws of the State of: _____

By: _____
(Signature of general partner, attach evidence of authority to sign)

Name: _____
(Type or print)

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Title: _____
(Type or print)

Attest: _____
(Signature of Corporate Secretary)

A Corporation

N/A

Corporation Name: _____

State of Incorporation: _____

Type (General Business, Profession, Service, Limited Liability):

_____

By: _____
(Signature, attach evidence of authority to sign)

Name: _____
(Type or print)

Title: _____
(Type or print)

Attest: _____ Corporate Seal
(Signature of Corporate Secretary)

Date of Qualification to do business in North Carolina is _____.

Limited Liability Company – LLC

Name of LLC: Insituform Technologies, LLC

Name of State under whose Laws the Limited Liability Company was formed: Delaware

By: Diane Partridge
(Signature of Manager)

Name: Diane Partridge
(Type or print)

Title: Contracting and Attesting Officer
(Type or print)

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INSITUFORM TECHNOLOGIES, LLC

PRESIDENT APPOINTMENT OF
CONTRACTING AND ATTESTING OFFICERS

The undersigned, being the President of Insituform Technologies, LLC, a Delaware Limited Liability Company (the "Company"), and pursuant to the authority set forth in the Limited Liability Company Operating Agreement of the Company, hereby determines that:

1. Christlanda Adkins, Janet Hass, Jana Lause, Diane Partridge, Whittney Schulte, and Ursula Youngblood are appointed as Contracting and Attesting Officers of the Company, each with the authority, individually and in the absence of the others, subject to the control of the Board of Managers of the Company, to: (i) certify and attest to the signature of any officer of the Company; (ii) enter into and bind the Company to perform pipeline rehabilitation activities of the Company and all matters related thereto, including the maintenance of one or more offices and facilities of the Company; (iii) execute and to deliver documents on behalf of the Company; and (iv) take such other action as is or may be necessary and appropriate to carry out the project, activities and work of the Company.

2. Any person previously appointed or serving as a Contracting and Attesting Officer of the Company prior to the date hereof and who is not named above is hereby removed from any such appointment.

Dated: October 31, 2019

Ralph E. Western
President

EJCDC

PENAL SUM FORM

BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER *(Name and Address)*:
Insituform Technologies, LLC
17988 Edison Avenue, Chesterfield, MO 63005

SURETY *(Name, and Address of Principal Place of Business)*:
Travelers Casualty and Surety Company of America
One Tower Square, Hartford, CT 06183

OWNER *(Name and Address)*:

Town of Apex
P.O. Box 250, 73 Hunter Street
Apex, NC 27502-0250

BID

Bid Due Date: **November 19, 2019**
Description *(Project Name— Include Location)*: **Priority Sewer Rehabilitation Project-2019**

BOND

Bond Number: **N/A**
Date: **November 19, 2019**
Penal sum **Five Percent of the Amount Bid** (Words) $ **5% Amount Bid** (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER	**SURETY**
Insituform Technologies, LLC (Seal)	**Travelers Casualty and Surety Company of America** (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: Diane Partridge	By:
Signature	Signature (Attach Power of Attorney)
Diane Partridge	**Ashley Miller**
Print Name	Print Name
Contracting & Attesting Officer	**Attorney-in-Fact**
Title	Title
Attest: Janet Hass	Attest: Amanda L Williams
Signature	Signature
Title **Janet Hass, Contracting & Attesting Officer**	Title **Amanda L. Williams, Witness**

Note: Addresses are to be used for giving any required notice.
Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2 All Bids are rejected by Owner, or

3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

State of **Missouri**
County of **St. Louis**

On **11/19/2019**, before me, a Notary Public in and for said County and State, residing therein, duly commissioned and sworn, personally appeared **Ashley Miller** known to me to be Attorney-in-Fact of

TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA

the corporation described in and that executed the within and foregoing instrument, and known to me to be the person who executed the said instrument in behalf of said corporation, and he duly acknowledged to me that such corporation executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year stated in this certificate above.

Amanda L. Williams

Amanda L. Williams, Notary Public

AMANDA L. WILLIAMS
NOTARY PUBLIC - NOTARY SEAL
STATE OF MISSOURI
COMMISSIONED FOR ST. LOUIS COUNTY
MY COMMISSION EXPIRES JUL. 24, 2021
ID #13507257

My Commission Expires: _____

TRAVELERS

Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **Ashley Miller** of **Chesterfield** **Missouri**, their true and lawful Attorney-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **3rd** day of **February, 2017.**

State of Connecticut

City of Hartford ss.

By: _____
Robert L. Raney, Senior Vice President

On this the **3rd** day of **February, 2017**, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June, 2021**

Marie C. Tetreault
Marie C. Tetreault, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

Dated this **19** day of **November**, **2019**

Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.
Please refer to the above-named Attorney-in-Fact and the details of the bond to which the power is attached.

Attach to Bid Attach to Bid **Bidders must provide *either* Affidavit A or Affidavit B (not both)** Attach to Bid Attach to Bid

Identification of Minority Business Participation

I, Insituform Technologies, LLC
(Name of Bidder)

do hereby certify that on this project, we will use the following minority business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	Work type	*Minority Category
N/A none		

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

The total value of minority business contracting will be ($) 0.00 .

Attach to Bid Attach to Bid **Bidders must provide *either* Affidavit A or Affidavit B (not both)** Attach to Bid Attach to Bid

State of North Carolina AFFIDAVIT A – Listing of Good Faith Efforts

County of _____

(Name of Bidder)

Affidavit of Insituform Technologies, LLC

I have made a good faith effort to comply under the following areas checked:

Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive. (1 NC Administrative Code 30 I.0101)

- ☑ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- ☑ **2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- ☑ **3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- ☑ **4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ☑ **5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- ☐ **6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- ☐ **7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- ☐ **8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- ☐ **9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- ☐ **10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: Nov. 19, 2019 Name of Authorized Officer: Diane Partridge

Signature: Diane Partridge

Title: Contracting and Attesting Officer

JANET W. HASS
Notary Public – Notary Seal
St Louis County – State of Missouri
Commission Number 12529086
My Commission Expires May 2, 2020

SEAL

State of ~~North Carolina~~ Missouri, County of St. Louis

Subscribed and sworn to before me this 19th day of Nov. 20 19

Notary Public Janet W. Hass

My commission expires 11/27/20

MBForms

License Year

2019

License No.

42890

North Carolina

Licensing Board for General Contractors

This is to Certify That:

Insituform Technologies, LLC
Chesterfield, MO

is duly registered and entitled to practice

General Contracting

Limitation: Unlimited
Classification: PU(Water Lines & Sewer Lines)

until

December 31, 2019

when this Certificate expires.
Witness our hands and seal of the Board.
Dated, Raleigh, N.C.

January 1, 2019

This certificate may not be altered.

LICENSING BOARD FOR GENERAL CONTRACTORS
MAY 20. 1775
NORTH CAROLINA

J. [signature]
Chairman

C. Frank Wiesner
Secretary-Treasurer

NORTH CAROLINA
Department of the Secretary of State

CERTIFICATE OF AUTHORIZATION
(Limited Liability Company)

I, Elaine F. Marshall, Secretary of State of the State of North Carolina, do hereby certify that

INSITUFORM TECHNOLOGIES, LLC

a limited liability company organized under the laws of Delaware, was authorized to transact business in the State of North Carolina by issuance of a certificate of authority on the 20th day of January, 2012.

I FURTHER certify that the said limited liability company's certificate of authority is not suspended for failure to comply with the Revenue Act of the State of North Carolina; that the said limited liability company's certificate of authority is not revoked for failure to comply with the provisions of the North Carolina Limited Liability Company Act; and that a certificate of withdrawal has not been issued in the name of the said limited liability company as of the date of this certificate.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal at the City of Raleigh, this 27th day of March, 2017.

Elaine F. Marshall

Secretary of State

Scan to verify online.

NORTH CAROLINA
Department of the Secretary of State

To all whom these presents shall come, Greetings:

I, Elaine F. Marshall, Secretary of State of the State of North Carolina, do hereby certify the following and hereto attached to be a true copy of

APPLICATION FOR CERTIFICATE OF AUTHORITY

OF

INSITUFORM TECHNOLOGIES, LLC

the original of which was filed in this office on the 20th day of January, 2012.

Scan to verify online.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal at the City of Raleigh, this 20th day of January, 2012.

Elaine F. Marshall

Secretary of State

SOSID: 1239549
Date Filed: 1/20/2012 8:45:00 AM
Elaine F. Marshall
North Carolina Secretary of State
C201201900484

State of North Carolina
Department of the Secretary of State

APPLICATION FOR CERTIFICATE OF AUTHORITY FOR LIMITED LIABILITY COMPANY

Pursuant to §57C-7-04 of the General Statutes of North Carolina, the undersigned limited liability company hereby applies for a Certificate of Authority to transact business in the State of North Carolina, and for that purpose submits the following:

1. The name of the limited liability company is INSITUFORM TECHNOLOGIES, LLC ;

   and if the limited liability company name is unavailable for use in the State of North Carolina, the name the limited liability company wishes to use is _____

2. The state or country under whose laws the limited liability company was formed is: Delaware

3. The date of formation was 03/27/1980 ; its period of duration is: Perpetual

4. Principal office information: (*Select either a or b.*)

   a. ☒ The limited liability company has a principal office.

   The street address and county of the principal office of the limited liability company is:

   Number and Street 17988 Edison Ave.
   City, State, Zip Code Chesterfield, MO 63005 County St. Louis

   The mailing address, ***if different from the street address***, of the principal office of the corporation is:

   _____

   b. ☐ The limited liability company does not have a principal office.

5. The street address and county of the registered office in the State of North Carolina is:

   Number and Street 327 Hillsborough Street

   City, State, Zip Code Raleigh, NC 27603 County Wake

6. The mailing address, ***if different from the street address***, of the registered office in the State of North Carolina is:

   _____

7. The name of the registered agent in the State of North Carolina is: Corporation Service Company

CORPORATIONS DIVISION P. O. BOX 29622 RALEIGH, NC 27626-0622

(Revised January 2002) *(Form L-09)*

APPLICATION FOR CERTIFICATE OF AUTHORITY
Page 2

8. The names, titles, and usual business addresses of the current managers of the limited liability company are:
(use attachment if necessary)

Name	*Business Address*
Joe Burgess	17988 Edison Ave. Chesterfield MO 63005
David F. Morris	17988 Edison Ave. Chesterfield MO 63005
David Martin	17988 Edison Ave. Chesterfield MO 63005

9. Attached is a certificate of existence (or document of similar import), duly authenticated by the secretary of state or other official having custody of limited liability company records in the state or country of formation. **The Certificate of Existence must be less than six months old. A photocopy of the certification cannot be accepted.**

10. If the limited liability company is required to use a fictitious name in order to transact business in this State, a copy of the resolution of its managers adopting the fictitious name is attached.

11. This application will be effective upon filing, unless a delayed date and/or time is specified: _____

This the 9th day of January, 2012

INSITUFORM TECHNOLOGIES, LLC
Name of Limited Liability Company

Signature of Manager

David F. Morris, Manager
Type or Print Name

Notes:
1. **Filing fee is $250.** This document must be filed with the Secretary of State.

CORPORATIONS DIVISION P. O. BOX 29622 RALEIGH, NC 27626-0622
(Revised January 2002) *(Form L-09)*

Delaware

The First State

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "INSITUFORM TECHNOLOGIES, LLC" IS DULY FORMED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE SEVENTEENTH DAY OF JANUARY, A.D. 2012.

AND I DO HEREBY FURTHER CERTIFY THAT THE SAID "INSITUFORM TECHNOLOGIES, LLC" WAS FORMED ON THE TWENTY-SEVENTH DAY OF MARCH, A.D. 1980.

AND I DO HEREBY FURTHER CERTIFY THAT THE ANNUAL TAXES HAVE BEEN PAID TO DATE.



Jeffrey W. Bullock, Secretary of State

0889565 8300

120055443

AUTHENTICATION: 9301190

DATE: 01-17-12

You may verify this certificate online at corp.delaware.gov/authver.shtml

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

December 21, 2018

DIANE PARTRIDGE
INSITUFORM TECHNOLOGIES, LLC
1819 JOHN MOORE RD
MONROE, NC 28110

Dear DIANE PARTRIDGE:

Subject: First Renewal as a Subcontractor

The information you submitted to the Department for approval as a Subcontractor has been reviewed and your firm has been approved for the following work codes:

001510:WATER/SEWER LINE INSTALLATION

Accordingly, the Department considers your firm prequalified as a Subcontractor until 12/31/2019. Failure to renew or requalify will result in removal from our prequalified contractors' list.

If at any time prior to your next renewal date there is a change in any information for your firm, please proceed to the following website and submit a notice of change in your firm's information:

https://apps.ncdot.gov/vendor/prequal

Sincerely,

Phyllis Scudder
Qualification Officer
Contract Standards and Development
919-707-4815

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
CONTRACTUAL SERVICES UNIT
1509 MAIL SERVICE CENTER
RALEIGH, NC 27699-1509

Telephone: (919) 707-4800
Fax: (919) 250-4127
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
1020 BIRCH RIDGE DRIVE
BUILDING B
RALEIGH, NC 27610

Insituform
Technologies, LLC
Worldwide Pipeline Rehabilitation

Robert Van Horne
1076-A Van Buren Ave.
Indian Trail, NC 28079

Tel: 704-221-8443
Fax: 704-296-5121
rvanhorne@aegion.com

RE: MBE Forms & GFE's Apex Sewer Rehab 2019 **November 22, 2019**

Brandon Sykes, PE
Hydrostructures, PA
126 Commerce Court
Pittsboro, NC 27312

(910) 819-5109
Brandon.sykes@hydrostructures.com

Dear Brandon,

Per our email today, please see attached MBE forms and documentation of Insituform's Good Faith Efforts for the Apex Sewer Rehabilitation job.

Enclosed includes:

- Affidavit D
- Good Faith Efforts
- Copy of Insituform's MBE solicitation ad
- Copies of email solicitations to MBE's and phone record log notes
- Proof of MBE ad posting in both NCDOA HUB Opportunities website and "The Institute"

I'm sorry we didn't receive any interest for scopes of work advertised.

Please do not hesitate to contact me with any questions.

Very truly yours,

Insituform Technologies, LLC.

Robert Van Horne
Business Development Manager

State of North Carolina AFFIDAVIT D – Good Faith Efforts

County of Wake

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

(Name of Bidder)

Affidavit of: Insituform Technologies, LLC

I do certify the attached documentation as true and accurate representation of my good faith efforts.

(Attach additional sheets if required)

Name and Phone Number	*Minority Category	Work description	Dollar Value
please see attached documentation			

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Documentation of the Bidder's good faith efforts to meet the goals set forth in these provisions. Examples of documentation include, but are not limited to, the following evidence:

A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.

B. Copies of quotes or responses received from each firm responding to the solicitation.

C. A telephone log of follow-up calls to each firm sent a solicitation.

D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.

E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.

F. Copy of pre-bid roster.

G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.

H. Letter detailing reasons for rejection of minority business due to lack of qualification.

I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

Date: 11/20/19 Name of Authorized Officer: Diane Partridge

Signature: Diane Partridge

Title: Contracting and Attesting Officer

JANET W HASS
Notary Public – Notary Seal
St Louis County – State of Missouri
Commission Number: 12479086
My Commission Expires Nov 27, 2020

SEAL

State of ~~North Carolina~~ Missouri, County of St. Louis

Subscribed and sworn to before me this 20 day of Nov 20 19

Notary Public Janet W. Hass

My commission expires 11/27/20

Insituform Technologies, LLC
1076-A Van Buren Ave.
Indian Trail, NC 28079

November 15, 2019

RE: Town of Apex, North Carolina
Priority Sewer Rehabilitation Project – 2019

The Town of Apex will be receiving sealed bids on this project November 19, 2019 @ 3:00 pm.

Scope: Approximately 8,020 LF of 8" CIPP Rehabilitation. 60 IF of 10" CIPP. Reinstatement of 91 services. Installation of 88 laterals of 8" & 10" service mains. Cutting of protruding taps.

Insituform Technologies, Inc. is bidding as a general contractor on the project listed above.
We are soliciting subcontract bids from certified MBE/WBE/DBE firms in the following areas:

- Pipeline cleaning & CCTV inspection
- Lateral lining
- Cutting of Protruding Taps

All bids must be received by November 18th at noon to allow time for review. If you have questions or require additional information, please feel free to call Robert Van Horne at (704) 221-8443. You may email your proposal to rvanhorne@aegion.com. A link to the Plans and Specifications will be provided upon request. Please send the request for the Plans and Specs to rvanhorne@aegion.com, reference in the request, Town of Apex. If you have any questions, please contact me.

Insituform Technologies, LLC will negotiate fairly with interested minorities and will not reject without sound reason. If not selected, you may contact me to discuss the reason for rejection.

Insituform Technologies, LLC will assist or advise concerning obtaining bonding, loan capital, lines of credit, and insurance or joint pay agreements.

Insituform Technologies, LLC will be glad to discuss partnership arrangements where possible and quick pay agreements.

Bob Van Horne

From: Terrell, Melissa <melissa.terrell@doa.nc.gov>
Sent: Monday, November 4, 2019 9:52 AM
To: Bob Van Horne
Subject: [EXTERNAL]Insituform Technologies, LLC - PRIORITY SEWER REHABILITATION PROJECT - 2019 - Apex, NC

November 4, 2019

Dear Bob,

Your invitation to the bid notice has been posted on the HUB Office Bid Opportunities webpage: https://ncadmin.nc.gov/news/events-calendar/2019/11/19/insituform-technologies-llc-priority-sewer-rehabilitation-project

Please review the posting and let us know if any changes are needed.

- We strongly encourage you to print your posting to keep as documentation of your efforts to reach Historically Underutilized Businesses.
- Please let us know the name of the company that was awarded the work by e-mailing it to John Guenther (john.guenther@doa.nc.gov).
    - If you know if the winning company is a HUB or any of its subcontractors are HUBs that would be helpful to know as well.

Thank you for using the HUB Bid Opportunities website and for providing feedback on who responds to your posting.

Sincerely,

Melissa Terrell
Community Engagement Specialist
Office for Historically Underutilized Businesses
Department of Administration

919 807 2339
Melissa.Terrell@doa.nc.gov

116 West Jones Street
Suite 4109
Raleigh, NC 27603-8002

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

NC DOA

Department of Administration

DOA HOME

Insituform Technologies, LLC - PRIORITY SEWER REHABILITATION PROJECT - 2019 - Apex, NC

Event Description

Organization Information

Insituform Technologies, LLC

BID Information

BID Due Time 3:00 pm
Bid Due Date 11/19/2019
BID Location Street Address Public Works Administration Building at 105-B Upchurch Street, Apex, NC 27502

Project Information

Project Title PRIORITY SEWER REHABILITATION PROJECT - 2019

Project Location Street Address Public Works Administration Building at 105-B Upchurch Street, Apex, NC 27502

Donate to Hurricane Recovery

Scope of Work

The Project consists of cured-in-place lining of approximately 8,080 LF of existing 8 through 10-inch sewer main, installation of 88 service lateral connection seals, and associated work.

Pre-Bid Information

Pre-Bid Meeting Yes
Pre-Bid Meeting Optional
Pre-Bid Meeting Time 2:00 pm
Pre-Bid Meeting Date 11/05/2019

Pre-Bid Meeting Location Address

Public Works Administration Building
105-B Upchurch Street
Apex, NC 27502

* HUB certified vendors/contractors are encouraged to submit a bid for this project*

When and Where



(https://maps.google.com/maps?daddr=105-B%20Upchurch%20Street%2C%20Apex%2C%20NC%2027502%2C%20United%20States)

When:
Tuesday, November 19, 2019 - 3:00 p.m.

Where:
105-B Upchurch Street
Public Works Administration Building

Donate to Hurricane Recovery

Apex, NC 27502
United States

Contact:
Robert Van Horne
rvanhorne@aegion.com (mailto:rvanhorne@aegion.com)
704-221-8443

Share this page:

 Facebook (https://www.facebook.com/sharer/sharer.php?u=https%3A%2F%2Fncadmin.nc.gov%2Fnews%2Fevents-calendar%2F2019%2F11%2F19%2Finsituform-technologies-llc-priority-sewer-rehabilitation-project)

 Twitter (http://twitter.com/intent/tweet?url=https%3A%2F%2Fncadmin.nc.gov%2Fnews%2Fevents-calendar%2F2019%2F11%2F19%2Finsituform-technologies-llc-priority-sewer-rehabilitation-project)

Bob Van Horne

From: Bob Van Horne
Sent: Thursday, November 7, 2019 11:36 AM
To: 'Dan Stafford'
Subject: Please post MBE ad The Institute
Attachments: Apex, NC MBE ad.docx

Hi Dan , can you please post the attached ad in "The Institute"?
Thanks again for all your help,
Bob

Note my new address below.

Robert Van Horne | Business Development Manager | Insituform Technologies, LLC
1076-A Van Buren Ave. | Indian Trail, NC 28079
Office: 704. 296.5110 | **Mobile: 704.221.8443** | **Fax: 704.296.5121** | www.Aegion.com
rvanhorne@aegion.com

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« All Events

Insituform/Apex Priority Sewer Rehab

November 19 @ 8:00 am - 5:00 pm

Insituform Technologies, LLC

1076-A Van Buren Ave.

Indian Trail, NC 28079

November 12, 2019

RE: Town of Apex, North Carolina

Priority Sewer Rehabilitation Project – 2019

The Town of Apex will be receiving sealed bids on this project November 19, 2019 @ 3:00 pm.

Scope: Approximately 8,020 LF of 8" CIPP Rehabilitation. 60 lF of 10" CIPP. Reinstatement of 91 services. Installation of 88 laterals of 8" & 10" service mains. Cutting of protruding taps.

Insituform Technologies, Inc. is bidding as a general contractor on the project listed above.

We are soliciting subcontract bids from certified MBE/WBE/DBE firms in the following areas:

- Pipeline cleaning & CCTV inspection
- Lateral lining
- Cutting of Protruding Taps

Search products...

- Insituform Technologies, LLC will be glad to discuss partnership arrangements where possible and quick pay agreements.
- Insituform Technologies, LLC will assist or advise concerning obtaining bonding, loan capital, lines of credit, and insurance or joint pay agreements.
- Insituform Technologies, LLC will negotiate fairly with interested minorities and will not reject without sound reason. If not selected, you may contact me to discuss the reason for rejection.
- All bids must be received by November 18th at noon to allow time for review. If you have questions or require additional information, please feel free to call Robert Van Horne at (704) 221-8443. You may email your proposal to rvanhorne@aegion.com. A link to the Plans and Specifications will be provided upon request. Please send the request for the Plans and Specs to rvanhorne@aegion.com, reference in the request, Town of Apex. If you have any questions, please contact me.
-
-

+ GOOGLE CALENDAR + ICAL EXPORT

Details

Date:
November 19

Time:
8:00 am - 5:00 pm

Event Category:
Bid Opportunities

« McDavid/Southeastern Wayne Sanitary District

McDavid/ Jones Contracts 3-5 Rebid »

Search products...

Bob Van Horne

From: Bob Van Horne
Sent: Thursday, November 7, 2019 1:20 PM
Subject: Town of Apex MBE ad for 11/19/19 bid
Attachments: Apex, NC MBE ad.docx

Please see the attached and let me know if you are interested in bidding any of your respective scopes as subcontractor. Specs/Maps can be provided upon request.
Questions, please call me.

Thanks very much,
Bob

Note my new address below.

Robert Van Horne | Business Development Manager | Insituform Technologies, LLC
1076-A Van Buren Ave. | Indian Trail, NC 28079
Office: 704. 296.5110 | Mobile: 704.221.8443 | Fax: 704.296.5121 | www.Aegion.com
rvanhorne@aegion.com

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Aegion is the parent company of Aegion Coating Services, AllSafe Services, The Bayou Companies, Brinderson, Corrpro, Fibrwrap Construction, Fyfe Co., Insituform, MTC, Schultz, Underground Solutions and United Pipeline Systems

Bob Van Horne

From: Microsoft Outlook
To: stepconstruct@aol.com
Sent: Thursday, November 7, 2019 1:20 PM
Subject: Relayed: Town of Apex MBE ad for 11/19/19 bid

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

stepconstruct@aol.com (stepconstruct@aol.com)

Subject: Town of Apex MBE ad for 11/19/19 bid

MBE

no response

Bob Van Horne

From: Microsoft Outlook
To: trentlocklear@bellsouth.net
Sent: Thursday, November 7, 2019 1:20 PM
Subject: Relayed: Town of Apex MBE ad for 11/19/19 bid

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

trentlocklear@bellsouth.net (trentlocklear@bellsouth.net)

Subject: Town of Apex MBE ad for 11/19/19 bid

DBE, SBE, & MBE
No response

Bob Van Horne

From: Microsoft Outlook
To: bandmpipe@yahoo.com; blackshearcorp@yahoo.com
Sent: Thursday, November 7, 2019 1:20 PM
Subject: Relayed: Town of Apex MBE ad for 11/19/19 bid

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

bandmpipe@yahoo.com (bandmpipe@yahoo.com)

blackshearcorp@yahoo.com (blackshearcorp@yahoo.com)

Subject: Town of Apex MBE ad for 11/19/19 bid

DBE's & MBE's.

B+M is also HUB

no response from either

Bob Van Horne

From: postmaster@moffatpipe.com
To: bids@moffatpipe.com
Sent: Thursday, November 7, 2019 1:20 PM
Subject: Expanded: Town of Apex MBE ad for 11/19/19 bid

Your message has been delivered to the following groups:

bids@moffatpipe.com

Subject: Town of Apex MBE ad for 11/19/19 bid

DBE, WBE, + HUB
Jacob Kirs responded
not interested in
quoting.
phone call 11/11/19.

Bob Van Horne

From: Microsoft Outlook
To: rellandrod@comporium.net
Sent: Thursday, November 7, 2019 1:20 PM
Subject: Relayed: Town of Apex MBE ad for 11/19/19 bid

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

rellandrod@comporium.net (rellandrod@comporium.net)

Subject: Town of Apex MBE ad for 11/19/19 bid

DBE, MBE, SBE

Neely Bros. Construction

no response

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Dennis Brown

Department(s): Administration

Requested Motion

Motion to approve and authorize the town manager to execute contract with Construction Manager at Risk, J M Thompson, in amount of $181,710.00 (for the pre-construction fee only) for the new Pleasant Park Project. Guaranteed Maximum Price (GMP) will be developed and added to this contract by an amendment after subcontractor bidding is completed.

Approval Recommended?

Yes

Item Details

J M Thompson has successfully completed numerous projects around the triangle area and state that included similar park projects and numerous projects with difficult site conditions and constraints. J M Thompson has been working with the town staff and designers to identify and plan for working with and around the difficulties of this site and project.

Attachments

- Copy of Proposed Contract between the Town of Apex and J M Thompson

TOWN OF APEX

CONSTRUCTION MANAGER AT RISK PRE-CONSTRUCTION AND CONSTRUCTION SERVICES CONTRACT

TOWN OF APEX PLEASANT PARK

92 ACRES, OLD US 1 HWY, APEX, NC 27502

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33. INCORPORATION OF DOCUMENTS / COMPLETE CONTRACT

APPENDIX A - GENERAL CONDITIONS OF THE CONTRACT

APPENDIX B - PERFORMANCE BOND

APPENDIX C - PAYMENT BOND

APPENDIX D - CMAR PRE-CONSTRUCTION PROPOSAL/FEE BREAKDOWN

This Construction Manager at Risk Pre-Construction and Construction Services Agreement (hereinafter "Contract") is made and effective on _____ _____ 2019, by and between the Town of Apex, a North Carolina municipal corporation (hereinafter "Town") and the Construction Manager at Risk, J.M. Thompson Company, a North Carolina company with its principal offices located at 1002 East Chatham St., Cary, NC 27513 (hereinafter "CMAR"). Town and CMAR may hereinafter be referred to collectively as "Parties." Services to be provided are as described in this Contract for the construction of the Town of Apex Pleasant Park (hereinafter "Project"). The designer for this Project is WithersRavenel, Inc. (hereinafter "Designer"), along with any of its sub-consultants.

WITNESSETH:

WHEREAS, the Town has resolved to design and construct the Town of Apex Pleasant Park; and

WHEREAS, the Town desires to procure Construction Management Services for pre-construction and construction services as set forth herein and in accordance with any subsequent amendments to the Contract (hereafter called "Services"); and

WHEREAS, the Town published a Request for Qualifications (RFQ) seeking the submission of Statements of Qualifications to act as a Construction Manager at Risk (CMAR) to furnish construction management services during the pre-construction and construction of the Project identified and described in that Request for Qualifications; and

WHEREAS, the undersigned CMAR submitted a responsive Statement of Qualifications, dated February 27, 2019; and

WHEREAS, the Town has evaluated the Statement of Qualifications and approved the selection of the undersigned CMAR to furnish professional construction management services during the design and construction of the Project; and

WHEREAS, the Town has requested from the CMAR and the CMAR has provided a Preconstruction Services Fee Spreadsheet for Services under this Contract, and

WHEREAS, CMAR has affirmed it has the experience, staff, and resources to perform such Services; and

WHEREAS, the Town has agreed to engage the CMAR, and the CMAR has agreed to contract with the Town, for performance of services as described, and according to the further terms and conditions, set forth herein.

NOW THEREFORE, in consideration of sums to be paid to the CMAR, and other good and valuable consideration, the CMAR and Town do contract and agree as follows:

1. RESPONSIBILITIES OF CMAR:

1.1 Reporting / Coordination. CMAR shall provide progress reports in a format acceptable to the Town at intervals requested by the Town or otherwise established in this Contract, and any Supplemental Contract. At any time, upon request, the Town shall be entitled to information regarding the status of the Project. CMAR is responsible for coordinating its work with the Town in such a manner so as to meet Project deadlines.

1.2 Delays / Extensions. If delays to the completion date for the Project or for tasks within the Project that have individual deadlines result from circumstances that could not reasonably be foreseen by CMAR and which are beyond the reasonable control of the CMAR, one or more extensions of time may be granted, upon written request documenting the reasons for the request. The Town may, in its discretion, which shall be reasonably exercised, grant such request if such request falls within the parameters set forth in Section 30 of the General Conditions of the Contract in Appendix A.

1.3 Responsibilities for Services Performed. CMAR shall maintain an adequate professional staff within the state of North Carolina to render Services to the Town. CMAR may use subcontractors to provide Services only if such subcontractors and the services to be performed are identified in either the Contract or any Contract Amendment. Otherwise, all services described in the Contract, and any Contract Amendment, shall be rendered by CMAR's employees. CMAR is responsible for the professional quality, technical accuracy, and timely completion and submission of all Services performed under this Contract, and any Contract Amendment, and for the performance and payment of all its subcontractors.

1.4 Professional Certifications / Endorsements. All plans, documents, reports, studies, calculations, and other data or materials prepared by the CMAR will bear the endorsement of a person employed by CMAR or its approved sub-contractors who shall be duly registered in the appropriate professional architect, engineer or other category for the work performed, if delegated design is required for a specific portion of the Work. It is understood that the Owner has hired the Designer to perform all architectural and engineering design services for the Project.

1.5 Retention of Records. CMAR shall maintain all books, documents, and papers pertaining to Services performed under this Contract, and accounting records and other records of costs incurred in performance of this Contract, and any Supplemental Contracts, and shall make them available to the Town upon request during the period of this Contract, and in accordance with Chapter 132 of the North Carolina General Statutes, after final payment is made. Records of costs incurred include the CMAR's general accounting records and the Project records, together with supporting documents and records of the CMAR and its subcontractors performing work on the Project, and all other records of the CMAR and its subcontractors considered necessary by the Town for a proper audit of Project costs.

1.6 Meetings. CMAR shall meet with Town representatives at mutually agreed upon times upon the Town's request. Such meetings shall be held at locations designated by the Town.

2. RESPONSIBILITIES OF TOWN:

2.1 Town Authority. Once authorized by the Town Council through approval of this Contract, the Town Manager, or designated representative, shall be authorized to take actions on behalf of the Town with respect to performance of this Contract, and any Supplemental Contracts. His instructions, requests, and decisions on behalf of the Town, where documented in writing, and not inconsistent with this Contract or Supplemental Contracts shall be binding. The Town Manager, or designated representative, may authorize and execute the following changes, if such are agreed to in writing by both parties:

2.1.1 change the amount of payment for particular subtasks, if such changes do not alter the rate of compensation of CMAR or its subordinates, or increase the total compensation required for completion of the Project, or reduce the amount of work being performed by CMAR;

2.1.2 refine or redistribute services where there is no change in the general amount, scope, or nature of the work to be performed on the Project;

2.1.3 extend time for the Project or portion thereof if the final completion date for the Project is not extended by more than 25% of the time originally allotted for the Project.

2.2 Town Information. Town shall provide existing data, plans, reports, and other information in possession of or under control of the Town, which are necessary for CMAR's Performance of Services and shall assist CMAR in obtaining other necessary information from the Town's files. The Town shall provide full information as to its requirements for the Project, consistent with the total Project budget.

2.3 Town Project Manager. The Town shall designate, when necessary, an individual authorized to act in its behalf, who shall examine documents submitted by the CMAR, and render decisions pertaining thereto promptly, to avoid unreasonable delay in the progress of the CMAR's work. The Town's Project Manager shall observe the procedure of issuing instruction to contractors only through the CMAR. The Town's Project Manager shall attend periodic and requested job meetings scheduled by the CMAR and shall be empowered to make commitments for the Town at such meetings. The Town's Project Manager for this project is: Dennis Brown, Construction Project Manager, unless CMAR is notified otherwise in writing by the Town Manager or Assistant Town Manager.

2.3.1 Notice of Inadequate Performance: Town shall give prompt written notice to the CMAR if the Town observes or otherwise becomes aware of any fault or defect in CMAR's conformance to this Contract. Failure to give such notice shall not constitute a waiver of the Town's right to require compliance with this Contract or Supplemental Contracts.

2.4 Insofar as any of the above services are necessary for the CMAR's performance of their obligations under this Contract, the Town shall be responsible for providing such services in a satisfactory and timely manner so as not to delay the CMAR in their performance thereof.

2.5 Services provided by the Town: It is understood that certain services, as required, may be performed and / or furnished by the Town. These services may include the following:

2.5.1 Assist the CMAR by placing at their disposal all available information pertinent to the Project, including previous reports and other relative data.

2.5.2 Assist in gaining access to and making all provisions for the CMAR to enter upon public and private property as required for performance of their services described herein.

2.5.3 Examine all studies, reports, sketches, drawings, specifications, proposals, and other documents prepared by the CMAR, obtaining advice of legal counsel as the Town deems appropriate for such examination and rendering in writing decisions pertaining thereto within a reasonable time so as not to delay the service of the CMAR.

2.5.4 Giving prompt written notice to the CMAR whenever the Town observes or otherwise becomes aware of any problems or changed circumstances in the Project.

2.5.5 Furnishing the CMAR in a timely manner with copies of pertinent correspondence relating to this Project, which would not have otherwise been delivered to the CMAR.

2.5.6 Designate a person, as identified in section 2.3 of this Contract, to act as Town's representative with respect to the work to be performed under this Contract; such person(s) shall have complete authority to transmit instructions, receive information, interpret and define Town's policies and decisions with respect to materials, equipment, elements and systems pertinent to the services covered by this Contract.

2.5.7 The Town shall provide to the CMAR such information as is available to the Town for rendering of services hereunder. The CMAR may rely on the sufficiency of such information.

2.5.8 Insofar as any of the above services are necessary for the CMAR's performance of their obligations under this Contract, the Town shall be responsible for providing such services in a satisfactory and timely manner so as not to delay the CMAR in their performance thereof.

3. SCHEDULE / TIME OF PERFORMANCE:

3.1 The work to be performed and the services rendered under this Contract shall commence as directed by the Town. In performing the services described in this Contract, it is mutually agreed that time is of the essence in the entrance into the obligations of this Contract by each party. The CMAR shall complete work under the Contract as mutually agreed upon.

3.2 The CMAR shall utilize industry standard software to prepare, provide, and maintain appropriately detailed design phase Critical Path Method ("CPM") schedules as approved by the Town.

3.3 Scheduling software shall allow for integration of all aspects of the design processes and provide for coordination of all Services to be performed. The scheduling software shall be capable of producing and coordinating logic developed network diagrams, and tabular reports.

3.4 The Project schedule shall be sufficiently detailed to allow for a realistic projection of design activity sequences and durations. Updated schedules will be required at the end of each design phase established by the Contract between the Town and Designer, and after major value analysis decisions.

3.5 The CMAR is to establish a detailed CPM schedule of the pre-construction/design phase with the concurrence of the Town and Designer. The CMAR is responsible to monitor this schedule during the pre-construction/design phase, ensure that this schedule is updated, and advise the Town of any deficiencies in adhering to this schedule by any party.

4. CMAR FEE AND GENERAL CONDITIONS COSTS:

4.1 The CMAR shall be entitled to payment of a fee (the "CMAR Fee") for its services on the Project and shall be entitled to reimbursement of General Conditions costs as set forth herein, and in accordance with Section 5 below.

4.2 The CMAR Fee shall be three and one half percent (3.5%) of the sum of 1) Cost of the Work, 2) the CMAR - GMP Contingency, and 3) the CMAR General Conditions set forth in the GMP accepted by the Town. The CMAR Fee as a lump sum dollar cost will be shown in a future Contract Amendment. If the Total Construction Budget is adjusted by the Town, the CMAR Fee shall not exceed three and one half percent (3.5%) of the sum of 1) the Cost of the Work, 2) the CMAR - GMP Contingency, and 3) the CMAR General Conditions, as of the date when the final GMP is established and approved by the Town, subject to modification and limitation as set forth herein. The CMAR Fee will include all CMAR home office personnel costs, including officers as well as home office and local office support staff not included in General Conditions below, together with all other CMAR home office overhead costs and profit. CMAR costs which are not to be included in the CMAR Fee are the costs of all Subcontracts, on-site field staff and home office staff providing Services on the Project, General Conditions costs (as provided below), and the CMAR-GMP Contingency described below. Notwithstanding any other provision herein, CMAR's staff and staff positions indicated in the Preconstruction Fee Proposal are reimbursable costs under this Contract. Beyond the Preconstruction Phase, CMAR's staff costs shall be included in the CMAR General Conditions as a lump sum and not as Cost of the Work.

4.3 When a GMP is established (post bidding) and approved for a defined phase of the Work, the CMAR Fee for that GMP shall be converted to a lump sum and be included in the GMP. When the final GMP is established and approved, the CMAR agrees that the cumulative CMAR Fee shall not exceed the maximum amount set forth above in paragraph 4.2. Thereafter, the CMAR Fee shall not be adjusted unless cumulative Town requested Change Orders to the Work of the Project adjust the total Cost of the Work in the total cumulative GMP in excess of **5%** percent. The entire CMAR Fee at the time the final GMP is fixed, including all lump sum CMAR fees for each GMP for a defined phase of Work, shall not exceed the amount in 4.2 above. In the event an adjustment to the CMAR Fee is warranted under this paragraph, a lump sum adjustment to the CMAR Fee shall be equitably determined based on the nature of the changes to the Work, proven changes in the scope of services provided by the CMAR, and any other factor that would affect the effort and cost expended by the CMAR due to changes to the Work.

4.4 In addition to the foregoing CMAR Fee, a lump sum for the General Conditions for the entire Project on a "not-to-exceed" basis will be submitted by the CMAR with GMP 1 for the Town's approval. No costs associated with the CMAR's main office or its main office or other off-site personnel, including the costs associated with the use of items or equipment of the main office, are covered under the General Conditions lump sum. All such costs are deemed to have been included in the CMAR Fee. Subject to approval by the Town's Representative, each GMP may include special designated allowances for defined expenses. The entire General Conditions lump sum shall be fixed at the time of the final GMP, after which the General Conditions shall not be adjusted unless an amount is negotiated with Town-requested Change Orders to the Work of the Project. The sum of the entire General Conditions at the time the final GMP is fixed shall be determined and listed in future Contract Amendments, subject to approval by the Town and modification and limitation as further set forth herein.

4.5 General Conditions shall be broken down into a reasonable number of categories as approved by the Town's Representative. The General Conditions items to be handled by the CMAR on a not-to-exceed lump sum basis are to include, but not necessarily be limited to the following items:

4.5.1 Mobilization: Move on site and establish appropriate field offices.

4.5.2 Reimbursable Expenses: All reimbursable expenses, relating to the Project; except that, with the prior approval of the Town's Representative, travel required for product reviews, selection, inspection, approvals and expediting at the place of production of such products, shall be chargeable at cost of the Work under the GMP.

4.5.3 Temporary Facilities: This shall include an independent office for the Town's Designated Representative(s) and conference rooms for about twenty (20) people; and for providing field office(s) furniture. Provide CMAR's own high-speed Internet connections and field office computers, as needed, for Project tracking purposes. Provide other appropriate office type equipment for field office use, coordinated and approved by the Town's Representative. Field Office(s) temporary electric, heating, water, sanitation, and electronic equipment maintenance and field office operation costs, e.g., stationary, postage, etc., shall be provided after consultation with the Town's Representative. These costs should be incurred judiciously. Establish and maintain appropriate shipping and receiving systems.

4.5.4 Plans / Surveys / Permits / Testing: Reproduction of Construction Documents as needed by the CMAR over and above the allowance for Construction Documents provided by the Town. Provide surveyor's services (site layout, etc.), as required. Acquire all required permits. Perform inspections of the existing buildings and Project conditions and perform destructive testing, if required, to assist the Designer prepare a complete and accurate set of Construction Documents and for the CMAR to estimate the cost of the Work in order to minimize change orders due to unforeseen conditions within allowances in the GMP.

4.5.5 Site Safety / Security / Cleanup: Establish and maintain an on-site safety program throughout the construction phases. (Note: The cost of home office safety personnel is included in the CMAR Fee. The cost of materials and onsite personnel may be included in General Conditions.) Install and maintain temporary facilities, as required: safety barricades, partitions, ladders, stairs, site fencing, signage, first aid, traffic control devices, etc. Provide daily site clean-up, trash collection, and removal. Provide and maintain site security throughout Project construction phases. Provide snow, ice, storm water, sanitary sewer water or other debris removal, as may be required throughout Project construction phases to maintain the safety of the site.

4.5.6 General: Provide temporary weather and dust protection (that which must practically remain outside of subcontracts) as may be required during construction phases. Provide field personnel pagers, and two-way radio throughout the construction phases, as applicable. Include travel expenses for personnel related to off-site equipment/materials survey and inspections. Staffing needs shall be provided by the CMAR as part of General Conditions, and shall be limited to the specific staff positions noted. Provide Project supervisory personnel, as may be required, throughout the

construction phases, e.g., project superintendents, project managers, and project engineers. Provide field office support staff, as may be required, throughout the construction phases, e.g., secretarial, laborers, etc.

4.5.7 Insurance / Bond: Provide 100% Performance and Payment Bonds. Provide liability insurance and provide builder's risk insurance policy in the amount of the GMP unless directed otherwise by Town's Representative.

4.5.8 Close-Out / De-Mobilization: Provide final site/facility clean up. Provide final release of liens for all contracts. Provide sets of all Subcontractor as-built drawings to the Town and Designer; one set will be used by the Designer to prepare as-built drawings.

4.6 The CMAR will be paid for actual General Condition's costs as they are incurred or as otherwise approved by the Town, with no mark-up by the CMAR, except for the CMAR Fee.

4.7 The Town reserves the right to adjust the scope of Work or construction at any time prior to agreement on the final GMP. The Town and the CMAR acknowledge and agree that separate interim GMP will include costs for General Conditions that (a) will overlap or otherwise continue into subsequent phases of the Work and Project, (b) may involve preparation for work to be performed and completed in subsequent phases of the Work and Project, and (c) assures adequate protection and maintenance of Work completed in subsequent phases.

4.8 Deleted.

4.9 Costs for CMAR's staff will be included in the General Conditions lump sum. Unless a schedule of personnel rates are agreed to in writing in an amendment to this Contract, field personnel costs shall be billed at Direct Personnel Expenses / Employee costs (direct salary) plus all customary payroll benefits including but not limited to FICA, SUTA, FUTA, 401K, vacation leave, sick leave, holidays, jury duty leave and bereavement leave with no employee overhead mark up. The staff is limited to full time staff and vehicles which includes the Project Engineer(s), Superintendent(s), Foremen, Project Manager(s), and Project Executive(s) actually furnishing services to the Project, Field Secretaries / Clerks, and occasional laborers (on as needed basis), as amended from time to time by agreement of the parties.

4.10 Additional General Conditions costs alleged to arise from any Town-requested change orders to the Work of the Project will be reviewed on an individual change order basis. After consultation with the Designer, the Town shall determine whether the requested increases are caused by a Town-requested change order.

5. GUARANTEED MAXIMUM PRICE (GMP):

5.1 Time is of the essence under this Contract. The CMAR shall exert its best efforts and work with the Designer scheduling the packaging of bids and bidding the Work to accomplish substantial completion at the earliest possible date. The CMAR will develop and submit a GMP for each major phase of construction in order to accomplish the most expeditious schedule for the Work. The number of construction phases shall be developed in conjunction with the Designer and Town and shall be approved by the Town. The CMAR shall reconcile the schedule and GMP with Designer and Town against pre-established budget and schedule. Upon submission by the Designer of sealed and signed Construction Documents for an agreed phase of the Work, the CMAR will promptly begin soliciting Trade Subcontractor bids for that phase, which will include all costs of construction (hereinafter sometimes referred to as "Cost of the Work"). The CMAR will promptly and not later than 45 calendar days after receipt of Construction Documents for a phase of the Work, provide a guaranteed maximum price proposal ("GMP proposal") for the phase, including without limitation the CMAR Fee, the CMAR-GMP Contingency and the General Conditions lump sum, but not including the Town's Construction Contingency. The allocation, basis, and distribution of the cost of construction, CMAR Fee, General Conditions and CMAR-GMP Contingency for each GMP shall be set out in detail in each GMP amendment to this Contract.

5.2 The GMP proposal shall set out each proposed subcontract amount without adjustment for contingencies or other increases, the CMAR Fee, the General Conditions Allowance costs

including on-site field staff, the CMAR-GMP Contingency, Town's Special Allowances, if any are approved by the Town, and all Project related costs, e.g., bonds, personnel payroll benefits, etc. The GMP proposal shall reflect all cash discounts anticipated on payments made by the CMAR or any Subcontractor, which shall be for the benefit of the Town. Trade discounts, rebates, refunds, and amounts received from sales of surplus or salvaged materials and equipment shall accrue to the Town and the CMAR shall make provisions so they can be secured and shall reduce the GMP accordingly. Amounts which accrue to the Town in accordance with this section shall be accounted for and credited to the Town as a deduction from the Cost of the Work or the General Conditions as appropriate. The allocation, basis and distribution of the cost of construction, CMAR Fee, General Conditions and CMAR-GMP Contingency for each GMP shall be set out in detail in each GMP proposal.

5.3 Upon final submission by the Designer of the last of the complete Construction Documents for the entire Project, the CMAR will develop and submit its final GMP for the Project. At that time, the GMP will be fixed, subject to changes only as set forth herein by change order. In the event the Town does not accept the CMAR's proposed GMP, the Town may terminate this Contract in accordance with its terms. In the alternative, the Town may require the CMAR to recalculate the GMP, including any phase of any GMP, after making changes to the scope of work or obtaining further development of the drawings and specifications from the Designer.

5.4 The sum of all GMP proposals must not exceed the Total Construction Budget, including CMAR Fees, and overhead. If bids as they are received make it appear likely to the Town that the final GMP will exceed the desired final Total Construction Budget, the CMAR shall reject bids or otherwise take the steps that are required by the Town and this Contract to reduce the GMP, unless the Town authorizes a higher GMP.

5.5 Each GMP proposal for a phase of the Work shall identify the Construction Drawings that define the scope of work covered by the GMP proposal, shall describe any assumptions or clarifications concerning the scope of the Work, shall describe any contractor's special designated allowances and the basis on which each allowance was calculated, and shall contain the progress schedule related to that phase of the Work. It is the intent of the project development process to minimize the need for allowances. However, when needed they shall be identified in each trade subcontract and later tracked on each trade subcontractor's schedule of values and payment application. The CMAR shall also compile and maintain a tabulation of all allowances. Although the GMP proposal shall describe the scope of work included in the GMP, the description of the work in the GMP proposal shall not be deemed to modify or amend the Construction Documents, until incorporated by a Change Order Amendment.

5.6 The Town reserves the right to direct the CMAR to (and the CMAR shall) work in conjunction with the Designer to redesign the Project as necessary to maintain the Project program and meet the Total Construction Budget as follows:

5.6.1 After consultation with the Town, the CMAR shall coordinate and cooperate with the Project Team to alter and redraft Construction Documents as necessary to accomplish the required reduction in cost.

5.6.2 The CMAR shall develop and provide to the Town a GMP in connection with the redrafted and altered Construction Documents to accomplish the necessary reductions in cost.

5.6.3 The CMAR shall analyze the Designer's originally submitted and as altered and redrafted Construction Documents, and make recommendations to the Town as to ways and methods to reduce the costs of constructing the Project to a sum which does not exceed the Total Construction Budget. The Town has the right to reject any GMP as originally submitted, or as adjusted. In that event, the Contract may be terminated according to its terms. In addition, the Town has the right to withhold, in its sole discretion, approval of the amendment of the Contract to reflect any GMP, in which event the Contract may be terminated according to its terms.

5.6.4 The CMAR's detailed construction cost estimates and GMP will be reviewed by the Designer and the Town for reasonableness and compatibility with the Total Construction Budget. Meetings and negotiations between the Town, Designer and the CMAR will be held to resolve questions and differences that may occur between the Town's Project Budget and the CMAR's construction cost

estimate and corresponding GMP. The CMAR shall work with the Town and Designer to reach a mutually acceptable GMP. Notwithstanding the foregoing, the CMAR is not responsible for providing, nor does the CMAR control, the Project design and contents of the design documents prepared by the Designer. By performing any design reviews described in the Contract, the CMAR is not acting in a manner so as to assume professional responsibility or liability, in whole or in part, for all or any part of the Project design and design documents prepared by the Designer or the Town.

5.7 All Work shall be bid and procured for lump sum or not-to-exceed prices based on the Construction Documents. Unit prices may be solicited from the Subcontractors solely for the purpose of providing a basis to adjust Subcontracts for justifiable change orders and changes in the scope of the Work shown in the Construction Documents.

5.8 Upon acceptance by the Town of a GMP proposal, the Town shall prepare an amendment to this Contract to fix the GMP and establish when and on what terms the CMAR may commence the Work. Within 10 days after the execution of the amendment provided herein, the CMAR shall provide the Town with a Performance Bond and a Labor and Material Payment Bond each for 100% of the GMP in conformity with the terms of N.C. Gen. Stat. Chapter 44A and this Contract. If it appears that all bids for Work under a GMP will not be received and all contracts will not be awarded within sixty days after the date of the acceptance of the GMP, the CMAR shall provide the Town with a Performance Bond and a Labor and Material Payment Bond each for 100% of the estimated GMP in conformity with the terms of N.C. Gen. Stat. Chapter 44A and this Contract. If the Town increases the construction budget or authorizes a GMP in excess of the estimated GMP, the Town may require that the CMAR increase the Performance Bond and the Labor and Material Payment Bond each to 100% of the approved GMP. The CMAR will execute the agreed upon amendment within ten days after receipt from the Town.

5.9 Upon acceptance of the GMP, the CMAR shall continue to advise and assist the Town and Designer during any continuing design activities as described in the RFQ and this Contract.

5.10 Upon completion of the Work, any and all non-expended funds remaining in any GMP will be retained by the Town, except as specifically set forth above in Section 4.

6. CONTINGENCY ALLOWANCES:

6.1 Town's Contingency: A Town's Construction Contingency will be established. Expenditures against this contingency will be available to cover all costs not covered by the GMP resulting from changes in scope and initiated by the Town via a change order amendment issued by the Town.

6.2 In addition to the Town's Contingency for the overall Project, the Town may include in the Total Construction Budget special allowances ("Town's Special Allowance") which have been dedicated to the Project but may only be spent in the discretion of the Town. The Town's Special Allowance is a designated special allowance to provide for the management of unforeseen conditions, design errors and omissions, or new scope identified and desired by the Town and as otherwise noted herein. The Town's Special Allowance is not included in the CMAR's GMP until written authorization signed by the Town's Representative for its expenditure is executed. Allocations, restrictions upon, or expenditures from this Town's Special Allowance must be approved by the Town's Representative in writing to be considered valid in any manner. The Town may, in its discretion, use the Town's Special Allowance to pay justifiable claims for additional costs submitted by the CMAR in accordance with the Contract. The Town may also, in its discretion, authorize the CMAR to procure Subcontracts to perform work previously deleted through value engineering, or to procure Subcontracts to perform additional or changed work as directed by the Town's Representative in writing.

6.3 CMAR-GMP Contingency: Each GMP shall contain a CMAR-GMP Contingency fixed as an estimated lump sum for each GMP in an amount approved by the Town, to help reduce the risks assumed by the CMAR in providing the GMP for the Project. The entire CMAR-GMP Contingency shall be fixed, based on the final GMP, after which the CMAR-GMP Contingency shall not be adjusted unless an amount is negotiated with Town requested Change Orders to the Work of the Project. In the event an adjustment to the CMAR-GMP Contingency is negotiated

under this paragraph, a lump sum adjustment to the CMAR-GMP Contingency shall be equitably determined based on the nature of the changes to the Work, proven changes in the scope of services provided by the CMAR, and any other factor that would affect the CMAR risks due to changes to the Work.

6.3.1 The Town and the CMAR acknowledge that the CMAR-GMP Contingency is included to compensate for eventualities which have not been taken into precise account in the establishment of the GMP, specifically unanticipated costs which do not result in, warrant, or cause a change order to the GMP, including (1) legal fees not to exceed in the aggregate $50,000.00 associated with defending bid protests or subcontract awards, provided the CMAR is not negligent or at fault, (2) scope gaps between trade Subcontractors, (3) contract default by trade Subcontractors, (4) threat of or damage due to Acts of God to the extent not otherwise covered by insurance; (5) costs of corrective work not provided for elsewhere, and (6) unforeseen field conditions and design omissions. Design errors which the CMAR could not have reasonably detected during the discharge of CMAR's preconstruction duties will be resolved on a case-by-case basis and may warrant a change order to the GMP. Such design errors may be paid from the Town Contingency, but shall not be chargeable to the CMAR-GMP Contingency.

6.3.2 The CMAR-GMP Contingency is not allocated to any particular item of the Cost of the Work, and is established for the CMAR's use as may be required for increases in costs as noted above. It is understood that the amount of the CMAR-GMP Contingency is the maximum sum available to the CMAR to cover costs incurred as a result of such unanticipated causes or details, and that cost overruns in excess of the amount of the CMAR-GMP Contingency will be borne by the CMAR.

6.3.3 The CMAR-GMP Contingency may be applied to any items within the Cost of the Work without the necessity of a change order, without constituting a change in the Work, and without resulting in any change in the GMP. The CMAR will notify the Town and Designer in writing of the CMAR's intent to apply any part of the CMAR-GMP Contingency to any item within the Cost of the Work prior to any such application. The CMAR shall fully document the change on its copy of the Construction Documents for inclusion in the as-built record documents required by this Contract.

6.3.4 When each GMP is fixed, the CMAR - GMP Contingency for that GMP shall be converted to a lump sum. The entire CMAR-GMP Contingency shall be fixed in the final GMP, after which the CMAR–GMP Contingency shall not be adjusted unless an amount is negotiated with Town requested Change Orders to the Work of the Project.

6.3.5 The amount of the CMAR - GMP Contingency is to be reviewed by the Town as part of its review of each GMP. The Town retains the right to specifically request revisions to the amount of the CMAR - GMP Contingency prior to the Town's acceptance and approval of each GMP. If, after a contingency is fixed as part of a GMP proposal, the contract prices are lower than anticipated, the CMAR and Town agree that the CMAR-GMP Contingency shall not be reduced prior to completion of that GMP phase. In the event that the CMAR is not required to use any or all of the CMAR - GMP Contingency for a particular GMP it shall be carried forward to each subsequent GMP. In the event that there are any funds remaining in any special or dedicated Town's allowance, those funds shall be retained solely by the Town.

7. COMPENSATION:

7.1 For services to be performed hereunder, the Town shall authorize payments for Pre-Construction Services under this Contract a lump sum not to exceed **One Hundred Eighty-One Thousand, Seven Hundred and Ten Dollars ($181,710.00)**. The parties acknowledge that the sums due to the CMAR for Pre-Construction Services shall not exceed the amount listed in 7.1 without amendment to this Contract.

7.2 Upon the execution of this Contract, payment for sub-phases and specific services as indicated in

Appendix D shall be authorized, payable monthly upon the Town's evaluation of monthly payment requests and after consultation with the Designer.

7.3 Applications for payment shall be in a format required by the Town and include whatever supporting information that is reasonable and consistent with requirements of other Town projects, as may be required by the Town.

7.4 **The Town of Apex shall pay invoices within thirty (30) days of certification of the Payment Application by the Designer**.

8. PRE-CONSTRUCTION SERVICES: General Requirements

8.1 The CMAR services shall include pre-construction services as required during design development as set forth herein. The CMAR shall continue to provide pre-construction services throughout the Project as needed. The CMAR shall become an integral part of the Project Team that will coordinate the development and progress of the design and construction processes.

8.2 The CMAR shall meet with the Town, the Designer and any other design team members to better understand the Project program, the design documents, the Project scope and all other pertinent aspects of the Project.

8.3 The CMAR shall develop initial written project procedures, in cooperation with the Town and the Designer, which will be used as a guide for the management and coordination of the Project throughout the life of the Project to ensure adherence to the Project schedule and budget. Provide a management plan, updated for each design phase of the Project.

8.4 If requested by the Town, the CMAR shall develop detailed cost estimates for special system comparison and shall research different construction materials and report findings as needed. The CMAR will assist with the selection of systems and products by providing market intelligence to the Designer.

8.5 The CMAR shall develop a construction site management plan and utility installation plan. In conjunction with the Designer, these plans shall be presented and coordinated with Town and other regulatory entities and approved by the Town. These plans shall reflect construction offices and construction vehicle parking, crane and other equipment operations, material deliveries and storage, safety stations, temporary utility services, street and sidewalk closures and detours, traffic and vehicle movements, utility routing and signage and other items as needed to accomplish the Work.

8.6 The CMAR shall develop a process to track all changes or potential changes to the Work. It shall identify the potential change; track the review and evaluation of the potential change; estimate cost and/or time impacts; and record the authorization or acknowledgement of the change. These documents shall track, but are not limited to, the following items: use of allowances for their intended purposes, back charges between trade sub-contractors, use of the CMAR–GMP Contingency, use of the Town's special allowances; impacts of concealed conditions; or Town requested changes. These documents shall be available for auditing as requested by the Town.

8.7 The CMAR shall evaluate the designs available at the time of the CMAR's commencement of pre-construction services and conduct constructability review in conjunction with the Designer and Town.

8.8 Within ten (10) working days from the execution of this Contract, the CMAR is to establish a detailed CPM schedule of the pre-construction / design phase with the concurrence of the Town and Designer. The CMAR is responsible to monitor this schedule during the pre-construction / design phase, ensure that this schedule is updated, and advise the Town of any deficiencies in adhering to this schedule by any party. The CPM schedule to the Town shall provide a cash flow analysis to the extent practical during the pre-construction phase of services. Scheduling shall allow for integration of all aspects of the design processes and provide for coordination of all work to be performed including but not limited to identifying the critical path for regulatory agency approvals and permitting, development and approval of the site logistics plan, development and approval of the site utility construction and sequencing plan, and development and approval of a construction material delivery, staging and site utilization plan. The construction schedule shall be

included with the pre-construction/design phase schedule and shall be updated in increasing detail as the construction plans and specifications are revised and finalized. It shall include, but not be limited to, indicating methods of sequencing of procurement, permitting, construction and close out of the Project include time requirements for sequences and durations, milestone dates for receipt and approval of design documents, receipt of regulatory approvals and permits, preparation and processing of shop drawings and samples, delivery schedule of materials or equipment long-lead time procurement, project procurement schedule, installation and construction completion, and critical milestone dates for Town procured and installed fixtures, furnishings and equipment . Updated schedules will be required at the end of each design phase established by the Contract between the Town and Designer. Schedules will be reviewed by the Designer and approved by the Town.

8.9 The CMAR shall review the plans and specifications and make recommendations to the Town and Designer regarding phased issuance of the drawings and specifications prepared by the Architect to facilitate phased construction where such phasing is appropriate.

8.10 The CMAR shall review the drawings and specifications as they are being prepared, recommending alternative solutions whenever design details affect costs, construction feasibility or schedules. The CMAR shall notify the Designer and the Town in writing upon observing any features in the plans or specifications, which appear to be ambiguous, confusing, conflicting or erroneous. The CMAR shall provide a thorough interdisciplinary coordination review of the Construction Documents submitted for review to the Town and Design Team (to be performed by a qualified firm or qualified personnel) before trade contract bidding. Review shall be performed utilizing a structured and industry accepted process. The CMAR shall review the final documents to ensure that all comments have been incorporated.

8.11 The CMAR shall develop and implement MBE / WBE procedures and policies and shall prepare the MWBE Participation Plan, begin MWBE outreach, and compile the MWBE database. The CMAR shall participate in and lead meetings regarding MWBE related issues, including but not limited to contracting, outreach and partnering. The CMAR shall document all aspects of activities for this section as needed for reporting under State of North Carolina and Town of Apex requirements.

8.12 The CMAR shall develop material for Town Council presentations and assist with those presentations as needed.

8.13 The CMAR shall meet with the Town, the Designer and any other design team members to better understand the Project, the design documents, the Project scope and all other pertinent aspects of the Project.

8.14 The CMAR shall attend regularly scheduled and especially called meetings with the Town and the Designer during their Design phases established by the contract between the Town and the Designer, to advise them on matters of cost, schedule, site use, utility relocations, on-site and off-site Improvements, maintenance of traffic and traffic control during construction, selection of materials, building methods, construction details, building systems and equipment, phasing and sequencing as follows: 1) Monthly meetings at the Designers or Towns offices, and 2) upon establishment of the first GMP, weekly on-site meetings as approved by the Town. Additional consultations required to maintain Project schedule and / or to achieve budget compliance shall be provided at no additional cost to the Town. The CMAR shall develop a Project Management Plan for management of the Project, including early hazardous materials (e.g., underground chemicals, etc.) abatement, site development including excavation and shoring, utility relocations, geological and environmental Investigations if applicable.

9. PRE-CONSTRUCTION SERVICES: Constructability Reviews

9.1 The CMAR shall review the design throughout the pre-construction phase as to constructability. A constructability report shall be submitted from the CMAR with each design team submission. With respect to each such issue, the CMAR shall submit a written report to both the Town and the Designer. At a minimum, each such written report shall contain: (1) A description of the constructability issue with background information; (2) a summary of the CMAR's in-depth study /

research; and (3) written recommendations for addressing each specific issue.

10. PRE-CONSTRUCTION SERVICES: Construction Cost Models / Estimates

10.1 The CMAR shall develop a project budget / cost model (independent from any similar cost estimates required of the Designer) which shall be updated as needed. Construction phase budgets and cost reports will be generated as the GMP for each construction phase is approved. Construction cost estimates shall be able to be sorted by trade bid packages. Financial and quality analysis of different construction methods in each major trade group shall be provided for potential quality, cost and schedule enhancements. Meetings and negotiations between the Town, the Designer and the CMAR will be held to resolve questions and differences that may occur between the estimates by the Designer and the CMAR cost estimates. The Town shall make the final decision after receiving recommendations from the CMAR and Designer.

10.2 Each CMAR cost estimate must contain a statement of the total amount determined to be the total construction costs for the Project (including alternates, CMAR General Conditions, CMAR fees, and CMAR-GMP Contingency).

10.3 In the event that the Designer's or CMAR's estimates exceed the Town's Project Budget and the CMAR's additional services under this Section were not reasonably anticipated in the CMAR's Pre-Construction Services or General Conditions, the Town and CMAR may agree on a change order directing the CMAR to work in conjunction with the Designer to revise the Project as necessary to meet the Town's Project Budget.

10.4 Meetings and negotiations between Town, Designer and the CMAR will be held to resolve questions and differences that may occur between the Designer's and CMAR's estimates. The CMAR shall work with the Town and Designer to reach a mutually acceptable Construction Cost.

10.5 The CMAR shall, if requested by the Town, provide review, assistance and recommendations in estimating all elements of the total construction cost.

11. PRE-CONSTRUCTION SERVICES: Value Analysis

11.1 The CMAR shall, after a complete review of the Project, evaluate the designs available at the time of the CMAR's commencement of pre-construction services, and obtain an understanding of the intent of the Town and the Designer, provide Value Analysis services and offer cost savings suggestions and best value recommendations to the Town. All recommendations shall be in writing and must be fully reviewed with the Designer and Town, and approved by the Town prior to implementation.

11.2 Value Analysis efforts shall also take into consideration applicable constructability issues.

11.3 All Value Analysis studies must be provided on a timely basis within the design schedule.

11.4 Value Analysis studies shall continue to be refined as the design is developed.

11.5 The CMAR shall conduct a major Value Analysis study at the end of Design Development (utilizing the Design Development documents) which shall include, but not be limited to, the items noted below:

11.5.1 Value Analysis at the Completion of the Design Development Design Phase

- **11.5.1.1** Building Structure
- **11.5.1.2** Foundation Systems
- **11.5.1.3** Retaining Wail Systems
- **11.5.1.4** Structural Framing Systems
- **11.5.1.5** Building Enclosure
- **11.5.1.6** Enclosures Systems and Materials
- **11.5.1.7** Engineering Systems
- **11.5.1.8** Plumbing Systems, Equipment and Materials

11.5.1.9 HVAC Systems, Equipment and Materials

11.5.1.10 Fire Protection Systems and Equipment

11.5.1.11 Electrical Systems and Equipment

11.5.1.12 Fire Detection and Alarm Systems and Equipment

11.5.2 Value Analysis at the Completion of the Construction Document Phase

11.5.2.1 Building Enclosure Systems such as variations within the selected enclosure system(s) (e.g., material quality, material sizes, fastening methods etc.)

11.5.2.2 Engineering Systems —such as, 1) Plumbing Fixtures and Fittings, 2) HVAC Devices and Controls, 3) Fire Protection Devices, 4) Electrical Fixtures and Controls, and 5) Fire Detection and Alarm Devices and Controls

11.6 Develop a value-analysis study for consideration at the session noted below (It is anticipated that the Designer will concurrently conduct a similar activity).

11.6.1 Brainstorming session(s) with design team.

11.6.2 Written cost studies shall be produced and submitted to the Town within two (2) weeks of the final brainstorming session.

11.6.3 Written pro / con evaluation of the cost studies shall be provided to the Town within two (2) weeks after submission of the cost studies and shall be prepared in collaboration with the Designer.

11.6.4 Formal presentation of the written study shall be conducted by the Designer and the CMAR firm.

11.6.5 A formal written Value Analysis study document including a summary of Value Analysis items, applicable cost savings, selected Items and their corresponding cost savings shall be presented to the Town and Designer.

11.7 Should the Town request the CMAR to conduct additional Value Analysis studies not contemplated in section 11.6 above, the CMAR may be entitled to request and justify a change order allowing payment for additional time needed by the CMAR to prepare such Value Analysis studies.

12. PRE-CONSTRUCTION SERVICES: Coordination of Contract Documents

12.1 The CMAR shall review the drawings and specifications as they are being prepared, recommending alternative solutions whenever design details affect costs, construction feasibility or schedules. The CMAR shall within seven business days notify the Designer and the Town in writing upon identifying any features in the plans or specifications, which appear to be ambiguous, confusing, conflicting, or erroneous.

12.2 The CMAR shall provide a thorough interdisciplinary coordination review of the Construction Drawings and Specifications submitted for review to the Town and Design Team (to be performed by qualified personnel) before trade contract bidding. Review shall be performed utilizing a structured and industry accepted process. The CMAR shall review the final documents for each phase of design to ensure that all comments have been incorporated.

12.3 All ambiguous, confusing, conflicting and / or erroneous features in the drawings or specifications discovered by the CMAR during the review process shall be brought to the attention of the Town and Designer in writing. If after review with the Designer the Town agrees that corrections should be made by the Designer, the Designer shall incorporate such changes and / or revisions as directed by the Town into the Project Manual to allow the CMAR to include associated cost impacts in the CMAR Cost Model Update.

12.4 The CMAR shall be primarily responsible, with the assistance of the Designer, for preparing bid packages and proposed subcontracts to solicit bids for the Work.

13. PRE-CONSTRUCTION SERVICES: Guaranteed Maximum Price (GMP)

13.1 Within time frames agreed upon between the Town and the CMAR, the CMAR will develop and provide to the Town a GMP which will include all construction costs, and all other projected costs including without limitation the CMAR fees, the CMAR-GMP Contingency and General Conditions lump sum but not including any Town Construction Contingency or other Town allowances. The GMP shall set out each anticipated trade contract amount: the CMAR's fixed fee; General Conditions reimbursable cost items including on-site field staff, and all project related costs, e.g., bonds, personnel payroll benefits, etc.

13.2 In the event that the GMP exceeds the Town's Project Budget, the Town reserves the right to direct the CMAR to (and the CMAR shall) work in conjunction with the Designer who shall redesign the facility as necessary to meet the Town's budget as follows:

13.3 After consultation with the Town, the CMAR shall coordinate and cooperate with the Project Design Team to assist the Designer who shall alter and redraft Construction Documents as necessary to accomplish the required reduction in cost.

13.4 The CMAR shall develop and provide to the Town a GMP in connection with the redrafted and altered Construction Documents to accomplish the necessary reductions in cost.

13.5 The CMAR shall analyze the Designer's originally submitted and as altered and redrafted Construction Documents, and make recommendations to the Town as to ways and methods to reduce the costs of constructing the Project to a sum which does not exceed the Town's budget.

13.6 *Deleted.*

13.7 The Town has the right to reject the GMP as originally submitted or as adjusted.

13.8 The CMAR's detailed construction cost estimates and GMP will be reviewed by the Designer and the Town for reasonableness and compatibility with the Town's budget. Meetings and negotiations between the Town, Designer, and CMAR will be held to resolve questions and differences that may occur between the Town's Budget and the CMAR's construction cost estimate and corresponding GMP. The CMAR shall work with the Town and Designer to reach a mutually acceptable GMP.

13.9 Upon acceptance by the Town of the GMP or the first GMP, the Town shall prepare an Amendment to this Contract detailing the GMP and scope of services covered by that GMP. Within ten (10) days after the Town provides the CMAR with the Amendment acceptable to both parties, the CMAR shall execute said Amendment, submit it to the Town, and provide the Town with an amended Performance Bond and Payment Bond each in the amount of the GMP in conformity with the provisions of Chapter 44A, Article 3 of the General Statutes of North Carolina.

13.10 Phasing of the Project may require that an initial GMP be developed by the CMAR and presented to the Town for approval to facilitate early construction packages. Such initial GMP(s) shall not relieve the CMAR of the responsibility to execute and submit the Amendment containing said GMP(s) and otherwise complete the Project within the Total Construction Budget as set forth by the Town.

14. BIDDING PHASE SERVICES:

14.1 The CMAR, shall develop procedures to advertise and solicit trade subcontractors in an open and public manner consistent with North Carolina General Statutes – Chapter 143. The CMAR shall act as the Town's fiduciary in handling and opening bids to the extent required by N.C.G.S. 143-128.1. The CMAR shall develop procedures and requirements to assure time, cost and quality control during construction.

14.2 The CMAR shall arrange and prepare bid packages to completely execute the Work and provide opportunities for maximum participation by minority and women-owned businesses. CMAR shall include a provisional construction schedule for issuance with the bid packages.

14.3 The CMAR shall identify, solicit and pre-qualify bidders for all packages. In conjunction with Town representatives, prepare and implement an MWBE outreach program to encourage participation by minority-owned and women-owned contracting firms. Advertise and distribute bid

packages. Schedule and conduct pre-bid conferences in conjunction with the Designer. Educate trade subcontractors on sustainability measures and monitor bidder activity.

14.4 The CMAR shall publicly open, review and analyze bids in conjunction with the Town and the Designers. A thorough scope review will be conducted with the bidders. A "Recommendation to Award" (RTA) for each trade subcontract shall be prepared which documents the reasons for the CMAR's decision and recommendation. Bid tabulations shall accompany the RTA's.

14.5 Upon approval of the Town, the CMAR shall execute subcontracts with the trade subcontractors.

15. CONSTRUCTION PHASE SERVICES:

15.1 The CMAR shall provide construction services as required to complete construction of the Project in a timely and economic fashion. The CMAR shall become an integral part of the Project Team that will coordinate the development and progress of the construction processes. Construction responsibilities are described further in this and subsequent sections of this document.

15.2 The CMAR shall maintain an on-site staff for management of the construction process. The CMAR shall establish and maintain coordinating procedures to execute the Work in its entirety. Industry standard monitoring shall be performed by the CMAR to ensure the quality of the Work and conformity to the plans and specifications. Deficiencies in the Work shall be documented and tracked until satisfactorily corrected.

15.3 The CMAR shall ensure satisfactory installation and operation of building systems prior to substantial completion. The CMAR and the trade subcontractors are responsible for construction quality control at all times.

15.4 Construction Services shall continue until certain post-occupancy activities, including coordination of furniture, furnishings and equipment deliveries and installation; resolution of punch lists; assembly of guarantees, operation manuals, record drawings and closeout documents; training; and regulatory approvals are completed.

16. BONDS:

16.1 Bonds shall be provided as indicated in Section 48 of the General Conditions of the Contract in Appendix A of this Contract.

17. NON-ACCEPTANCE OF THE GMP AND / OR TERMINATION:

17.1 **Termination by Town for Cause:** The Town may terminate this Contract for cause pursuant to Section 38 of the General Conditions of the Contract.

17.2 **Termination for Convenience of Town:** The Town may terminate this Contract for the Town's convenience pursuant to Section 37 of the General Conditions of the Contract.

17.3 **Intentionally Deleted.**

17.4 **Delivery of Documents After Termination:** Upon any termination, CMAR shall deliver or otherwise make available to Town all documents, data, drawings, specifications, reports, estimates, summaries, and such other information and materials that have been created, in whole or in part, or accumulated by CMAR in performing this Contract or Contract Amendments.

17.5 **Town May Complete Work:** Upon termination, the Town may complete the services in any way that the Town, in its discretion, determines is appropriate, including but not limited to using Town personnel, retention of selected sub-CMARs of the CMAR, or contracting with outside parties. The Town shall have the right to continue its activities to place the Project under construction with no further obligation towards the terminated CMAR and with full ownership and use of any data and information developed during pre-construction activities. Completion of such work shall not waive any of Town's rights and remedies.

18. INSURANCE:

18.1 Insurance shall be provided as indicated in Section 47 of the General Conditions of the Contract in Appendix A of this Contract.

19. LAWS AND REGULATIONS:

19.1 The validity, construction, interpretation, and administration of this Contract shall be governed by and subject to the jurisdiction and laws of the State of North Carolina.

19.2 If any disputes arise regarding the parties rights under this Contract, the parties shall endeavor to resolve their disputes pursuant to the dispute resolution provisions in G. S. 143-128 (f1) and 1 N.C.A.C. 30H. Should any dispute arise that cannot be settled through the above referenced dispute resolution provisions, then any civil action to be brought by either party shall be filed in the General Court of Justice of North Carolina, Superior Court Division, Wake County, North Carolina, which shall be the sole and exclusive venue for the resolution of any dispute arising out of or any way relating to this Contract.

19.3 The CMAR and its officers, managers, employees, representatives, agents, assigns and others acting on behalf of the CMAR in connection with the Project, agree to comply with all applicable laws, ordinances, statutes, building codes, rules and regulations pertinent to the Work to be performed under this Contract for the Project.

20. STANDARD OF CARE:

20.1 The CMAR shall perform for or furnish to the Town construction management services in all phases of the Project to which this Contract applies as hereinafter provided. The CMAR may employ subcontractors and consultants as deemed necessary to assist in the performance or furnishing of construction management services hereunder. The CMAR shall not be required to employ any Subcontractors unacceptable to CMAR.

20.2 The standard of care for all construction management services performed or furnished by CMAR under this Contract will be that of the care and skill ordinarily used by construction managers under similar conditions at the same time and in the same locality. CMAR makes no warranties, express or implied, under this Contract or otherwise, in connection with CMAR's services.

20.3 The CMAR shall re-perform any faulty or defective work that is not in compliance with the Standard of Care set forth above, at no expense to the Town, provided that the CMAR is notified of such non-compliance within the agreed upon period.

21. NOTICES:

All notices, requests for payment, or other communications arising hereunder shall be sent to the following:

For the Town of Apex:
Dennis Brown, Construction Project Manager
Town of Apex
PO Box 250
Apex, NC 27502

For CMAR:
Marty Thompson, Project Executive
J.M. Thompson Company
1002 E. Chatham St.
Cary, NC 27511

22. SMALL DISADVANTAGED MINORITY AND WOMEN-OWNED BUSINESS (SDMWOB) PARTICIPATION PLAN:

22.1 The CMAR shall develop and implement procedures and policies and review with Town for approval regarding:

- **22.1.1** Outreach and Networking
- **22.1.2** SDMWOB participation in preconstruction
- **22.1.3** SDMWOB E Contractors College
- **22.1.4** Community meetings
- **22.1.5** Workforce Program Development
- **22.1.6** Certification Assistance
- **22.1.7** Payment handling
- **22.1.8** Change Order handling
- **22.1.9** Bonding Assistance
- **22.1.10** Partnering with first tier subcontractors
- **22.1.11** Handling of rental and leasing equipment

22.2 The CMAR shall prepare the SDMWOB Participation Plan, begin SDMWOB outreach, and compile the SDMWOB database. The established SDMWOB goals for this Project are as outlined in N.C.G.S. 143-128.2.

22.3 The CMAR shall participate in and lead meetings regarding SDMWOB related issues, including but not limited to contracting, outreach and partnering.

22.4 The CMAR shall document all aspects of activities for this section as needed for reporting under State of North Carolina and Town of Apex requirements.

23. ANTI-HUMAN TRAFFICKING:

23.1 The CMAR warrants and agrees that no labor supplied by the CMAR or the CMAR's subcontractors in the performance of this Contract shall be obtained by means of deception, coercion, intimidation or force, or otherwise in violation of North Carolina law, specifically Article 10A, Subchapter 3 of Chapter 14 of the North Carolina General Statutes, Human Trafficking.

23.2 This provision being incorporated for the benefit of the Town of Apex and its residents may be enforced by action for specific performance, injunctive relief, or other remedy as by law provided. Failure to comply with this provision shall also be a default of this Contract.

24. INTELLECTUAL PROPERTY / OWNERSHIP OF WORK PRODUCT:

24.1 Intellectual Property, including, but not limited to copyrightable works, developed or created in performance of this Contract shall be the property of the Town. Any information, data, instruments, documents, studies, reports or deliverables given to, exposed to, or prepared or assembled by the CMAR under this Contract shall be kept as confidential proprietary information of the Town and not divulged or made available to any individual or organization without the prior written approval of the Town, unless required by law or to fulfill CMAR's obligations under this Contract (e.g., sharing Project documents and information with design professionals, subcontractors and potential subcontractors). Such information, data, instruments, documents, studies, reports or deliverables created for this Project will be the sole property of the Town and not the CMAR.

24.2 The Town shall maintain the right of reuse to any drawings, specifications or other deliverables (final drawings, plans, calculations, specifications, studies, electronic data and information, etc.) provided or furnished by the CMAR with respect to the design or construction of this project. The Town acknowledges that such drawings or specifications are not intended or represented to be suitable for reuse by the Town or others on extensions of the Project or on any other Project. If CMAR does not furnish a written verification that the products and deliverables can be reused for the Town's other purposes, or does not adapt them for such purposes, then re-use of the work product as a result of this Contract is at the sole risk of the Town, and Town shall waive and release CMAR from any liabilities arising, related, or associated with such unauthorized use.

24.3 Copyright in each separate contribution to a collective work is distinct from copyright in the collective work as a whole, including, but not limited to, copy, art, negatives, photographs, design, text, software, or documentation created as part of the CMAR's performance of this Project shall vest in the Town. Works of authorship and contribution to works of authorship created by the CMAR's performance of this Project are hereby agreed to be 'Works Made for Hire' within the meaning of 17 U.S.C. 201: Ownership of copyright. All plans, maps, documents, reports, studies, and /or other data and materials prepared or obtained under this Contract, and any Amendments (hereafter "work product"), shall be considered works made for hire and shall become the property of the Town without restriction or limitation on their use. Such work product shall be made available, upon request, to the Town at any time during the term of this Contract and any Amendments.

25. ASSIGNMENT:

25.1 Neither the Town nor the CMAR will assign, sublet, or transfer their interest, duties, or obligations hereunder without the prior written consent of the other. Nothing herein shall be construed as creating any personal liability on the part of any officer, employee, elected officials, or agent of any public body which may be party hereto, nor shall it create any rights or benefits to parties other than the Town and the CMAR, except such other rights as may be specifically called for herein.

26. APPLICABLE LAW:

26.1 All matters relating to this Contract shall be governed by the laws of the State of North Carolina, without regard to its choice of law provisions, and venue for any action relating to this Contract shall be the General Court of Justice of North Carolina, Superior Court Division, in Wake County, North Carolina, which shall be the sole and exclusive venue for the resolution of any dispute arising out of or any way relating to this Contract.

27. FORCE MAJEURE:

Except at otherwise provided in any environmental laws, rules, regulations or ordinances applicable to the parties and the services performed under this Contract, neither party shall be deemed to be in default of its obligations hereunder if and so long as it is prevented from performing such obligations by an act of war, hostile foreign actions, nuclear explosion, earthquake, hurricane, tornado, or other catastrophic natural event or act of God. Either party to the Contract must take reasonable measures and implement reasonable protections when a weather event otherwise defined as a force majeure event is forecast to be eligible to be excused from the performance otherwise required under this Contract by this provision.

28. ADVERTISING:

The CMAR may not use the project for marketing purposes unless advised otherwise by the Town of Apex.

29. LAWS / SAFETY STANDARDS:

29.1 The CMAR shall comply with all laws, ordinances, codes, rules, regulations, safety standards and licensing requirements that are applicable to the conduct of its business, including those of Federal, State, and local agencies having jurisdiction and/or authority.

The CMAR must comply with *North Carolina Occupational Safety and Health Standards for General Industry, 29CFR 1910.* In addition, CMAR shall comply with all applicable occupational health and safety and environmental rules and regulations.

CMAR shall effectively manage their safety and health responsibilities including:

A. **Accident Prevention**

Prevent injuries and illnesses to their employees and others on or near their job site. CMAR managers and supervisors shall ensure employer's personnel safety by strict adherence to established safety rules and procedures.

B. **Environmental Protection**

Protect the environment on, near, and around their work site by compliance with all applicable environmental regulations.

C. **Employee Education and Training**

Provide education and training to all CMAR's employees before they are exposed to potential workplace or other hazards as required by specific OSHA Standards.

30. APPLICABILITY OF NORTH CAROLINA PUBLIC RECORDS LAW:

30.1 Notwithstanding any other provisions of this Contract, this Contract and all materials submitted to the Town by the CMAR are subject to the public records laws of the State of North Carolina and it is the responsibility of the CMAR to properly designate materials that may be protected from disclosure as trade secrets under North Carolina law as such and in the form required by law prior to the submission of such materials to the Town or as designated in North Carolina General Statute § 132-1.7. SENSITIVE PUBLIC SECURITY INFORMATION. CMAR understands and agrees that the Town may take any and all actions necessary to comply with federal, state, and local laws and / or judicial orders and such actions will not constitute a breach of the terms of this Contract. To the extent that any other provisions of this Contract conflict with this paragraph, the provisions of this section shall control. CMAR acknowledges that it will not provide any trade secrets or confidential materials to the Town and that the Town may rely on this representation in the release of any materials associated with this Contract for inspection pursuant to a public records request.

31. MISCELLANEOUS:

31.1 The CMAR shall be responsible for the proper custody and care of any property furnished or purchased by the Town for use in connection with the performance of this Contract, and will reimburse the Town for its loss or damage.

31.2 The CMAR shall be considered to be an independent contractor and as such shall be wholly responsible for the Work to be performed and for the supervision of its employees. Nothing herein is intended or will be construed to establish any agency, partnership, or joint venture. CMAR represents that it has, or will secure at its own expense, all personnel required in performing the services under this Contract. Such employees shall not be employees of or have any individual contractual relationship with the Town.

31.3 This Contract may be amended only by written Contract of the parties executed by their authorized representatives.

31.4 The CMAR shall comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes (E-Verify). CMAR shall require all of its subcontractors to comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes (E-Verify).

31.5 Notwithstanding any other provisions of this Contract, the parties agree that payments due hereunder from the Town are from appropriations and monies from the Town Council and any other governmental entities. In the event sufficient appropriations or monies are not made available to the Town to pay the terms of this Contract for any fiscal year, the Town shall promptly terminate this Contract pursuant to Section 37 of the General Conditions to the Contract.

31.6 N.C.G.S. 147-86.60 prohibits the State of North Carolina, a North Carolina local government, or any other political subdivision of the State of North Carolina from contracting with any entity that is listed on the Final Divestment List created by the North Carolina State Treasurer pursuant to N.C.G.S. 147-86.58. N.C.G.S. 147-86.59 further requires that contractors with the State, a North Carolina local government, or any other political subdivision of the State of North Carolina must not utilize any subcontractor found on the State Treasurer's Final Divestment List. As of the date of execution of this Contract the CMAR hereby certifies that it is not listed on the Final Divestment List created by the North Carolina State Treasurer and that the CMAR will not utilize any subcontractors found on the Final Divestment List.

31.7 The Town of Apex may conduct an audit of CMAR's financial, performance and compliance records maintained in connection with the operations and services performed under this Contract. In the event of such an audit, CMAR agrees to provide the Town with reasonable access to CMAR's employees and make all such financial, performance and compliance records available to the Town. The Town agrees to provide the CMAR with an opportunity to discuss and respond to any findings before a final audit report is issued.

32. SURVIVAL:

32.1 Upon completion of all Services, obligations, and duties provided for in this Contract, or if this Contract is terminated for any reason, the terms and conditions of this Contract shall survive.

33. INCORPORATION OF DOCUMENTS / COMPLETE CONTRACT:

33.1 This Contract, and any documents incorporated below, represent the entire Contract between the parties and suspend all prior negotiations, representations or Contracts, either written or oral.

33.2 This Contract may only be amended in writing by consent of the Town and the CMAR.

33.3 Each party represents that it is authorized to execute this Contract and agrees to be bound by its terms and provisions.

33.4 Specifically incorporated into this Contract and attached are the following documents:

33.4.1 **Appendix A** General Conditions of the Contract

33.4.2 **Appendix B** Performance Bond

33.4.3 **Appendix C** Payment Bond

33.4.4 **Appendix D** Preconstruction Fee Proposal

33.5 Specifically incorporated into this contract, but not physically attached to this document, are the following documents:

33.5.1 Statement of Qualifications for CM at Risk Services Town of Apex Pleasant Park, dated February 27, 2019.

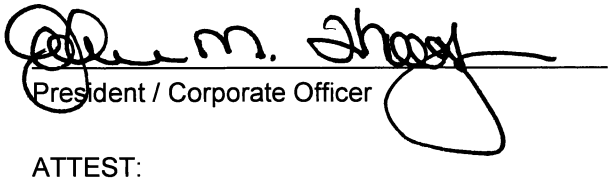
33.5.2 Request for Qualifications for Construction Manager at Risk for the Town of Apex Pleasant Park, including all addenda.

In cases of conflict between this Contract and any of the above incorporated attachments or references in this Section 33.5, the terms of this Contract shall prevail.

IN WITNESS WHEREOF, the CMAR has executed with the signature(s) of its duly authorized officer(s), under seal, and the Town has executed with the signature of its Town Manager, attested by its Town Clerk, with the official seal affixed, the day and date first above written.

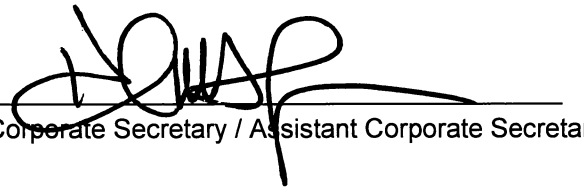
CMAR: J.M. Thompson Company

By:



President / Corporate Officer (CORPORATE SEAL)

ATTEST:



Corporate Secretary / Assistant Corporate Secretary

Town of Apex, North Carolina

By:

_____ (SEAL)

Andrew L. Havens
Town Manager

ATTEST:

_____

Donna Hosch
Town Clerk

This instrument has been preaudited in the manner required by the Local Government Budget and Fiscal Control Act.

_____

Vance Holloman, Finance Director

TOWN OF APEX

PLEASANT PARK

APPENDIX A

GENERAL CONDITIONS OF THE CONTRACT

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1. DEFINITIONS:

1.1. The Project Team consists of the Owner, the Project Designer, the CMAR and others as identified in the RFQ.

1.2. The Owner is the Town of Apex. The Owner in its sole discretion shall designate an Owner's Representative who shall be the CMAR's Owner contact point during both the Pre-Construction and Construction Phases. This representative is the Town's Construction Project Manager unless designated otherwise in writing. This representative shall be the primary channel of communication to the Owner and shall act as the Owner's liaison with the CMAR. The Owner may designate in writing multiple representatives responsible for defined aspects of the Project, and may replace or re-designate any or all multiple representatives. In the event of any disagreement or dispute between any members of the Project Team regarding the Project, the Owner's Representative shall be the final decision making authority, subject to written appeal by either party to the Owner and dispute resolution procedures incorporated herein.

1.3. The Designer or Project Designer means the firm or firms of architects or engineers or both (and their consultants) which have undertaken to design the Project pursuant to a contract with the Owner, (hereinafter, the "design contract" or "design agreement"). The Project Designer, WithersRavenel, Inc., will provide design services throughout the duration of the Project. Owner may utilize independent designers in addition to WithersRavenel, Inc.

1.4. The Construction Manager "at Risk" (CMAR) shall take all necessary action contemplated under the Contract Documents to: 1) establish during the design phase a Guaranteed Maximum Price (GMP) to construct the Project, and 2) ensure timely and quality completion of the Project at a cost within the GMP. CMAR as used in the Contract Documents means Construction Manager at Risk (CMAR), a licensed (Unlimited) General Contractor. The CMAR is the fiduciary for the Owner in handling and opening bids to the extent required by N.C.G.S. 143-128.1.

1.5. Construction management services means services provided by a construction manager, which may include preparation and coordination of bid packages, scheduling, cost control, value engineering, evaluation, preconstruction services, and construction administration.

1.6. A Subcontractor, as the term is used herein, shall include a general, mechanical, electrical or plumbing Subcontractor, or other specialty Subcontractor, trade Subcontractor, supplier or vendor who has entered into a direct contract with the CMAR, and includes one who furnishes labor, materials, equipment or other services to complete Work in accordance with the drawings, specifications and other plans for the Project. The term Subcontractor shall include, where appropriate, sub-subcontractors and suppliers to subcontractors of any tier.

1.7. Total Construction Budget shall consist of the Cost of the Work as defined in Item 1.8, the General Conditions of the Contract as defined in Item 1.9, the CMAR - GMP Contingency as defined in Item 1.10 below, the CMAR General Conditions, as defined in Item 1.9, and the CMAR Fee, as defined in Section 1.13. The Total Construction Budget number shall be determined and agreed upon in future Contract Amendments. The Owner reserves the right to adjust the Total Construction Budget at any time prior to agreement on the final GMP.

1.8. Cost of the Work is the sum of the trade packages and any self-performed work of the CMAR (only as permitted under this Contract) necessary to perform the Work and does not include General Condition Costs, CMAR – GMP Contingency or CMAR Fee.

1.9. General Conditions of the Contract shall define the contractual relationships between the Owner, Contractor, and Designer. The general conditions are usually included in the book of specifications (or in the accompanying architectural drawings) of a contract, that set the minimum performance requirements for the contractor. These conditions also include the rights and responsibilities of the parties involved. The general conditions provide the legal and liability

language necessary to establish a balanced work flow among the contracting parties. It clearly defines the roles of each contracting party and describes the scope and time frames of the project. In addition, general conditions may outline the insurance and bonding requirements for the project.

1.10. CMAR – GMP Contingency shall be allocated within each GMP. A CMAR-GMP Contingency fixed as an estimated lump sum for each GMP in an amount approved by the Owner, to help reduce the risks assumed by the CMAR in providing the GMP for the Project.

1.11. Owner Contingency, An Owner's Construction Contingency will be established. Expenditures against this contingency will be available to cover all costs not covered by the GMP resulting from changes in scope and initiated by the Owner via a change order amendment issued by the Owner.

1.12. The Guaranteed Maximum Price, also referred to as the GMP, is a monetary amount for the Work or a phase of the Work that, once approved by the Owner, the Owner will not be required to pay in excess of that amount to the CMAR for the Work covered by the GMP, unless the GMP is adjusted in accordance with the CMAR Pre-Construction and Construction Services Contract. The GMP is defined further in Article 5 of the CMAR Pre-Construction and Construction Services Contract. It is the intent of the CMAR Pre-Construction and Construction Services Contract that, once a GMP is fixed, any costs incurred by the CMAR over and above the GMP for the Work covered by the GMP will be at the risk of and shall be borne by the CMAR, unless the GMP is adjusted in accordance with this CMAR Pre-Construction and Construction Services Contract.

1.13. CMAR Fee, shall mean the fee to be negotiated between the Owner and the CMAR and paid to the CMAR for construction management services as a percentage of the sum of the "Cost of the Work", the CMAR General Conditions, and the CMAR-GMP Contingency. Notwithstanding anything to the contrary, if the GMP is not accepted, the CMAR shall only be entitled to receive a fee for the portion of the Pre-Construction Services completed as described in the Contract.

1.14. The Contract Documents consist of the RFQ, CMAR's Statement of Qualifications in response to the RFQ, the drawings and specifications, including all bulletins, addenda or other modifications of the drawings and specifications incorporated into the documents prior to their execution; the Construction Manager at Risk Pre-Construction and Construction Services Contract; the performance bond; the payment bond; and insurance certificates. All of these together form the Contract.

1.15. The Project Manual shall consist of the drawings, specifications and other plans for the Project prepared by the Designer and approved in writing by the Owner's Representative, which define the scope of the Work. The Contract Documents define terms and conditions. In case of discrepancy or disagreement in the Contract Documents, the order of precedence shall be the Construction Manager at Risk Pre-Construction and Construction Services Contract, large-scale detail drawings, small scale drawings. Construction Documents distributed to the CMAR for construction of the project shall be sealed by the appropriate design professional and reviewed by the Owner.

1.16. Bid packages are assembled by the CMAR to solicit and secure work from the trade subcontractors. It is the CMAR's responsibility to clearly assign and describe the scope of work in each bid package so that the intent of the Construction Documents will be met in their entirety. Bid packages or other materials prepared by the CMAR to contract with Subcontractors, while they might incorporate all or part of the Contract Documents and the Construction Documents, shall not be deemed part of nor shall they modify the Contract Documents or the Construction Documents for purposes of this Contract. The CMAR may obtain bids prior to issuance of the Final Construction Documents with approval of the Owner when deemed necessary to maintain schedule or for others reasons deemed important to the Owner. If bids are received prior to issuance of Final Construction Documents, changes affecting cost or time after issuance of the

Final Construction Drawings will be made in accordance with Section 30 of these General Conditions of the Contract.

1.17. Written notice shall be defined as notice in writing delivered in person or to a member of the contracting organization authorized to act or accept notice on behalf of the organization hereunder, or sent to the last known business address of the contracting organization by registered mail.

1.18. Work, as used herein as a noun, is intended to include materials, labor, and workmanship provided by the CMAR and its Subcontractors to carry out the intent of the Construction Documents.

1.19. Project is the total construction Work to be performed under the Contract Documents, whether performed by the CMAR and its Subcontractors, by the Owner, or by the Owner's separate contractors.

1.20. Cost or Construction Change Events (or similar term used by the CMAR's cost accounting system) shall identify all changes to the Contract and subcontracts. Certain Cost or Construction Change Events between trade subcontractors or causing the utilization of CMAR Contingency will be reviewed by the Owner with no further action taken. Other Cost or Construction Change Events that require changes in the design, project duration, or project cost, and in particular use of Construction Allowances or Owner's Special Allowances will require approval and signature of the CMAR, Designer, and the Owner. All documents are subject to audit.

1.21. Change Order Amendment, as used herein, shall mean a written order to the CMAR subsequent to the signing of the Contract authorizing a change in the Contract Amount (GMP) or Project Duration. The change order shall be signed by the CMAR, Designer, and the Owner. Approval by the Apex Town Council may be required.

1.22. Field Order, as used herein, shall mean a written approval for the CMAR to proceed with the Work requested by Owner prior to issuance of a formal Change Order. The field order shall be signed by the CMAR, Designer, and Owner's Representative.

1.23. Liquidated Damages, as stated in the Contract Documents, is an amount reasonably estimated in advance to cover the losses incurred by the Owner by reason of failure of the CMAR to complete the Work within the time specified.

1.24. Surety, as used herein, shall mean the bonding company or corporate body which is bound with and for the CMAR, and which engages to be responsible for the CMAR and its acceptable performance of the Work.

1.25. Request for information (RFI) is a request from the CMAR seeking an interpretation or clarification by the Designer relative to the Contract Documents. The RFI, which shall be labeled "RFI", shall clearly and concisely set forth the issue or item requiring clarification or interpretation and why the response is needed. The RFI must set forth the CMAR's interpretation or understanding of the Contract Documents requirements in question, along with reasons for such an understanding.

1.26. Inspection shall mean examination or observation of Work completed or in progress to determine its compliance with the Contract Documents.

1.27. "Equal to" or "approved equal" shall mean materials, products, equipment, assemblies, or installation methods considered equal by the bidder in all characteristics (physical, functional, and aesthetic) to those specified in the Construction Documents.

1.28. "Substitution" or "substitute" shall mean materials, products, equipment, assemblies, or installation methods deviating in at least one characteristic (physical, functional, or aesthetic) from those specified, but which in the opinion of the bidder would improve competition and/or enhance the finished installation.

1.29. "Provide" or "provides" shall mean furnished or furnished and installed by the CMAR or its Subcontractors as more fully described in the Contract Documents.

1.30. "Value Analysis" shall mean providing information on alternative means, methods, material or equipment that when incorporated into the project will provide the intended function at less cost.

1.31. "Substantial Completion" is that point when the work is sufficiently complete in accordance with the Contract Documents that the Owner could occupy and/or utilize the Project for its intended use, without undue interference.

1.32. "Beneficial Occupancy" is that stage of construction before final completion at which the Owner can occupy the Project for its intended purposes.

1.33. "Final Completion" is that stage that all contract requirements have been met including completion of all punch list items and owner training, delivery of all attic stock and submission of all close out documents.

2. GENERAL SCOPE AND INTENT:

2.1. For the fee, allowances and other sums set forth herein, the CMAR undertakes to furnish construction management services during the Project. The CMAR shall also act as the Owner's fiduciary in handling and opening bids to the extent required by N.C.G.S. 143-128.1. In broad terms, under this Contract, the CMAR will perform services, as generally defined in the RFQ, with General Conditions services being provided on a not-to-exceed allowance basis, and all construction being accomplished through the CMAR's Subcontractors, selected as provided herein, except as set forth in Section 7 and Section 9 and as allowed under GS143-128.1. The CMAR shall furnish efficient engineering reviews, cost control, business administration, and field supervision, and shall use its best efforts to see to it that the Work of the Project is done in the best and most expeditious, economical manner consistent with the interests of the Owner, and in strict conformity with the Contract Documents, including all reasonable implications therein. The Work of the Project may be divided into construction phases. The CMAR shall provide a Guaranteed Maximum Price for each construction phase, as more fully defined herein.

2.2. The CMAR shall familiarize itself with all available Project funding and Work with the Owner and Project Designer to maximize the scope and quality of the Project based upon the available funds.

2.3. The performance of the CMAR's services shall be in strict compliance with this Contract, the requirements of the RFQ (including all its general conditions, appendices and attachments), the CMAR's proposal, the CMAR's Small Disadvantaged Minority and Women Owned Business (SDMWOB) Plan as approved by the Owner, bonds, and all amendments hereto. To the extent that any term, requirement, or specification in the CMAR's proposal shall be in conflict with the Contract Documents, the terms, requirements, and specifications of the Contract Documents shall control and the conflicting contents of the CMAR's proposal and supporting documents shall be deemed unenforceable.

2.4. During the construction of the Work, the CMAR will provide all services to coordinate, manage and effect the construction of the Work (including the provision of General Conditions and the award and management of all Subcontracts) including without limitation: value analysis, change order review e.g., evaluation, negotiation, and recommendations for approval; quality control inspections; schedule maintenance; cost control measures; all meetings; shop drawing review; processing, tracking and monitoring of Requests For Information and substitution requests; resolution of claims by all Subcontractors; all inspections, including inspections by regulatory agencies, the Designer, the Owner's Representative, and the Owner's other technical inspectors; and close out documents with the Owner and Designer.

2.5. The drawings and specifications for the Project shall be considered complementary, one to the other. That which is shown on the drawings or called for in the specifications shall be as binding as if it were both called for and shown. The intent of the drawings and specifications is to establish the scope of all labor, materials, transportation, equipment, and any and all other things necessary to provide a complete job.

2.6. The wording of the specifications shall be interpreted in accordance with common usage of the language except that words having a commonly used technical or trade meaning shall be so interpreted in preference to other meanings.

3. PROJECT DESIGNER'S STATUS:

3.1. The Project Designer shall provide liaison and necessary inspection of the Work to ensure compliance with the Construction Documents. The Project Designer is the agent of the Owner only for the purposes to the extent stipulated in the various Contract Documents. The Project Designer has authority to stop Work or to order Work removed, or to order corrections of faulty Work where such action may be necessary to assure successful completion of the Work.

3.2. The Project Designer is the impartial interpreter of the Contract Documents, and, as such, shall exercise its powers under the Contract to enforce faithful performance by both the Owner and the CMAR, taking sides with neither. Designer shall review and make a recommendation to Owner approving, denying or modifying all change orders and change order requests.

3.3. Should the Project Designer cease to be employed on the Project for any reason whatsoever, then the Owner shall employ a competent replacement, subject to the CMAR's approval, which approval shall not be unreasonably withheld, who shall assume the status of the former Project Designer.

3.4. The Project Designer will make periodic inspections of the Project at intervals appropriate to the stage of construction. The Project Designer will inspect the progress, the quality and the quantity of the Work.

3.5. The Project Designer and the Owner shall have access to the Work whenever it is in preparation and progress during normal working hours. The CMAR shall provide facilities for such access so the Project Designer may perform its functions under the Contract Documents.

3.6. Based on the Project Designer's inspections and evaluations of the Project, the Project Designer shall issue interpretations, directives and decisions as may be necessary to assist the CMAR in the administration of the Project. The Project Designer's decisions relating to artistic effect and technical matters shall be final, provided such decisions are within the limitations of the Contract. The CMAR's decisions, however, relating to means and methods, and administration of the contracts the CMAR holds are final.

4. DRAWINGS, SPECIFICATIONS AND RECORD DOCUMENTS:

4.1. All data, information, material and matter of any nature and all copies thereof in any and all forms whatsoever developed by the CMAR or in the CMAR's possession or control relating to the Project are the property of the Owner and shall be turned over to the Owner within ten (10) days after the Owner's request.

4.2. All design drawings and specifications are instruments of service and remain the property of the Owner. The use of these instruments on Work other than this Contract without permission of the Owner is prohibited. All copies of drawings and specifications other than contract copies shall be returned to the Owner upon request after completion of the Work.

4.3. The Owner will bear the reasonable cost of reproduction and distribution of drawings, sketches, specifications and other Construction Documents for use on the project development and by the

CMAR and its Subcontractors for bidding and administrative purposes, up to an allowance to be determined upon the agreement of CMAR and Owner. No such costs shall be incurred until this agreement is reached. The CMAR shall receive clean sets of black line prints on white paper of all appropriate drawings provided by the Owner, the CMAR shall clearly and legibly record in redline all work-in-place that is at variance with the Contract Documents.

4.4. In such cases where the nature of the Work requires clarification by the Project Designer, such clarification shall be furnished by the Project Designer with reasonable promptness by means of written instructions or detail drawings, or both. Clarifications and drawings shall be consistent with the intent of Construction Documents, and shall become a part thereof unless objected to by the Owner's representative.

4.5. The CMAR shall maintain, in readable condition at its job office, one complete set of working drawings and specifications for its Work, including all shop drawings. Such drawings and specifications shall be available for use by the Project Designer or its authorized representative.

4.6. The CMAR shall require all Subcontractors to provide and CMAR shall maintain a day-to-day record of "as built" work-in-place that is at variance with the Contract Documents. Such variations shall be compiled by and fully noted on Project drawings by the CMAR and submitted to the Project Designer upon Project completion and no later than 30 days after acceptance of the Project. A condition of final payment to the CMAR shall be delivery to the Project Designer, in paper, digital image or electronic form, each Subcontractor's submittal drawings and as-built records, and certification by the Project Designer that it has the information needed to prepare a comprehensive as-built record of the Project for delivery to the Owner in accordance with the Project Designer's agreement.

4.7. The CMAR shall devise, implement and maintain at the Project site, on a current basis, a structured document control system which includes and tracks records of all necessary contracts, RFI's, shop drawings, samples, purchases, materials, equipment, maintenance and operating manuals and instructions, and any other documents and revisions thereto which arise out of the Contract or the Work. These documents and copies thereof in paper or electronic form or both as requested shall be readily available to the Owner any time during the performance of this Contract.

4.7.1. The CMAR shall arrange for and submit monthly to the Owner and Project Designer, as a General Conditions expense, progress photographs, organized by date into a sequentially labeled, three ring binders or approved electronic equivalent, in sufficient detail to properly record the Work.

5. CODES AND STANDARDS:

5.1. Wherever reference is given to codes, standard specifications or other data published by regulating agencies including, but not limited to, national electrical codes, North Carolina state building codes, federal specifications, ASTM specifications, various institute specifications, etc., it shall be understood that such reference is to the latest edition including addenda published prior to the date of the Contract Documents.

6. LABOR, MATERIALS AND EQUIPMENT:

6.1. The CMAR shall, unless otherwise specified, contract for and pay for all labor, transportation, materials, tools, construction apparatus, lights, power distribution, generators, heating apparatus, sanitary facilities, water distribution, scaffolding and incidentals necessary for the completion of the Work, shall arrange for the installation, maintenance and removal of all construction equipment, utensils or things, and be responsible for the safe, proper and lawful construction, maintenance and use of same, and the CMAR shall construct in the best and most workmanlike

manner, a complete Project and everything incidental thereto, as shown on the drawings, stated in the specifications, or reasonably implied there from, all in accordance with the Contract Documents.

6.2. All materials shall be new and of quality specified, except where reclaimed material is authorized herein and approved for use. Workmanship shall at all times be of a grade accepted as the best practice of the particular trade involved, and as stipulated in written standards of recognized organizations or institutes of the respective trades except as exceeded or qualified by the specifications.

6.3. As set forth in the Construction Documents or upon reasonable notice from the Owner's Representative, the CMAR shall require the Subcontractors to furnish warranties and evidence as to quality of materials.

6.4. Products are generally specified by ASTM or other reference standard and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the CMAR may select any product meeting this standard, by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the CMAR has the option of using any product and manufacturer combination listed. However, the CMAR shall be aware that the cited examples are used only to denote the quality standard of the product desired and that they do not restrict bidders to a specific brand, make, manufacturer or specific name; that they are used only to set forth and convey to bidders the general style, type, character and quality of product desired; and that equivalent products will be acceptable. Request for substitution of materials, items, or equipment shall be submitted to the Project Designer for approval or disapproval; such approval or disapproval shall be made by the Project Designer prior to the opening of bids.

6.5. The CMAR shall obtain written approval from the Project Designer for the use of products, materials, equipment, assemblies or installation methods claimed as equal to those specified. Such approvals must be obtained as soon after contract awards as possible and before any materials are ordered.

6.6. The Project Designer shall adjudge the equality of proposed substitution of products, materials or equipment, and its opinion shall be final, unless overridden by the Owner's Representative in writing, subject to written appeal to the Owner.

6.7. If at any time during the construction and completion of the Work covered by these Contract Documents, the conduct of any worker of the various crafts be adjudged by the Owner's Representative a nuisance to the Owner or Project Designer, or if any worker be considered detrimental to the Work, the CMAR and the Subcontractor shall order such parties removed immediately from the site and its environs.

7. SUBCONTRACTS AND SUBCONTRACTORS:

7.1. The CMAR shall determine the appropriate bid packages based on the available resources. One or more bid packages shall be prepared for each of the general construction, electrical, mechanical, fire protection, and plumbing divisions of the Work of the Project. The CMAR shall prepare any other contract packages for other divisions or subdivisions of the Work. Each Subcontractor may be required by the CMAR to provide bonds and insurance, consistent with the terms of the RFQ.

7.2. First-tier Subcontractors shall be pre-qualified by the CMAR. Only pre-qualified Subcontractors are allowed to bid to and contract with the CMAR on a Project. The CMAR and the Owner's Representative shall confer on the prequalification of lower tier subcontractors, and the CMAR shall decide whether to pre-qualify lower tier subcontractors after giving due regard to the Owner's SDMWOB goals. The prequalification criteria shall be determined jointly by the Owner, Project Designer and the CMAR to address quality, performance, time specified in the bids for

performance of the Contract, the cost of construction oversight, time for completion, capacity to perform, and other factors deemed appropriate by the Owner. The CMAR shall publicly advertise as prescribed in G.S. 143-129; and shall accept bids from first-tier Subcontractors for all construction Work. All bids shall be opened publicly and once they are opened, shall be public record under Chapter 132 of the General Statutes. The CMAR shall award each contract to the lowest responsible, responsive bidder, taking into consideration the Owner's requirements, quality, performance, time specified in the bids for performance of the contract, the cost of construction oversight, time for completion, compliance with G.S. 143-128.2, and other factors deemed appropriate by the Owner's Representative and advertised as part of the bid solicitation. If the low bid Subcontractor fails to account for all costs associated with the scope of the Work on which it is bidding, then the bid may be disqualified at the discretion of the CMAR or modified to show additional Project costs not accounted for. If after modification, the apparent low bid is no longer low, then the CMAR shall disqualify that bid and consider the next low bid submitted. The CMAR shall have the right as outlined above to verify the scope of each low bid in the same manner until it determines the lowest verified bid.

7.3. The CMAR shall conduct pre-bid meetings and award meetings for all contracts. The CMAR shall notify the Owner and Project Designer of each such meeting and shall not hold any such meeting outside the presence of the Owner and Project Designer.

7.4. The CMAR may reject all bids and repeat the bidding for a given division of Work or re-package the Work activity.

7.5. The CMAR shall not award or issue notice of award for the Work until certified tabulation of the bids, copies of the bids received, the CMAR's recommendations for award, a report of the documentation of SDMWOB participation and documentation of the good faith efforts of the bidders are provided to and reviewed with the Owner. Furthermore, the CMAR shall not award or issue notice of award of any Subcontract until the GMP that includes that Subcontract has been approved by the Owner and fixed by amendment to this Contract.

7.6. The CMAR may not bid on any trade package, nor may the CMAR perform the Work of any trade package except in the case of an emergency or extraordinary circumstance without the written approval of the Owner and Project Designer. The Owner's Representative may approve the CMAR performing a portion of the Work only if that bidding produces no responsible, responsive bidder for that portion of the Work, the lowest, responsive, responsible bidder will not execute a contract for the bid portion of the Work, or a Subcontractor defaults and a pre-qualified replacement cannot be obtained in a timely manner.

7.7. Once Subcontractors are in place, the CMAR shall provide copies of contracts to the Owner and Project Designer, including those for equipment and material suppliers. The CMAR will require the Subcontractors to provide the applicable Contract Documents including insurance certificates, SDMWOB participation schedules, and verification of SDMWOB participation (by submission of letters of intent, copies of purchase orders, etc).

7.8. If the Project Designer disapproves of any Subcontractor, then it shall submit its reasons for disapproval in writing to the Owner and CMAR. If the Owner's Representative concurs with the Project Designer's recommendation, the CMAR shall submit a substitute for approval. The Project Designer shall act promptly in the approval of material and equipment suppliers and when approval is given, no changes will be permitted except for cause or reason considered justifiable to the Project Designer and Owner's Representative.

7.9. The Project Designer will furnish to any Subcontractor, upon request, evidence regarding amounts of money approved for payment to the CMAR on account of the Subcontractor's Work.

7.10. The CMAR is and remains fully responsible for its own acts or omissions as well as those of any Subcontractor or of any employee of either. The CMAR agrees that no contractual relationship exists between the Subcontractor and the Owner in regard to the Contract, and that the

Subcontractor acts on its work as a subcontractor of the CMAR. The CMAR shall prepare bid documents and construction contract conditions for the Subcontracts for the Work, with the participation of the Designer as set forth in the agreement between the Designer and the Owner. Bid documents containing (but not limited to) the terms described below shall be prepared by the CMAR and the Design Professional as indicated:

7.10.1. Designer and CMAR: Any procedure or condition requested by the Owner's Representative in writing that is consistent with this Contract.

7.10.2. CMAR: Time of completion and liquidated damages.

7.10.3. Designer and CMAR: Alternate bids – as previously established with Owner's representative and CMAR's approval.

7.10.4. Designer and CMAR: Allowances - as previously established with Owner's representative and CMAR's approval.

7.10.5. Designer and CMAR: Any condition peculiar to the Project and the requirements of the particular contract.

7.10.6. CMAR: Tax reporting and payment procedures.

7.10.7. CMAR: Bid, Payment and Performance Bond forms and procedures in accordance with NC General Statutes.

7.10.8. CMAR: Insurance coverage and certificates.

7.10.9. CMAR: A statement emphasizing execution of the contract(s) and delivery to the CMAR and Owner in accordance with General Statutes (within 10 days of award).

7.10.10. Designer and CMAR: Determine special definitions, such as "unclassified excavation, mucking or rock", etc.

7.10.11. CMAR: Develop procedures for the Subcontractor(s) to request and the Owner's Representative to authorize field and laboratory testing by qualified independent testing agent, which include typically soils, concrete, masonry, asphalt, steel, welding, etc. in accordance with ASTM standards. The CMAR and Project Designer shall participate in reviewing qualification statements from local testing companies, evaluating with the Project Designer and Owner, and providing a final recommendation to the Owner. Subsequent to the Owner's Representatives approval, the CMAR shall participate in seeking proposals for separate contracts as required for testing and special testing necessary for the Project and recommending selection to the Designer and Owner, and the execution of contracts. The cost of independent testing agent(s) is not included in CMAR's GMP.

7.10.12. CMAR: Provisions which establish appropriate incentives and remedial measures for enforcing the contract requirements during construction.

7.10.13. Designer shall provide a listing of all Construction Documents.

7.10.14. CMAR: The Subcontractors shall be required to perform corrections to their Work and fulfill all Project closeout requirements in a timely manner.

7.10.15. CMAR: The CMAR shall require Subcontractors to organize their Work, and incorporate scheduling by the CMAR in accordance with the Owner's requirements.

7.10.16. CMAR: No retention shall be withheld on the CMAR's General Conditions Allowance expenditures.

8. BUSINESS PARTICIPATION GOALS AND STANDARDS:

8.1. CMAR shall document good faith efforts for meeting SDMWOB goals established by the Contract Documents.

8.2. The Subcontractor and CMAR shall comply in all respects with SDMWOB policies, rules and regulations. Percentages include all tiers of subcontractors in accordance with state laws and regulations.

8.3. To increase participation, if necessary, the CMAR may, with the written approval of the Owner's Representative, waive performance or payment bonds by Subcontractors, or may offer the participation of the CMAR as a guarantor or surety in the financing of materials purchases by Subcontractors, provided that the CMAR may condition such financing participation upon the issuance of joint checks or other similar arrangements to allow the CMAR to verify that timely payments are made to suppliers furnishing credit.

9. CONSTRUCTION MANAGER AND SUBCONTRACTOR RELATIONSHIPS:

9.1. The CMAR agrees that the requirements of these Contract Documents shall apply equally to each Subcontractor as to the CMAR, and the CMAR agrees to take such action as may be necessary to bind each Subcontractor to these requirements. The CMAR further agrees to conform to the Code of Ethical Conduct as adopted by the Associated General Contractors of America, Inc., with respect to CMAR-Subcontractor relationships, and that payments to Subcontractors shall be made in accordance with the provisions of G.S. 143-134.1 providing for interest on final payments due to prime Subcontractors and sub-subcontractors.

9.2. Within seven days after the CMAR receives each periodic or final payment and its bank makes the funds available after deposit, the CMAR shall pay each Subcontractor based on Work completed or service provided under the Contract. Should any periodic or final payment to a Subcontractor be delayed by more than seven days after receipt of periodic or final payment by the CMAR, the CMAR shall pay the Subcontractor interest, beginning on the eighth day, at the rate of one percent (1%) per month or fraction thereof on such unpaid balance as may be due, provided the Subcontractor has conformed to the specified billing procedures and insurance requirements.

9.3. The retainage withheld from payments made by the CMAR to the Subcontractor shall not exceed the retainage reflected in the CMAR payment applications and payments made by the Owner to the CMAR. Any retainage on payments made by the CMAR to the Subcontractor that exceeds the corresponding retainage on payments made by the Owner to the CMAR shall be subject to interest to be paid by the CMAR to the Subcontractor at the rate of one percent (1%) per month or fraction thereof.

9.4. Nothing in this section shall prevent the CMAR at the time of application and certification to the Owner from withholding application and certification to the Owner for payment to a Subcontractor for unsatisfactory job progress; defective construction not remedied; disputed Work; third-party claims filed or reasonable evidence that claim will be filed; failure of Subcontractor to make timely payments for labor, equipment and materials; damage to CMAR or another Subcontractor; reasonable evidence that the contract cannot be completed for the unpaid balance of the contract sum; or a reasonable amount for retainage not to exceed the initial percentage retained by Owner.

10. SEPARATE CONTRACTS:

10.1. Without invalidating the relationships with the CMAR, the Owner reserves the right to let other contracts in connection with the Project, the Work under which shall proceed simultaneously with the execution of the CMAR's Work. Separate contracts may include materials or equipment that the Owner elects to provide itself. The Owner may also enter into separate contracts with testing

firms or other technical support firms to assist the Owner in connection with the Project. The CMAR shall afford other separate Subcontractors reasonable opportunity for the execution of their work and for the introduction and storage of their materials, and the CMAR shall take all reasonable action to coordinate its Work with theirs. If the work performed by the separate Subcontractor is defective or so performed as to prevent the CMAR from carrying out its Work according to the plans and specifications, the CMAR shall immediately notify the Project Designer and the Owner upon discovering such conditions.

11. WARRANTY AND GUARANTEE:

11.1. The CMAR unconditionally warrants and guarantees all materials and workmanship against patent defects arising from faulty materials, faulty workmanship or negligence for a period of twelve (12) months following the date of substantial completion of the Work and beneficial occupancy (whichever is later) and shall replace such defective materials or workmanship without cost to the Owner. CMAR shall include this requirement in all subcontracts except demolition, any cleaning or trade support contracts, or others approved by the Owner's Representative.

11.2. In addition to the foregoing general warranty, the Owner may require extended warranties for specified building components, including without limitation mechanical and electrical equipment, elevators and escalators, security equipment, curtain wall, doors, roofing and waterproofing. Extended warranties shall be specified in the Construction Documents or specific written instructions from the Owner. All such extended warranties shall either be provided by the CMAR or by a Subcontractor or manufacturer. If the warranty is provided by a Subcontractor or manufacturer, the warranty shall explicitly state that it is for the benefit of and may be enforced by the Owner. Such warranties shall provide, at a minimum, for the repair or replacement of defective or non-conforming components within the warranty period. Beyond its general twelve month warranty, the CMAR shall not be responsible for extended warranties given by a Subcontractor or manufacturer, so long as the Owner has the benefit of and right to enforce the warranty. CMAR shall make recommendations on warranty issues and include as approved by Owner and Designer, alternates in all bid packages seeking optimal bid responses for Owner's and Designer's consideration on all warranty time length and feature issues, prior to bidding any packages. Owner and Designer shall review, consider options and direct CMAR on inclusion of warranty alternates in all bid package awards.

11.3. Additionally, the Owner may bring an action against the CMAR for latent defects which are hidden or not readily apparent to the Owner at the time of beneficial occupancy or final acceptance, whichever occurred first, in accordance with applicable law. The Owner shall not bring an action against the CMAR under this section unless the Owner has first provided the CMAR with sufficient notice of the latent defect, and the CMAR has refused to remedy the defect within a reasonable period of time.

11.4. The CMAR services shall extend through the completion of the warranty phase; once Project Closeout is achieved, however, the CMAR's obligations and services are limited to Warranty obligations.

12. ROYALTIES, LICENSES AND PATENTS:

12.1. The CMAR shall pay all royalties and license fees. The CMAR shall defend suits or claims for infringement of copyright and patent rights and shall hold the Owner harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents or Construction Documents or where the copyright violation are contained in Drawings, Specifications or other documents prepared by the Owner or Designer. However, if the infringement of a copyright or a patent is identified by the CMAR or the CMAR is otherwise

made aware of such infringement, the CMAR shall be responsible for such loss unless such information is promptly furnished to the Designer.

13. COMPLIANCE WITH LAWS, PERMITS, INSPECTIONS, FEES, AND REGULATIONS:

13.1. The CMAR shall give all notices and comply with all laws, ordinances, codes, rules and regulations bearing on the conduct of the Work under the Contract. If the CMAR observes that the drawings and specifications are at variance therewith, it shall promptly notify the Project Designer and Owner in writing. Any necessary changes required after contract award shall be made by change order. If the CMAR performs any Work knowing it to be contrary to such laws, ordinances, codes, rules and regulations, and without such notice to the Project Designer and Owner, it shall bear all cost arising there from. Additional legal requirements implemented after bidding will be subject to equitable adjustments to the GMP.

13.2. All Work under the CMAR Contract shall conform to the North Carolina State Building Code and other State, local and national codes as are applicable. The cost of all required regulatory agency inspections under State, local and national codes shall be the responsibility of the CMAR and its Subcontractors. Costs for re-inspections by the Town of Apex or other regulatory agencies, to the extent attributable to the CMAR and its Subcontractors, shall be the responsibility of the CMAR and its Subcontractors.

13.3. The CMAR shall cooperate with the state, county or municipal authorities by obtaining building and other required permits. Permits shall be obtained and paid for by the CMAR.

14. CONDUCT AND USE OF PREMISES:

14.1. The CMAR shall confine its apparatus, the storage of materials and the operations of its workers to limits as indicated by law, ordinances, permits or directions of the Project Designer and Owner's Representative and shall not exceed those established limits in its operations.

14.2. The CMAR shall not load or permit any part of the structure to be loaded with a weight that will endanger its integrity or safety.

14.3. The CMAR shall enforce the Project Designer's and Owner's Representative's instructions regarding signs and advertisements.

14.4. The CMAR, its Subcontractors and employees shall not possess or carry, whether openly or concealed, any gun, rifle, pistol, or explosive on any property owned by the Owner. This includes firearms locked in containers, vehicles or firearm racks within vehicles.

14.5. The CMAR, its Subcontractors and employees, are prohibited from profane, lewd, obscene or offensive conduct, including engaging in sexual harassment.

14.6. The CMAR and its Subcontractors shall not manufacture, transmit, conspire to transmit, possess, use or be under the influence of any alcoholic or other intoxicating beverage, narcotic drug, hallucinogenic drug, amphetamine, barbiturate, marijuana or anabolic steroids, or possess, use, transmit or conspire to transmit drug paraphernalia on any property owned by the Owner, except pursuant to a drug prescription by a physician.

14.7. Smoking or use of any tobacco product is prohibited in any enclosed or occupied facility at all times. The use of tobacco products is prohibited at all times on this site in areas routinely occupied by staff, and in enclosed areas of unoccupied sites. An enclosed area for construction projects shall be defined as any dried-in area or as designated by the Project Designer. Smoking shall be located in designated areas only.

14.8. The CMAR, its employees, its Subcontractors and their employees shall not solicit from or sell within the Owner's facilities.

14.9. Operators of all commercial vehicles on any property owned by the Owner shall be subject to post-accident, random, reasonable suspicion and follow-up testing for drugs and alcohol.

14.10. The CMAR shall at all times enforce strict discipline and good order among its employees and shall not employ any unfit person or anyone not skilled in the task assigned to it. The Owner may require the CMAR to remove any employee or Subcontractor the Owner deems incompetent, careless, or otherwise objectionable.

14.11. All agents and workers of the CMAR and its Subcontractors shall wear identification badges approved by the Owner's Representative and provided by the CMAR at all times they are on the Owner's property, or in the alternative, have a representative present that can confirm the workers' or agents' status as an employee of that entity. The CMAR and its Subcontractors shall comply with the Owner's access procedures when working on any existing facility.

15. CUTTING, PATCHING AND DIGGING:

15.1. The CMAR shall ensure satisfactory performance of all cutting, fitting or patching that may be required to make the Work come together properly and fit to receive or be received by Work of other Subcontractors shown upon or reasonably implied by the drawings and specifications for the completed structure, as the Project Designer may direct.

15.2. Any cost brought about by defective or ill-timed Work shall be borne by the party responsible therefore.

15.3. No Subcontractor shall endanger any work of another such Subcontractor by cutting, digging or other means, nor shall he cut or alter the work of any other such Subcontractor without the consent of the CMAR, the Project Designer, and the affected Subcontractor(s).

16. UTILITIES, STRUCTURES, SIGNS:

16.1. Prior to the operation of permanent systems, the CMAR will cooperate with the Owner to arrange for temporary power, lighting, water, and heat to maintain space temperature above freezing, as required for construction operations. Utility charges for temporary power, lighting, water and heat will be paid the CMAR as a General Conditions expense.

16.2. The CMAR shall provide or arrange for, as appropriate, necessary and adequate apparatus and facilities for water, electricity, gas, oil, sewer, and other utility services, which may be required for completion of the Project. It is anticipated that the Owner will pay directly to the each utility company all public utility charges for metered utilities such as water, sewer and power. Nevertheless, if requested by the Owner, any permanent meters installed shall be listed in the CMAR's name until its Work is deemed substantially complete and occupied by the Owner, and the Owner may hold the CMAR responsible for extended utility charges in the event completion of the Project is delayed. The Owner or CMAR, as applicable, shall cooperate with one another to recover actual costs of metered utilities from the responsible party should delays occur in Project completion. Extended metered utility costs are in addition to the liquidated damages provided for elsewhere in this Contract.

16.3. Any meters listed in the name of the CMAR shall be re-listed in the Owner's name on the day following completion and acceptance of the CMAR's Work, and the Owner shall pay for services used after that date.

16.4. The Owner shall be reimbursed for all metered utility charges after the meter is re-listed in the Owner's name and prior to completion and acceptance of the Work of all Subcontractors. Reimbursement shall be made by the Subcontractor that's Work has not been completed and accepted.

16.5. The CMAR shall have the permanent building systems in sufficient readiness for furnishing temporary climatic control at the time a building is enclosed and secured. The HVAC systems shall maintain climatic control throughout the enclosed portion of the building sufficient to allow completion of the interior finishes of the building. A building shall be considered enclosed and secured when windows, doorways (exterior, mechanical, and electrical equipment rooms), and hardware are installed; and other openings have protection, which will provide reasonable climatic control. The appropriate time to start the mechanical systems and climatic condition shall be jointly determined by the CMAR and the Project Designer. Use of the equipment in this manner shall in no way affect the warranty requirements of the CMAR.

16.6. The CMAR shall coordinate the Work so that the building's permanent power wiring distribution system shall be in sufficient readiness to provide power as required by the HVAC Subcontractor for temporary climatic control.

16.7. The CMAR shall coordinate the Work so that the building's permanent lighting system shall be ready at the time the Subcontractors begin final interior painting and other final interior finishes and shall provide adequate lighting in those areas where other interior painting and finishing is being performed.

16.8. The CMAR shall be responsible for its permanently fixed service facilities and systems in use during progress of the Work. The following procedures shall be strictly adhered to:

16.8.1. Prior to acceptance of Work by the Owner, the CMAR shall coordinate the removal and replacement of any parts of the permanent building systems damaged through use during construction.

16.8.2. Temporary closures or filters shall be installed in each of the heating and air conditioning units and at each return grille during construction. New filters shall be installed in each unit prior to the Owner's acceptance of the Work.

16.8.3. Extra effort shall be maintained to keep the building and the site adjacent to the building clean. Under no circumstances shall air systems be operated if finishing and site work operations are creating dust in excess of what would be considered normal if the building were occupied.

16.8.4. It shall be understood that any warranty on equipment presented to the Owner shall extend from substantial completion and occupancy by the Owner. The cost of maintaining the equipment during operation in the finishing stages of construction shall be borne by the Subcontractor whose system is utilized.

16.8.5. The CMAR shall ensure that all lamps are in proper working condition at the time of final Project acceptance.

16.9. The CMAR shall provide, if required and where directed, a shed for toilet facilities and shall furnish and install in its shed all water closets required for a complete and adequate sanitary arrangement. These facilities will be available to other Subcontractors on the job and shall be kept in a neat and sanitary condition at all times. Chemical toilets are acceptable.

16.10. The CMAR shall, if needed and where directed by the Owner's Representative, erect a temporary field office, complete with lights, telephone, heat and air conditioning. A portion of this office shall be partitioned off, of sufficient size, for the use of the Project Designer, should the Owner's Representative so direct.

16.11. The CMAR is responsible for making temporary elevators, lifts, or other special equipment available for the general use of all Subcontractors. The cost for such elevators, lifts or other special equipment and the operation thereof may be included in the CMAR's General Conditions.

16.12. The CMAR will erect one sign on the Project, and may erect others if approved by the Owner's Representative. The sign(s) shall be of sound construction, and shall be neatly lettered and

comply with all local, state, and federal regulations. Directional signs may be erected on the Owner's property subject to approval of the Owner with respect to size, style and location of such directional signs. Such signs may bear the name of the CMAR and a directional symbol. All signs must comply with Town of Apex sign, appearance and traffic ordinances. No other signs will be permitted except by permission of the Owner's Representative.

17. CLEANING UP:

17.1. The CMAR shall ensure that the building and surrounding area is reasonably free from rubbish at all times, and shall remove debris from the site on a timely basis or when directed to do so by the Owner's Representative. The CMAR shall provide an on site refuse container(s) for the use of all Subcontractors. The CMAR shall ensure that each Subcontractor removes their rubbish and debris from the building on a daily basis. The CMAR shall ensure that the building is broom cleaned as required to minimize dust and dirt accumulation.

17.2. The CMAR shall provide and maintain suitable all-weather access to the building.

17.3. Before final inspection and acceptance of the building, the CMAR shall ensure that all portions of the Work are clean, including glass, hardware, fixtures, masonry, tile and marble (using no acid). The CMAR shall clean and wax all floors as specified, and completely prepare the building for use by the Owner, with no additional pre-occupancy cleaning required by the Owner.

18. PROTECTION OF WORK, PROPERTY AND THE PUBLIC:

18.1. The CMAR shall be responsible for the entire site and the building or construction of the same and provide all the necessary protections, as required by the Owner's Representative or Designer, and by laws or ordinances governing such conditions. Consistent with the indemnification provisions elsewhere in the Contract Documents, and subject to the benefits of any Owner-controlled or Owner-provided insurance that covers the interests of the CMAR and its Subcontractors, the CMAR shall be responsible for protecting the public and those on the site against all bodily injury or harm, and protecting against any damage to the Work, to adjacent property, and to property of others. The CMAR shall have access to the Project at all times. Subject to its ultimate contractual responsibility for protection of work, property and the public under this Contract, and subject to any non-delegable duties imposed by law, the CMAR may delegate to Subcontractors these obligations of the CMAR under this Contract, and may obtain indemnification and insurance from Subcontractors as the CMAR deems reasonable and prudent.

18.2. The CMAR shall provide cover and protect all portions of the structure when the Work is not in progress, provide and set all temporary roofs, covers for doorways, sash and windows, and all other materials necessary to protect all the Work on the building, whether set by it, or any of the Subcontractors.

18.3. Any Work damaged through the lack of proper protection or from any other cause, shall be repaired or replaced without extra cost to the Owner.

18.4. No fires of any kind will be allowed inside or around the operations during the course of construction without special permission from the Owner's Representative.

18.5. The CMAR shall protect all trees and shrubs designated to remain in the vicinity of the operations in accordance with the Contract Documents. The CMAR shall barricade all walks, roads, etc., as directed by the Designer to keep the public away from the construction. All trenches, excavations or other hazards in the vicinity of the Work shall be well barricaded and properly lighted at night.

18.6. The CMAR shall develop and implement a Project safety program in accordance with the RFQ and applicable regulations. The Owner will have final approval of the CMAR's Safety Program. The Owner's Representative may require additional safety measures before granting approval.

Subcontractors must also comply with any such additional safety requirements of the Owner Controlled Insurance Program, if any, or the Contractor Controlled Insurance program. The CMAR shall report, to the Owner, as part of each monthly report, any safety violations and actions taken to protect the safety of persons and property engaged in the Project. The CMAR may require that all Subcontractors meet the CMAR's safety program requirements including where those requirements meet or exceed State or Federal requirements.

18.7. In the event the Owner implements an Owner Controlled Insurance Program ("OCIP") or a Contractor Controlled Insurance Program ("CCIP"), the CMAR agrees to cooperate and coordinate with any reasonable safety plan or risk management plan implemented in connection with the OCIP or CCIP.

18.8. The CMAR shall be responsible for all necessary safety measures for the protection of all persons on the job, including the requirements of the Associated General Contractors of America Manual of Accident Prevention in Construction, as amended, and shall fully comply with all state laws or regulations and North Carolina State Building Code requirements to prevent accident or injury to persons on or about the location of the Work. The CMAR shall clearly mark or post signs warning of hazards existing, and shall barricade excavations, elevator shafts, stairwells and similar hazards. The CMAR shall protect against damage or injury resulting from falling materials and shall maintain all protective devices and signs throughout the progress of the Work.

18.9. The CMAR shall, at a minimum, adhere to the rules, regulations and interpretations of the North Carolina Department of Labor relating to Occupational Safety and Health Standards for the Construction Industry (Title 29, Code of Federal Regulations, Part 1926, published in Volume 39, Number 122, Part II, June 24, 1974, Federal Register), and revisions thereto as adopted by General Statutes of North Carolina 95-126 through 155.

18.10. The CMAR shall designate a responsible member of its organization as safety inspector, whose duties shall include accident prevention on the Project. The name of the full-time onsite safety inspector shall be made known to the Designer and Owner at the time the Work is started. The CMAR will provide the Owner's Representative with the name of each Subcontractor's onsite safety officer.

18.11. In the event of emergency affecting the safety of life, the protection of Work, or the safety of adjoining properties, the CMAR is hereby authorized to act at its own discretion, without further authorization from anyone, to prevent such threatened injury or damage. Any compensation claimed by the CMAR on account of such action shall be determined as provided for in the Contract Documents.

18.12. If reasonable precautions are inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance encountered but not created on the site by the CMAR or its Subcontractors, the CMAR shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Designer in writing. The Owner shall take responsibility for remediation of the material or substance from the site. If the CMAR claims its progress in completing the Project is delayed because of the Owner's remediation of the site, the CMAR shall file notice and a claim in accordance with this Contract.

19. SEDIMENTATION POLLUTION CONTROL ACT OF 1973:

19.1. Any land-disturbing activity performed by the CMAR in connection with the Project shall comply with all erosion control measures set forth in the Contract and Construction Documents and any additional measures which may be required in order to ensure that the Project is in full compliance with the Sedimentation Pollution Control Act of 1973, as implemented by Title 15, North Carolina Administrative Code, Chapter 4, Sedimentation Control, Subchapters 4A, 4B and 4C, as amended (15 N.C.A.C. 4A, 4B and 4C).

19.2. Upon receipt of notice that a land-disturbing activity is in violation of said Act, the CMAR shall be responsible for ensuring that all steps or actions necessary to bring the Project in compliance with said act are promptly taken.

19.3. The CMAR shall be responsible for defending any legal actions instituted pursuant to N.C.G.S. 113A-64 unless such legal action arises from the acts or omissions of: the Owner; the Designer; any of the Owner's or Designer's agents, elected officials, consultants, contractors, subcontractors, or employees; or any person or entity who is not under the CMAR's control.

19.4. To the fullest extent permitted by law, the CMAR shall indemnify and hold harmless the Owner, the Project Designer and the agents, elected officials, consultants, and employees of the Owner and Project Designer, from and against all claims, damages, civil penalties, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from the performance of Work or failure of performance of Work, provided that and only to the extent that any such claim, damage, civil penalty, loss or expense is solely attributable to the CMAR or its Subcontractors and is a violation of the Sedimentation Pollution Control Act. Such obligation shall not be construed to negate, abridge or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or persons described in this Contract, including specifically paragraph 40.

20. INSPECTION OF THE WORK:

20.1. It is a condition of this Contract that the Work shall be subject to inspection during normal working hours by the Designer, designated official representatives of the Owner, and those persons required by state law to test special Work for official approval. The CMAR shall therefore provide safe access to the work at all times for such inspections.

20.2. All instructions to the CMAR regarding the interpretation of the plans and specifications will be made only by or through the Designer or its designated Project representative. Observations made by official representatives of the Owner shall be conveyed to the Project Designer for review and coordination prior to issuance to the CMAR.

20.3. Where special inspection or testing is required by virtue of any state laws, instructions of the Designer, specifications or codes, the CMAR shall give adequate notice to the Designer and Owner of the time set for such inspection or test, if the inspection or test will be conducted by a party other than the Designer. Such special tests or inspections will be made in the presence of the Designer and Owner's representative or the Owner's designated agent, and it shall be the CMAR's responsibility to serve ample notice of such tests.

20.4. All laboratory tests shall be paid by the Owner unless provided otherwise in the Contract Documents except the CMAR shall pay for laboratory tests to establish design mix for concrete, and for additional tests to prove compliance with Contract Documents where materials have tested deficient except when the Owner's testing laboratory did not follow the appropriate ASTM testing procedures.

20.5. The CMAR shall perform quality control inspections on the work of the Subcontractors to guard the Owner against defects and deficiencies in the Work and shall coordinate its activity with the on-site duties of the Designer. The CMAR shall advise the Designer of any apparent variation and deviation from the intent of the Construction Documents and shall take the necessary action to correct such variations and deviations from the intent of the Construction Documents. The CMAR shall provide two sets of all inspection reports (in binder form) as part of the job progress meetings to the Designer and the Owner.

20.6. The Owner reserves the right to independently contract for compliance inspection and testing.

20.7. The CMAR shall record and effectuate the correction of deficiencies submitted by the Owner and the Designer.

20.8. The Designer shall in all cases make final interpretation of the Contract Documents and rule on compliance of the Work.

20.9. Should any Work be covered up or concealed prior to required inspection and approval by the Designer, such Work shall be uncovered or exposed for inspection, if so requested by the Designer in writing. Inspection of the Work will be made promptly upon notice from the Designer or Owner. All cost involved in uncovering, repairing, replacing, recovering and restoring to design condition, the Work that has been covered or concealed will be paid by the CMAR.

20.10. If any other portion of the Work has been covered which the Designer has not specifically requested to observe prior to being covered, the Designer or Owner's Representative may request to see such Work and it shall be uncovered by the CMAR. If such Work be found in accordance with the Construction Documents, the cost of uncovering and replacement shall, by appropriate change order, be charged to the Owner. If such Work be found not in accordance with the Contract Documents, the CMAR shall pay such costs.

21. TIME OF COMPLETION, DELAYS, EXTENSION OF TIME:

21.1. The CMAR shall commence provision of services under this Contract not later than five days after the date of this Contract, and shall fully complete all services hereunder and accomplish the substantial and final completion of the Project in accordance with the schedules attached to future contract amendments of the Contract, which shall be adhered to unless otherwise agreed to in writing by the Owner.

21.2. The Project shall be brought to Substantial and Final Completion within the time prescribed by the Project schedule that is updated and established at the time the final GMP is accepted, which shall be in accord with the foregoing target schedule as extended by the Owner by change order in accordance with the Contract.

21.3. If the CMAR is delayed at any time in the progress of its Work by any act or negligence of the Owner or the Designer, or by any employee of either; by changes ordered in the Work; by labor disputes at the Project site; by abnormal weather conditions not reasonably anticipated for the locality where the Work is performed; by unavoidable casualties; by any causes beyond the CMAR's control; or by any other causes which may justify the delay, then the Contract time shall be extended by change order for a reasonable time as agreed upon by the CMAR, Owner, and Project Designer. Contract defaults or other breaches of any legal duty by a Subcontractor shall not be grounds for a time extension under this Contract. Time extensions will not be granted for rain, wind, snow or other natural phenomena of normal intensity for the locality where the Work is performed. For purpose of determining the extent of delay attributable to unusual weather phenomena, a determination shall be made by comparing the weather for the contract period involved with the average of the preceding ten (10) year climatic range during the same time interval based on the National Oceanic and Atmospheric Administration National Weather Service statistics for the locality where Work is performed and on daily weather logs kept on the job site by the CMAR reflecting the effect of the weather on progress of the Work. Absent extraordinary circumstances, time extensions for weather delays shall not entitle the CMAR to an increase in the GMP.

21.4. Except for requests due to weather delays, a request for extension of time shall be made in writing to the Designer and the Owner's Representative within twenty one (21) consecutive calendar days following the CMAR's identification of the event that is the cause of delay. The CMAR shall submit any requests for extension of time due to weather delays in writing to the Designer and Owner's Representative on a monthly basis. If notification is not made as defined above, no time extension will be considered.

21.5. The CMAR shall notify its surety in writing of each extension of time granted.

21.6. The schedule for all responses by the Designer to submittals by the CMAR shall be part of the Project schedule, as amended from time to time in accordance with the Contract. No request for a time extension shall be allowed on account of failure of the Project Designer to process any type of submittals, furnish drawings, or provide instructions unless and until the CMAR provides written notice of the request to the Owner as defined in Section 21.

21.7. Should the CMAR fail to bring the Project to substantial completion within the time prescribed by the schedule that is established at the time the final GMP is accepted (or such later date as may result from extension of time granted by the Owner), the CMAR shall be liable to the Owner for delay damages as set forth herein. The CMAR acknowledges that delays will damage the Owner, but also acknowledges that proof of such damages would be difficult and costly for both parties, and that the injury to the Owner which could result from a failure of the CMAR to complete on schedule is uncertain and cannot be computed with exact precision. In order to liquidate in advance the delay damages that the Owner will be entitled to recover from the CMAR in the event of unexcused delays in the completion of the Project, the CMAR agrees that it will pay, and that the Owner may retain from the funds otherwise to be paid to the CMAR, the following liquidated damages, which sums are agreed upon as a reasonable and proper measure of damages which the Owner will sustain by failure of the CMAR to complete Work within the time stipulated.

21.7.1. The sum of **$1,500.00** per day for each consecutive calendar day that the CMAR fails to achieve substantial completion of the entire Project.

21.8. In addition to the foregoing liquidated damages, the Owner may recover extended utility charges as expressly set forth elsewhere in this Contract.

21.9. The CMAR shall not use its unexpended GMP Contingency to pay liquidated damages. The CMAR may in its discretion provide in its construction contracts that its Subcontractors will be liable for liquidated delay damages, in the amount of the Owner's liquidated damages or in different amounts. Notwithstanding anything in this Contract that might be construed to the contrary, in the event the CMAR deducts liquidated damages from a particular construction contract, thereby reducing the sum payable under that contract, the GMP will not be reduced by the amount withheld from that Subcontractor.

21.10. This provision for liquidated damages does not bar Owner's right to enforce its other contractual rights and remedies under this Contract, including without limitation the right to order the CMAR to accelerate the Work or the right to terminate the Contract. Liquidated damages represent the Owner's best effort at the commencement of the Contract to estimate its reasonable anticipated damages for delay, and should not be construed as a penalty.

22. CONSTRUCTION SUPERVISION AND SCHEDULE:

22.1. The CMAR shall maintain a competent and adequate full-time staff approved by the Owner at the Project site to coordinate and provide adequate direction of the Work, and to monitor progress of the Subcontractors on the Project at all times. The CMAR's on-site representatives shall manage the Work of the Subcontractors and coordinate the Work with the activities and responsibilities of the Owner, Designer and CMAR to complete the Project in accordance with the Owner's objectives of cost, time and quality.

22.2. It is understood that the designated and approved on-site resident CMAR representatives will remain on the job and in responsible charge as long as those persons remain employed by the CMAR, unless the Owner's Representative agrees otherwise in writing during the course of the Project. A contract amendment may be required by the Owner's Representative issued accordingly by the Owner. The Owner may request in writing that the CMAR promptly remove any individual staff member for any reason.

22.3. The CMAR shall establish an on-site organization and lines of authority in order to carry out the overall plans of the Project Team. The CMAR will coordinate with the on-site Subcontractors to provide the necessary on-site services for the construction activities and on-site requirements of the CMAR, Owner and Designer.

22.4. The CMAR shall establish and maintain an on-site safety program. The safety program shall be discussed on a regular basis at contractor meetings and during CMAR/Owner/Designer progress meetings. Safety reports shall be included in weekly and monthly progress reports. The CMAR will also provide project orientation and safety training to the Owner's staff, all consultants, agents of the Owner and visitors. The CMAR will lead and facilitate tours of the site as requested by the Owner.

22.5. The CMAR shall accept delivery and arrange for storage, protection and security for any Owner purchased materials, systems and equipment that are a part of the Work until such items are turned over to the respective Subcontractors.

22.6. The CMAR shall provide a cost and resource loaded critical path method (CPM) schedule utilizing accepted standard computer based software. The scheduling software shall allow for integration of all aspects of the Project and provide for coordination of all Work to be performed. The scheduling software used by the CMAR shall be capable of producing and coordinating logic developed network diagrams, and tabular format reports.

22.7. After acceptance of each GMP and issuance of a construction contract amendment to the CMAR for a Construction Phase of the Project and within fifteen (15) days of written notice to proceed (NTP), the CMAR shall submit a preliminary CPM schedule for inclusion in the contract bid packages consistent with the time frames submitted in each GMP.

22.8. After contract award but prior to thirty (30) days from the date of the notice to proceed, the CMAR shall obtain from the Subcontractors their respective Work activities and integrate them into a Project construction schedule. The CMAR shall develop the complete and final CPM schedule in the form of a CPM network arrow diagram using the CMAR's logic and time estimates for each segment of the Work and shall be cost loaded, the sum of which totals the GMP exclusive of a CMAR-GMP contingency, and manpower loaded to complete the Work within the scheduled time frames. The scheduling obligation shall include coordinating and tracking the progress of the Owner's and Designer's tasks and activities in relation to the milestone schedule including but not limited to Fixtures, Furnishing and Equipment delivery; and telecommunications and data installation. The CMAR shall promptly notify Owner of any delay that might impact construction. The CMAR shall make recommendations to the Owner, with a copy to the Designer, regarding strategies for overcoming any delay in the design of the Project that will affect the construction schedule. The CMAR and the Designer shall prepare, if deemed necessary, a schedule fixing dates upon which foreseeable clarifications will be required. The schedule will be subject to addition or change in accordance with progress of the Work. The Designer shall furnish drawings or clarifications in accordance with that schedule. The CMAR shall not proceed with the Work without such detail drawings and/or written clarifications.

22.9. The arrow network diagram will be drawn in a level of detail suitable for display of salient features of the Work, including but not limited to the placing of orders for materials, submission of shop drawings for approval, approval of shop drawings by the Designer and the Owner, delivery of material, and all Work activities inclusive of punch list agreed to by the Owner. Each Work activity shall be assigned a time estimate by the CMAR. One-day shall be the smallest time unit used. This cost loaded schedule will not be the basis for invoicing, but may be considered by the Designer and the Owner when evaluating the percentage of Work represented to be complete in each schedule of values.

22.10. Upon completion of the network diagrams, the CMAR shall have computer input data prepared, and a computer run made to generate a printout for the Project based on the information

supplied. In the event the completion date indicated by the schedule exceeds the contractual date, the logic and time estimates used to develop the plan will be reviewed, changes made in the logic and time estimates, and another computer run made to generate a new schedule. This procedure shall be repeated, if necessary, to provide a plan and schedule to meet Owner requirements. All submissions shall be both in hard copy and in electronic format.

22.11. Within fifteen (15) days of each GMP notice-to-proceed, the updated CPM schedule shall be submitted to the Owner for review and approval. No application for payment will be processed until the Project CPM schedule is approved by the Owner. This working plan shall show job identification, job duration, manpower loading, cost loading, calendar dates for start and finish of each job, and jobs critical to the completion of the Project on schedule. When approved by the Owner, they shall become the working plan and schedule for the Project and such information shall be provided to the CMAR for distribution to the Project Team. The CMAR shall distribute to the Subcontractors the approved Project CPM schedule and shall display same at the job site.

22.12. The CMAR shall review the plan and schedule each week. An updated cost-loaded Project schedule shall be furnished showing actual completed Work at the end of each month in respect to the entire Project. The form used shall be approved by the Owner and shall be submitted with the monthly invoice. The CMAR shall also develop and submit a Work plan for a two week, thirty day and sixty day look ahead.

22.13. The CMAR shall provide regular monitoring of the schedule as construction progresses, identify potential variances between scheduled and desired completion dates, review the schedule for Work not started or incomplete, review the status of submittals and delivery of long-lead time deliveries, review the Owner's occupancy priorities, and take the action necessary to meet the required completion date. The CMAR shall furnish to the Owner various schedules and updates setting forth planned and completed progress of the Project broken down by the various divisions or parts of the Work and by calendar days. The CMAR shall ensure that all schedules are prepared and updated in strict conformance with the Owner's requirements for formatting of reports for the Owner. The CMAR shall keep the Owner, the Designer and all Subcontractors fully informed as to all changes and updates to the schedule. The CMAR shall ensure that all schedules are prepared and updated in strict conformance with the Owner's requirements and for provision of one inclusive schedule incorporating necessary lead times for actions required, by the Owner and regulatory agencies (including the Town of Apex), by the Designer, by the CMAR, and by utility companies providing services or relocating service lines and facilities, by all Subcontractors, and for significant General Condition's activities, including but not limited to agenda submittals, permit and approvals applications and review of interim and final plans, specifications and bid packages.

22.14. The CMAR shall schedule and preside over regular site coordination meetings with Subcontractors as conditions on the Project require, but at least weekly. In addition, the CMAR shall conduct weekly progress meetings and other meetings as may be directed by the Owner, at which Subcontractors, the Owner, the Designer, other designated representatives, and the CMAR can discuss jointly such matters as progress, scheduling, and construction-related problems. All Subcontractors shall be represented at these job progress conferences by both home office and Project personnel, unless specifically excused by both the CMAR and the Owner. The CMAR shall require attendance from other subcontractors and material suppliers who can contribute toward maintaining required job progress. It shall be the principal purpose of these meetings, or conferences, to effect coordination, cooperation and assistance in every practical way toward the end of maintaining progress of the Project on schedule and to complete the Project within the specified contract time. The CMAR shall be prepared to assess progress of the Work and to recommend remedial measures for correction of progress as may be appropriate. The CMAR with assistance from the Project Designer shall be the coordinator of the conferences and shall preside as chairman. The CMAR shall take and distribute complete minutes of meetings to all attendees and others as directed by the Owner within three (3) days of such meetings.

Representatives of the Owner may attend any or all meetings and shall in any case receive all notices and minutes of meetings.

22.15. The CMAR shall keep accurate and detailed written records of Project progress during all stages of construction. The CMAR shall maintain a detailed daily diary of all events, which occur at the jobsite or elsewhere, and which affect, or may be expected to affect, Project progress. The diary shall record weather data, including minimum and maximum temperatures, precipitation type and amount, sky conditions, and wind velocities. The diary shall also record all visitors, and include a detailed list of all material deliveries to the site. The diary shall be available to the Owner at all times and shall be turned over to the Owner upon completion of the Contract.

22.16. The CMAR shall compile and submit to the Owner daily a summary report consisting of the CMAR's Daily Diary and each Subcontractor's daily report describing the construction activities of the day along with manpower and equipment usage, including that of the Subcontractors and safety incidents or concerns.

22.17. The CMAR shall submit to the Owner and the Designer a weekly report of the status of all Work activities. The CMAR is to submit and confirm the report format to the Owner's requirements for these reports and prior to implementation the CMAR must obtain the Owner's approval of the format. The Owner shall have no duty to respond to any information in the periodic reports, unless the CMAR specifically requests a response or action by the Owner in writing in a separate document.

22.18. The weekly status report shall show the actual Work completed to date in comparison with the original amount of Work scheduled, inclusive of information on the Subcontractors' Work and the percentage of completion for the Project. The report shall describe major milestones achieved and slipped, including a discussion of each slippage. In addition to schedule information, the report shall contain an overall summary of the financial status of the Project with a cost control report with proposed solutions for resolution of any cost concerns or issues. The report shall contain a summary statement on the status of change orders for the Project inclusive of potential change orders, approved change order and rejected/voided change orders as well as change orders which require the Owner's immediate attention. The report shall contain a summary statement as to the status of shop drawings, submittals and RFI's for the Project inclusive of items requiring the Owner and/or the Designer's immediate attention. The report shall contain a summary statement as to the status of quality control/inspections for the Project including, but not limited to, number and type of inspections made, overall Project quality to date, and recommendations. Finally, subject to the requirements of any OCIP or CCIP, if utilized, the report shall include a safety/accident report. If an OCIP or CCIP is utilized, additional details and reports may be required.

22.19. Should an issued Project schedule indicate that the critical path is thirty (30) days or more behind schedule, the CMAR shall within fourteen (14) calendar days after schedule issuance, provide a written report of such condition to the Owner and Designer and present to the Owner and Designer a written recovery schedule and acceleration plan to re-sequence and reschedule the Work to achieve the agreed Project completion dates. The recovery schedule and acceleration plan shall be in a format suitable to the Owner with all data and any requested PDF (filtered) files for review. The recovery schedule and acceleration plan shall indicate what measures are being taken to bring the Work back on schedule and ensure that the Substantial Completion date is not exceeded. The recovery schedule and acceleration plan shall include as necessary overtime work, extra shifts, additional labor forces, additional supervision, re-sequencing of activities, changes in means and methods, and any other tactics needed to achieve timely completion. The recovery schedule shall identify the activity durations to be achieved by the plan and the Subcontractors that are affected by the plan. If the schedule delay is solely due to the action, inaction, or fault of the CMAR, the CMAR shall immediately implement the acceleration plan and recovery schedule upon written approval by the Owner's Representative which shall not warrant

an increase to the GMP. If the schedule delay is not the fault of the CMAR, then implementation of the acceleration plan and/or recovery schedule shall warrant an increase in the GMP, and the CMAR shall not implement the acceleration plan or recovery schedule until a change order is issued. The acceleration plan shall also include an estimate of the cost of acceleration. If the CMAR intends to seek a time extension, in addition to the other requirements of the Contract, the request for a time extension shall include a fragnet analysis appropriately referenced to specific predecessor and successor activities in the base line schedule as updated supporting any proposed revisions to the schedule.

22.20. In the event the CMAR is required to present a recovery plan and accelerate the Work, the CMAR shall account for and allocate the costs of acceleration as follows:

22.20.1. If the CMAR otherwise would be entitled to a time extension, and the CMAR has requested a time extension or given notice of a claim for acceleration in writing in accordance with the Contract, and the Owner orders the CMAR to implement a recovery plan to accelerate the Work, then in such event the Owner will authorize the use of other funds in the Total Construction Budget or provide additional funds to pay the costs of such acceleration and issue a change order to increase the GMP.

22.20.2. Should an issued Project schedule indicate that the critical path is thirty (30) days or more behind schedule, the CMAR and its trade subcontractors shall without being entitled to any increase in the GMP or other compensation work overtime, increase labor forces, or take such action as may be necessary or appropriate to complete the activity by the completion dates shown, unless the CMAR is otherwise entitled to an extension of the completion dates under the Contract. The CMAR shall require each subcontractor to prepare and submit a recovery schedule as specified herein. The CMAR shall review and ascertain that each subcontractor is providing sufficient resources to regain lost time. In no event will the GMP be increased or any expenses paid to the CMAR or its subcontractors for delays solely caused by the CMAR or its subcontractors, it being understood that the CMAR bears the risk of delays caused by its subcontractors.

23. SHOP DRAWINGS, SUBMITTALS, SAMPLES, DATA:

23.1. The CMAR shall develop and implement a system for review, acceptance or rejection, and processing of all shop drawings and submittals, including the projected lead-time on the CPM schedule. The CMAR shall review this system with the Owner and the Designer, and obtain the Owner's approval prior to implementation.

23.2. Within 30 consecutive calendar days of the notice to proceed with each GMP, a schedule for anticipated submission of all shop drawings, product data, samples, and similar submittals shall be prepared by the CMAR and provided to the Designer. This schedule shall indicate the items, relevant specification sections, other related submittal data, and the date when these items will be furnished to the Designer.

23.3. The CMAR will be responsible for logging all shop drawings/submittals and stamping them reviewed and approved prior to submission to the Designer. The CMAR shall provide additional copies of any submittals or shop drawings requested by the Owner. The CMAR is to insure that shop drawing/submittal packages are submitted in an appropriate manner and, if not, return them to the Subcontractor for proper submission.

23.4. The CMAR shall be responsible for tracking and monitoring all shop drawings/submittals throughout construction until all shop drawings/submittals have been approved by the Designer and completion reported to the Owner.

23.5. The CMAR shall include shop drawings as an agenda item on all Owner meetings and advise the Owner immediately of any delays in the shop drawing and submittal process.

23.6. The CMAR shall develop a shop drawing and submittal aging report which is to be submitted to the Owner at each weekly progress meeting.

23.7. Approval of shop drawings by the Designer shall not be construed as relieving the CMAR from responsibility for compliance with the design or terms of the Contract Documents nor from responsibility of errors of any sort in the shop drawings, unless such error has been called to the attention of the Designer in separate writing by the CMAR.

24. SUBSTITUTION REQUESTS:

24.1. The CMAR will be responsible for logging all substitution requests. The CMAR will be responsible for reviewing all substitution requests to ensure that they are complete; and, if not, return them to the Subcontractor for proper submission. The CMAR will be responsible to review all substitution requests prior to submission to the Designer and the Owner. It is to be noted that the Owner discourages substitutions and the Owner's approval will be granted only upon the most persuasive arguments as to quality, function and financial merit regarding a substitution. The CMAR shall be responsible for tracking and monitoring all substitution requests throughout construction until all substitution requests are processed by the Designer and the Owner. The CMAR shall be responsible to see that all substitution requests are submitted in a timely manner per the specifications. The CMAR shall include substitution requests, if any, on the agenda topic at the Owner's meetings and advise the Owner immediately of any delays in the substitution request process.

25. REQUESTS FOR INFORMATION:

25.1. The CMAR will be responsible for developing and implementing a Request for Information (RFI's) form for use on the Project. The CMAR will be responsible for logging and reviewing all RFI's prior to submission to the Owner and the Designer. The CMAR is to insure that the RFI's submitted are appropriate and not frivolous. The CMAR shall be responsible for tracking and monitoring all RFI's throughout construction in a timely manner until they are processed by the Designer and the Owner. The CMAR shall include RFI's as an agenda topic at all Owner meetings and advise the Owner immediately of any delays in their process. All responses to the RFI's that have an added cost impact must also be discussed with the Owner immediately upon such determination. The CMAR shall develop an RFI aging report that is to be submitted to the Owner at each progress meeting.

26. SUBSTANTIAL COMPLETION:

26.1. The date of substantial completion of the Work or designated portion thereof is the date certified by the Designer when the Work or a designated portion thereof is sufficiently complete, in accordance with the Construction Documents, so the Owner can fully occupy and utilize the Work or designated portion thereof for the use for which it is intended, with all of the Project's parts and systems operable as required by the Contract Documents. Only incidental corrective Work and any final cleaning beyond that needed for the Owner's full use may remain for final completion. The issuance of a temporary or final certificate of occupancy shall not, in itself, constitute substantial completion.

26.2. When the CMAR considers that the Work, or a designated portion thereof which is acceptable to the Owner, is substantially complete as defined above, the CMAR shall prepare for and submit to the Designer and Owner a list of all items which in the CMAR'S opinion are to be completed or corrected and shall attach it to a request in writing that the Designer perform a substantial completion inspection. The Owner's occupancy of incomplete Work shall not alter the CMAR's responsibilities. The Designer shall review the CMAR'S list and shall compile a punch list of items to be corrected and completed. The failure to include any items on such list does not alter the responsibility of the CMAR to complete all Work in accordance with the Contract Documents.

26.3. When the Owner, Designer and CMAR, on the basis of an inspection, jointly determine that the Work or designated portion thereof is substantially complete, the Designer will then prepare a certificate of substantial completion which shall establish the date of substantial completion, shall state the responsibilities of the Owner and the CMAR for security, maintenance, heat, utilities, damage to the Work, and insurance, and shall signify the beginning of the time within which the

CMAR shall complete the items listed therein. Warranties required by the Contract Documents shall commence on the date of substantial completion of the Work or designated portion thereof, unless otherwise provided in the certificate of substantial completion.

26.4. The certificate of substantial completion shall be submitted to the Owner and the CMAR for their written acceptance of the responsibilities assigned to them in such certificate. Upon substantial completion of the Work or designated portion thereof and upon application by the CMAR and certification by the Designer, the Owner shall make payment, except retainage held pursuant to the Contract Documents, for such Work or portion thereof as provided in the Contract Documents.

26.5. The acceptance of substantial completion payment shall constitute a waiver of all claims by the CMAR and its Subcontractors, except those previously made in writing and identified by the CMAR as unsettled at the time the CMAR submits the application for payment for substantial completion, and except for the retained sums due at final acceptance.

26.6. The CMAR shall indemnify and hold the Owner harmless against any accrued claims by its Subcontractors that are waived because they were not made in writing and identified by the CMAR as unsettled when the CMAR submitted the application for payment for substantial completion.

26.7. The Owner shall have the option to correct or complete any and all punch list items not completed by the CMAR to the satisfaction of the Designer and the Owner within forty five (45) days for any GMP package of less than 1 year's duration and not more than ninety (90) days from the actual date of substantial completion for any GMP package of more than 1 year's duration by utilizing its own forces or by hiring others. The cost of such correction of remaining punch list items by the Owner or others shall be deducted from the final payment to the CMAR.

26.8. If CMAR does not complete certain punch list items within the required time period, all warranties and guarantees for such incomplete punch list items shall become effective upon CMAR submitting to the Owner and Designer certification of the date such items were completed and approval by the Owner's Representative and Designer. The issuance of the certificate of substantial completion does not indicate final acceptance of the Project by the Owner, and the CMAR is not relieved of any responsibility for the Project except as specifically stated in the certificate of substantial completion.

26.9. Should the Designer and the Owner determine that the Work or a designated portion thereof is not substantially complete, they shall provide the CMAR with written notice stating why the Work or designated portion is not substantially complete. The CMAR shall expeditiously complete the Work and shall re-request in writing that the Designer perform another substantial completion inspection. Costs, if any, associated with such re-inspection shall be assessed to the CMAR at the rates specified in the Designer's contract.

27. PARTIAL UTILIZATION / BENEFICIAL OCCUPANCY:

27.1. The Owner may desire to occupy or utilize all or a portion of the Project when the Work for that portion is substantially complete.

27.2. Prior to the final payment, the Owner may request that the CMAR in writing, through the Designer if applicable, permit the Owner to use a specified part of the Project which the Owner believes it may use without significant interference with construction of the other parts of the Project. If the CMAR agrees, the Designer will schedule a beneficial occupancy inspection after which the Designer may issue a certificate of substantial completion. The certificate shall include the following documentation and information:

27.2.1. Date of substantial completion.

27.2.2. A tentative list of items to be completed or corrected before final payment.

27.2.3. Establish responsibility between the CMAR and Owner for maintenance, heat, utilities and insurance.

27.2.4. Establish the date for guarantees and warranties under the terms of the Contract.

27.2.5. Consent of surety.

27.2.6. Endorsement from the CMAR'S insurance company permitting occupancy shall be a condition precedent to the Owner's occupancy of a part or parts of the Project.

27.3. The Owner shall have the right to exclude the CMAR from any part of the Project which the Designer has so certified to be substantially complete, but the Owner will allow the CMAR reasonable access to complete or correct Work to bring it into compliance with the Contract. Subcontractors allowed to work in substantially complete and occupied areas shall clean up after their operations daily or be subject to back charges therefore. Occupancy by the Owner pursuant to this section will in no way relieve the CMAR from its contractual requirement to complete the Project within the specified time.

28. FINAL INSPECTION, ACCEPTANCE, AND PROJECT CLOSEOUT:

28.1. The CMAR is responsible for the close out requirements under the Contract. The CMAR is to work closely with the Owner as to the procedures and schedule for contract close-out and the related contractual obligations.

28.2. Upon notification from the CMAR that the Project is complete and ready for inspection, the Designer shall make a preliminary final inspection to verify that the Project is complete and ready for final inspection. Prior to final inspection, the CMAR shall complete all items requiring corrective measures noted at the preliminary inspection. The Designer shall schedule a final inspection at a time and date acceptable to the Owner and the CMAR.

28.3. At the final inspection, the Designer shall, if job conditions warrant, record a list of items that are found to be incomplete or not in accordance with the Construction Documents. At the conclusion of the final inspection, the Designer shall make one of the following determinations:

28.3.1. That the Project is completed and accepted.

28.3.2. That the Project is accepted subject to the list of discrepancies (punch list). Subject to unavoidable delays in the delivery of materials needed to correct or complete discrepancies, all punch list items must be completed within thirty (30) days of acceptance or the Owner may invoke Owner's Right to Do Work.

28.3.3. That the Project is not complete and another date for a final inspection will be established.

28.4. Within fourteen (14) days of acceptance or within fourteen (14) days after completion of punch list, the Designer shall certify the Work and issue applicable certificate(s) of compliance.

28.5. Any discrepancies listed or discovered after the date of final inspection and acceptance shall be resolved as a warranty item.

28.6. The CMAR shall obtain as-built and product data from Subcontractors and maintain a current set of record drawings, specifications and operating & maintenance manuals. For mechanical and electrical equipment, the CMAR is to obtain the operating and maintenance (O&M) manuals at least three (3) months prior to the demonstration for such equipment for review prior to the equipment demonstration. Prior to Project Closeout, three copies of the O&M manuals are to be sent to the Owner's representative who will forward as he/she sees fit.

28.7. At the completion of the Project and before final payment, the CMAR shall deliver a complete set of as-built drawings for use by the Designer in preparing Record Drawings.

29. COST CONTROL:

29.1. The CMAR shall develop and maintain an effective system of Project cost control. Elements of the system of Project cost control will include, but not necessarily be limited to, Project budgets, GMP proposals, the cost and resource loaded critical path schedule, and cash flow forecasts and reports, all in formats to be approved by the Owner.

29.2. The CMAR shall incorporate into each element of the system of Project cost control all Owner approved changes as they occur, update and refine the GMP, and develop reports and forecasts as needed, or as directed by the Owner. The CMAR shall identify variances between actual and estimated costs and advise the Owner whenever projected cost exceeds bid allowances or estimates.

29.3. The CMAR shall check and supervise all material deliveries, equipment and labor entering the Work site. The CMAR shall maintain cost accounting records on authorized Work performed under unit costs, actual costs for labor and material, or other bases requiring accounting records, and afford the Owner access to these records and preserve them for a period of three (3) years after final payment. The Owner reserves the right to audit these records during that period.

30. CHANGES IN THE WORK:

30.1. The CMAR shall develop and implement a system for review, negotiation, and processing of proposed Change Orders. The CMAR shall, with complete supporting data, recommend necessary desirable changes to the Owner and the Designer for approval.

30.2. The Owner unilaterally at any time may have changes made in the Work covered by the Contract, including but not limited to changes: (1) in the specifications or drawings; (2) in the sequence, method or manner of performance of the Work; (3) in the Owner-furnished facilities, equipment, materials, services or site; or (4) directing acceleration in the performance of the Work. Furthermore, it is understood and agreed that refinement and detailing may be accomplished from time to time with respect to the drawings and specifications. The CMAR's entitlement to an increase in the GMP or an extension of time, or both, if any, for such changes shall be determined in accordance with the Contract.

30.3. No adjustment in the Guaranteed Maximum Price shall be made unless such change, refinement, or detailing results in changes in the scope and/or design of the Project, or a compensable delay to the Project's schedule.

30.4. The Designer with the Owner's Representative's approval has the authority to order minor changes in the Work not involving an adjustment in the GMP or time for completion, and not inconsistent with the intent of the Construction Documents. Such changes shall be effected by written order and shall be binding on the Owner and the CMAR. The CMAR shall not perform any changes, other than minor changes, in the Work unless authorized in writing by the Owner. The CMAR's performance of minor changes pursuant to this section shall not constitute a waiver of any claim the CMAR may have for additional compensation or time. Any claim the CMAR may have, however, shall be filed in strict conformance with the Contract.

30.5. No Change Order will be issued for resolution of conflicts in the documents which are to be covered by the CMAR-GMP Contingency.

30.6. Except in an emergency endangering life or property, no change shall be made by the CMAR except upon receipt of approved change order or written field order from the Designer, countersigned by the Owner's representative authorizing such change. No claim for increases in

the GMP shall be honored or valid unless this procedure is followed. A field order, transmitted by fax or hand-delivered, may be used where the change involved impacts the critical path of the Work. A formal change order shall be issued within the time stated on the field order.

30.7. The CMAR shall notify the Owner in writing (and copy to Designer) if the CMAR believes that a change in scope or design will require a change in the GMP. The Owner shall have the right to require the performance thereof on a lump sum basis, a unit price not to exceed basis, or a time and material not to exceed basis.

30.8. The CMAR shall notify the Designer and the Owner of such changes before trade bids for the Work associated are requested. The Owner and CMAR shall reach agreement on the nature of the subject change and upon the Owner's direction, eliminate the circumstances of the change or negotiate a mutually agreed cost change to be made to the GMP.

30.9. The CMAR acknowledges that some changes in the Project may require approval by the Apex Town Council. So as not to delay the Project, the CMAR shall notify the Owner's representative of any requested deadlines for responses and how the Owner's failure to respond will impact the Project schedule. CMAR shall notify the Owner of any such changes as soon as practicable and shall not be entitled to an extension or change in cost or GMP due to failure to timely notify Owner such that any decision needing approval by the Apex Town Council can be obtained at a regularly scheduled Council meeting.

30.10. Upon receipt of an Owner directed change request, the CMAR shall submit a proposal within fourteen (14) calendar days, or provide written justification acceptable to the Owner within ten (10) working days stating the additional time required to submit a proper proposal for the change requested. The CMAR's proposal shall be itemized and segregated by labor and materials for the various components of the change in or addition to the Work (no aggregate labor total will be acceptable) and shall be accompanied by signed proposals by any Subcontractors who will perform any portion of the change in, or addition to, the Work, and of any persons who will furnish materials or equipment for incorporation therein. The proposal shall also include the CMAR's estimate of the time required to perform said changes or additional Work.

30.11. Change order proposals will consist of actual costs, e.g., Subcontractors' change order proposals and CMAR General Conditions items, if applicable, plus CMAR Fee pursuant to the Contract. All costs saved by scope reductions shall revert to the Owner in full.

30.12. All change orders shall be supported by a breakdown showing method of arriving at net cost as defined below. The Owner and Designer will review the CMAR's analysis and cost data and advise the CMAR of their findings. The CMAR will provide such supporting data in suitable format. The Designer shall verify correctness. Within ten (10) days after receipt of the CMAR's proposal, the Designer shall prepare the change order and forward to the CMAR for its signature or otherwise respond, in writing, to the CMAR's proposal. Within five (5) days after receipt of the change order executed by the CMAR, the Designer shall certify the change order by its signature, and forward the change order and all supporting data to the Owner for the Owner's signature. The Owner shall endeavor to execute the change order within fifteen (15) days of receipt, or in accordance with the Owner's standard procedures when Town Council approval is required. Upon approval by the Owner, copies of the change order will be sent to the Designer and the CMAR and its surety. In case of emergency or extenuating circumstances, approval of changes may be obtained verbally by telephone or field orders approved by all parties, then shall be substantiated in writing as outlined under normal procedure.

30.13. The portions of the proposal relating to labor and materials may include the reasonably anticipated direct costs to any of the CMAR's Subcontractors for labor and materials to be purchased for incorporation in the change in the Work, plus transportation and applicable sales and use taxes. The term "direct cost" as used herein shall mean the difference between all proper cost additions and deductions. The "cost" as used herein shall be limited to the following:

30.14. The actual costs of materials and supplies incorporated or consumed as part of the Project;

30.15. The actual costs of labor expended performing the Work;

30.16. The actual costs of labor burden, limited to the costs of social security (FICA) and Medicare/Medicaid taxes; unemployment insurance costs; health/dental/vision insurance premiums; paid employee leave for holidays, vacation, sick leave, and/or petty leave, not to exceed a total of 30 days per year; retirement contributions; worker's compensation insurance premiums; and the costs of general liability insurance when premiums are computed based on payroll amounts; the total of which shall not exceed forty percent (40%) of the actual costs of labor.

30.17. The actual costs of rental for tools, excluding hand tools; equipment; machinery; and temporary facilities required for the Project;

30.18. The actual costs of premiums for bonds, insurance, permit fees, and sales or use taxes related to the Project;

30.19. Overtime and extra pay for holidays and weekends may be a cost item only to the extent approved by the Owner;

30.20. The CMAR may include up to fifteen percent (15%) of said costs as overhead and profit for its Subcontractors. In the case of deductible change orders, the CMAR shall deduct no less than ten percent (10%) for overhead and profit.

30.21. If any of the items included in the lump sum proposal are covered by unit prices, the Owner may, if it requires the change in the Work to be performed on a lump sum basis, elect to use these unit prices in lieu of the similar items included in the lump sum proposal, in which event an appropriate deduction will be made in the lump sum amount prior to the application of any allowed overhead and profit percentages. No additional Subcontractor overhead and profit shall be applied to any unit prices.

30.22. In the event that the CMAR fails to submit its proposal or obtain approval of an extension of time within the designated period, the Owner may order the CMAR to proceed with the change or addition to the Work and the CMAR shall so proceed. The Owner shall unilaterally determine the reasonable cost and time to perform the Work in question, subject to dispute resolution at a later time.

30.23. The Owner reserves the right to reject the CMAR's proposal for a change in the Work and to elect to perform said Work using a separate Contractor. Under such circumstances, the CMAR shall coordinate the work of the Owner's contractor.

30.24. If the Owner requests a change order and the CMAR's terms are unacceptable, the Owner may require the CMAR to perform such Work on a time and material basis. If the Owner elects to have the change in the Work performed on a time and material basis, the CMAR shall submit to the Owner daily time and material tickets, to include the identification number assigned to the change in the Work, the location and description of the change in the Work, the classification of labor employed, the materials used, the equipment rented (not tools) and such other evidence of cost as the Owner may require. The Owner may require authentication of all time and material tickets and invoices by persons designated by the Owner for such purpose. The failure of the CMAR to secure any required authentication shall constitute a waiver by the CMAR of any claim for the cost of that portion of the change in the Work covered by a non-authenticated ticket or invoice.

30.25. In the event that the parties are unable to agree as to the reasonable cost and time to perform the change in or addition to the Work based upon the CMAR's proposal and the Owner does not elect to have the change in the Work performed on a time and material basis, Owner has the right to direct in writing that the CMAR perform the change in the Work. Failure of the parties to reach agreement regarding the cost and time of performing the change in the Work regardless of any

pending protest, shall not relieve the CMAR from performing the change in the Work promptly and expeditiously. Nothing contained in this section shall prevent the CMAR from making a claim for additional costs and/or an extension of time for changes to the Work that justify an increase in the GMP and/or an extension to the Contract time.

30.26. At the time of signing a change order, the CMAR shall be required to certify as follows: "I certify that my bonding company will be notified forthwith that my contract has been changed by the amount of this change order, and that a copy of the approved change order will be mailed upon receipt by me to my surety."

30.27. A change order, when issued, shall be full compensation, or credit, for the Work included, omitted or substituted. It shall show on its face the adjustment in time for completion of the Project as a result of the change in the Work.

30.28. No changes will invalidate, relieve or release the CMAR from any guarantee given by him pertinent to the contract provisions. No changes will affect the validity of the performance bond or relieve the surety on said bond.

30.29. In the event of emergency endangering life or property, the CMAR and the Subcontractors may be directed to proceed on a time and material basis by the Owner's Representative whereupon the CMAR shall proceed and keep accurately on such form as may be required, a correct account of costs together with all proper invoices, payrolls and supporting data. Upon completion of the Work the change order will be prepared and settled as outlined herein.

31. CLAIMS FOR EXTRA COST:

31.1. If the CMAR or any of its Subcontractors asserts that any event or occurrence has caused a change in or addition to the Work which change causes an increase or decrease in the GMP or the time required for the performance of any part of the Work under the Contract, including Work not affected directly by the change, the CMAR shall, within twenty one (21) calendar days of the CMAR receiving notice of such event, give the Owner and Designer written notice as herein required. Said notice shall include the instructions or circumstances that are the basis of the claim and the CMAR's best estimate of the cost and time involved. The statement of claim hereunder may be included in the notice required above. The statement of claim shall include all direct, indirect and impact costs associated with the change, as well as the CMAR's estimate of the schedule impact of the change, if any. The CMAR and its Subcontractors shall not be entitled to reimbursement or an increase in the GMP for any claims that are not filed in strict conformance with this section. The CMAR shall not proceed with the Work affected until further advised, except in emergency involving the safety of life or property. No claims for extra compensation will be considered unless the claim is so made. The Designer shall review and render a written decision on each claim for extra cost within seven (7) days of receipt of claim.

31.2. The CMAR shall not act on instructions received by it from persons other than the Designer, and any claims for extra compensation or extension of time on account of such instruction will not be honored. The Designer will not be responsible for misunderstandings claimed by the CMAR of verbal instructions which have not been confirmed in writing, and in no case shall instructions be interpreted as permitting a departure from the Contract Documents unless such instruction is confirmed in writing and supported by a properly authorized change order.

31.3. Approved claims for extra cost will be considered change orders for purposes of determining if the CMAR is entitled to an increase in its Fee under the Contract.

31.4. If the parties are unable to agree to the reasonable cost and time to perform the change, or are unable to agree as to whether a change occurred, the Owner's representative shall make a unilateral determination regarding the basis of proceeding, subject to dispute resolution at a later time. The CMAR shall proceed with the Work as directed by the Owner's representative.

31.5. Should a claim for an increase in the GMP or an extension of the Contract time by the CMAR be denied by the Owner, the CMAR may request mediation in connection with the dispute resolution rules adopted for this Project.

32. DIFFERING SITE CONDITIONS:

32.1. Should the CMAR encounter subsurface or latent conditions, or both, at the site materially differing from those shown on the drawings or indicated in the specifications or differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in this Contract, the CMAR shall immediately, and in no event later than thirty days later, give notice to the Owner of such conditions before they are further disturbed. The Owner and the Designer shall thereupon promptly investigate the conditions and if they find that they materially differ from those shown on the drawings or indicated in the specifications, they shall at once make such changes in the drawings and/or specifications as they may find necessary. Any increase or decrease in the Cost of the Work or the Contract time resulting from such changes shall be adjusted in the manner provided herein for adjustments as to extra and/or additional Work and changes. However, neither the Owner nor the Designer shall be liable or responsible for additional Work, costs or changes to the Work that could have been reasonably determined from any geotechnical, soils and other reports, surveys and analyses made available for the CMAR's review or that could of been discovered by the CMAR through the performance of its obligations pursuant to the Contract Documents.

33. CORRECTION OF WORK BEFORE FINAL PAYMENT:

33.1. Any Work, materials, fabricated items or other parts of the Work which have been condemned or declared not in accordance with the Contract by the Designer shall be promptly removed from the Work site by the CMAR, and shall be immediately replaced by new Work in accordance with the Contract at no additional cost to the Owner. Work or property of the Owner, damaged or destroyed by virtue of such faulty Work, shall be made good at the expense of the CMAR.

33.2. Correction of condemned Work described above shall commence within seventy-two (72) hours after receipt of notice from the Designer, and shall make satisfactory progress until completed.

33.3. Should the CMAR fail to proceed with the required corrections, then the Owner shall have the right to complete the Work under the terms herein.

34. CORRECTION OF WORK AFTER FINAL PAYMENT:

34.1. Neither the final certificate, final payment, occupancy of the premises by the Owner, nor any provision of the Contract, nor any other act or instrument of the Owner, shall relieve the CMAR from responsibility for negligence, for faulty material or workmanship, for breach of any warranty or guarantee, or for failure to comply with the drawings and specifications. The CMAR shall correct any defects due thereto and repair any damage resulting therefrom, which may appear during the guarantee period following final acceptance of the Work in accordance with its warranty and guarantee. The Owner will report any defects as they may appear to the CMAR and establish a time limit for completion of corrections by the CMAR.

35. UNCORRECTED FAULTY WORK:

35.1. Should the correction of faulty or damaged Work be considered inadvisable or inexpedient by the Owner and the Designer, the Owner shall be equitably reimbursed by the CMAR. The reimbursement may be deducted from any amounts due or to become due to the CMAR. Should the cost of such reimbursement exceed the amount due or to become due the CMAR, then the CMAR or its surety, or both, shall be liable for and shall pay to the Owner the amount of said

deficiency. The CMAR may in turn deduct such reimbursements from amounts due to responsible Subcontractors.

36. OWNER'S RIGHT TO DO WORK:

36.1. If, during the progress of the Work or during the period of guarantee or warranty, the CMAR fails to prosecute the Work properly or to perform any provision of the Contract, the Owner, after fifteen (15) days' written notice sent by certified mail, return receipt requested, to the CMAR and the Designer, may perform or have performed that portion of the Work. The cost of the Work may be deducted from any amounts due or to become due to the CMAR, such action and cost of same having been first approved by the Designer. Should the cost of such action of the Owner exceed the amount due or to become due the CMAR, then the CMAR or its surety, or both, shall be liable for and shall pay to the Owner the amount of said excess.

37. TERMINATION FOR CONVENIENCE:

37.1. The Owner may terminate the Contract for the Owner's convenience at any time and for any reason including, without limitation, failure of the parties to reach agreement on any GMP. In the event the Contract is terminated pursuant to this provision, the CMAR shall, as requested by the Owner, cancel all subcontracts for Work or cooperate with the Owner to assign subcontracts for portions of the Work to the Owner or the Owner's designee. The Owner shall pay the CMAR all costs of the Work incurred by the CMAR, including cancellation costs, settlement costs, demobilization costs and restocking Fees, until all subcontracts with the CMAR can be canceled or assigned, and the CMAR has otherwise been paid in-full for the Cost of the Work it has incurred. Otherwise, the CMAR shall only receive the CMAR Fee and the CMAR General Conditions Costs incurred through demobilization from the Project.

37.2. Termination under this paragraph shall not release either the CMAR or its surety from liability or responsibility for any default, known or unknown, at the time of termination. If known, Owner shall provide proper notice in accordance with the Contract.

38. TERMINATION FOR DEFAULT:

38.1. If the CMAR (1) fails to begin the Work within the time specified by the Contract; (2) fails to complete the Work consistent with the schedule provided pursuant to the Contract; (3) fails to perform consistently with the terms of the Contract or allows Work to be performed inconsistent with the standards and terms mandated by the Contract; (4) refuses or fails to supply enough properly skilled workers or proper materials; (5) fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the CMAR and the Subcontractor; (6) disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; (7) becomes insolvent or is declared bankrupt, or allows any final monetary judgment, which is not subject to appeal or challenge, to stand against it unsatisfied for a period of seven days after the CMAR receives notice of the judgment, or shall make a general assignment for the benefit of its creditors; (8) or otherwise is guilty of a material breach of this Contract, the Owner may give notice in writing, sent by certified mail, return receipt requested, to the CMAR and its surety of such default, specifying the same, and if the CMAR within a period of thirty (30) days after such notice shall not proceed in accordance therewith, then upon the Owner's issuance of an additional ten (10) day notice of intent to terminate, the Owner may terminate employment of the CMAR and may, subject to any prior rights of the surety, take the prosecution of the Work out of the hands of the CMAR, to appropriate or use any or all Contract materials and equipment on the grounds as may be suitable and acceptable and may enter into an agreement, either by public letting or negotiation, for the completion of said Contract according to the terms and provisions thereof or use such other reasonable methods for the

completion of the Work in an acceptable manner. All costs and charges incurred by the Owner in completing the Work under Contract, shall be deducted from any monies due or which may become due said CMAR and surety. In case the expense so incurred by the Owner shall be less than the sum which would have been payable under the Contract, if it had been completed by said CMAR, then the said CMAR and surety shall be entitled to receive the difference, but in case such expense shall exceed the sum which would have been payable under the Contract, then the CMAR and the surety shall be liable and shall pay to the Owner the amount of said excess.

38.2. It is further mutually agreed between the parties hereto that if at any time after the execution of this Contract and the surety bonds hereto attached for its faithful performance, such bonds, for any reason, cease to be adequate to cover the performance of the Work, the CMAR shall, within twenty (20) days after the receipt of notice from the Owner of such inadequacy, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be adequate to cover the performance of the Work. In such event no further payment to the CMAR shall be due under this Contract until such new or additional security for the faithful performance of the Work shall be furnished to the Owner. Said new or additional security shall meet the same criteria required for the furnishing of the original bonds pursuant to the Contract Documents.

38.3. In the event it is determined by a court of law that termination under this paragraph was not justified, the termination of the CMAR will be treated as if it were a termination for convenience hereunder.

39. CONSTRUCTION MANAGER'S RIGHT TO STOP WORK OR TERMINATE THE CONTRACT:

39.1. Should the Work be stopped for a period of three months by order of a court having jurisdiction or by order of any other public authority due to cause beyond the fault or control of the CMAR, or if the Owner should fail or refuse to make payment on account of a certificate issued by the Designer within thirty (30) days after receipt of same, or in the event that the Designer receives the CMAR's application for payment but fails to take any action on it, within thirty (35) days of the Designer's receipt of the application for payment, then the CMAR, after fifteen (15) days' written notice sent by certified mail, return receipt requested, to the Owner and the Designer, may suspend operations on the Work and/or terminate the Contract.

39.2. The Owner shall be liable to the CMAR for the cost of the Work delivered and performed on this Contract plus all general conditions costs incurred to date plus its fee earned to date, and shall make such payment. The Designer shall determine and certify the correctness of such payment.

40. INDEMNIFICATION:

40.1. Except to the extent caused by the negligence, willful misconduct, acts, or omissions of the Owner, the Designer, any of the Owner's or Designer's agents, elected officials, consultants, contractors, subcontractors, or employees, or any person or entity who is not under the CMAR's control, the CMAR shall indemnify and hold and save the Owner, its officers, elected officials, agents, and employees harmless from liability of any kind, including all claims, costs (including defense) and losses accruing or resulting to any other person, firm, or corporation furnishing or supplying work, services, materials, or supplies in connection with the performance of this Contract, and from any and all claims, costs (including defense) and losses accruing or resulting to any person, firm, or corporation to the extent caused by the negligent acts or omissions of the CMAR and its Sub-contractors and suppliers at any level in the performance of the Contract. This representation and warranty shall survive the termination or expiration of the Contract.

The above obligations shall not be construed to negate, abridge or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this Section. Such obligation shall not be affected or limited by the immunity granted under any worker's compensation plan.

41. REQUEST FOR PAYMENT:

41.1. Prior to payment by the Owner, the Designer shall review and approve the CMAR's pay applications. Based on applications for payment submitted to the Designer by the CMAR and certificates for payment issued by the Designer, the Owner shall make progress payments to the CMAR as provided below and elsewhere in the Contract Documents.

41.2. The period covered by each application for payment shall be one calendar month ending on the last day of the month or as agreed to and set during the Pre-construction Conference.

41.3. No advance payments or interim payments will be made by the Owner.

41.4. Provided a proper and complete application for payment is received by the Designer, payment shall be made by the Owner not later than thirty days after the Designer's certification of the application for payment.

41.5. With each application for payment for General Conditions and Work performed directly by the CMAR and such Subcontractors as the Owner may specify, the CMAR shall submit transaction summaries, certified payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner or Designer to demonstrate that cash disbursements already made by the CMAR on account of general conditions and the Cost of the Work equal or exceed (1) progress payments already received by the CMAR less (2) that portion of those payments attributable to the CMAR's Fee; plus (3) payrolls and costs for the period covered by the present application for payment. All documentation for General Conditions claimed with a pay application shall be for the actual period stated on the payment application.

41.6. With each application, the CMAR shall submit:

41.6.1. Evidence of Consent of Surety to the partial payment.

41.6.2. Update reports of SDMWOB subcontracting status are required to be included in each pay application from the CMAR unless all work is self-performed.

41.6.3. Copies of CMAR's daily reports are to be included in every pay application.

41.6.4. Lien releases will be provided with each pay application for each paid entity.

41.6.5. Progress photos (dated) of weekly progress are to be included in each pay application (on disc).

41.6.6. Copies of all building code and regulatory permits of any type obtained during the pay period are to be included in each pay application.

41.6.7. Status of State and Town required licenses (including business licenses) for each contractor.

41.6.8. Updated project schedule.

41.6.9. Insurance certificates.

41.6.10. Submittal schedule log updates signed and dated by Designer and CMAR.

41.6.11. Requests for Information status log signed and dated by Designer and CMAR.

41.6.12. Change order status log signed and dated by CMAR.

41.6.13. License status update, signed and dated by CMAR.

41.6.14. As-built update log signed and dated by Designer.

41.6.15. Format and content of pay application as directed by Owner's Representative.

41.6.16. Initial pay application shall contain the following if not submitted prior:

41.6.16.1. Performance and Payment Bond documents

41.6.16.2. Project directory

41.6.16.3. Submittal schedule

41.6.16.4. Licenses status (numbers and dates of authorized period) of all contractors (including business licenses)

41.6.16.5. Initial conditions photographs, dated, on disc, flash drive or other portable data storage device

41.6.16.6. Schedule of unit prices applicable to the Project, signed and dated as approved by Designer and Owner's Representative

41.6.16.7. Other items as required by law or written direction of the Owner's Representative.

41.7. The CMAR shall submit a schedule of values that allocates the entire GMP among the various portions of the Work, except that the CMAR's Fee shall be shown as a separate item. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Designer may require. This schedule, unless objected to by the Designer, shall be used as a basis for reviewing the CMAR's applications for payment. The Designer may also use the Project critical path schedule when reviewing the CMAR's applications for payment.

41.8. Each application for payment shall be compared to the most recent schedule of values submitted by the CMAR. Applications for payment shall show the percentage completion of each portion of the Work as of the end of the period covered by the application for payment. The percentage completion shall be the percentage of that portion of the Work which has actually been completed.

41.9. Subject to other provisions of the Contract, the amount of each progress payment shall be computed as follows:

41.9.1. Take that portion of the GMP properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the GMP allocated to that portion of the Work in the schedule of values.

41.9.2. Add that portion of the GMP properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work or if approved in advance by the Owner, suitably stored off site at a location agreed upon in writing.

41.9.3. Subtract the aggregate of previous payments made by the Owner.

41.9.4. Subtract the amount, in any, by which the CMAR has been previously overpaid, as evidenced by the Owner's review of the CMAR's documentation required herein or by any audit of the CMAR records.

41.9.5. Subtract amounts, if any, for which the Designer has withheld or nullified a certificate of payment.

41.9.6. Subtract retainage as provided below.

41.10. Payments allocated to Subcontractors shall be subject to a retention of five percent (5%), provided, however, that after fifty percent (50%) of the Cost of the Work has been satisfactorily completed on schedule, with the approval of the Designer and Owner and with written consent of the Surety, the CMAR shall not retain any further retainage from periodic payments due the Subcontractor if the Subcontractor continues to perform satisfactorily and any nonconforming work identified in writing prior to that time by the Designer and Owner has been corrected by the Subcontractor and accepted by the Owner. The Subcontractor shall be deemed fifty percent (50%) complete when the Subcontractor's gross project invoices, excluding the materials stored

off-site, equal or exceed fifty percent (50%) of the value of the Subcontractor's contract, except the value of materials stored on-site shall not exceed twenty percent (20%) of the Subcontractor's gross project invoices for the purpose of determining whether the Project is fifty percent (50%) complete.

41.11. Periodic payments to the CMAR shall be subject to a retention of five percent (5%) of the value of Work completed then to date and not previously invoiced and paid, provided however, that after fifty percent (50%) of the CMAR's work has been satisfactorily completed on schedule, with approval of the Owner and written consent of the surety, further requirements for retainage will be waived so long as work continues to be completed satisfactorily and on schedule.

41.12. Notwithstanding the above provisions, following fifty percent (50%) completion of the Project, the Owner shall be authorized to withhold additional retainage from a subsequent periodic payment, not to exceed five percent (5%), in order to allow the Owner to retain two and one-half percent (2.5%) total retainage through the completion of the Project. If the Owner elects to withhold additional retainage on any periodic payment subsequent to the release of retainage pursuant to this subparagraph, the CMAR may also withhold from the subcontractors remaining on the Project sufficient retainage to offset the additional retainage held by the Owner, notwithstanding the actual percentage of retainage withheld by the Owner of the Project as a whole. Nothing in this section shall prevent the Owner from withholding payment to the CMAR in addition to the amounts authorized by this section for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the Owner, or reasonable evidence that a third-party claim will be filed.

41.13. Except with the Owner's prior approval, the CMAR shall not make advance payments to suppliers for materials or equipment that has not been delivered and stored at the site.

41.14. Within five (5) days of receipt of the CMAR's application for payment, the Designer shall take action on the CMAR's application for payment in accordance with the Agreement between the Owner and Designer. The Designer's certification for payment shall be based upon the Designer's on-site observation and the documentation submitted in accordance with this paragraph and the CMAR's application for payment.

42. CERTIFICATES OF PAYMENT AND FINAL PAYMENT:

42.1. Within five (5) days from receipt of request for payment from the CMAR, the Designer shall issue and forward to the Owner a certificate for payment. This certificate shall indicate the amount requested or as approved by the Designer. If the certificate is not approved by the Designer, it shall state in writing to the CMAR and the Owner its reasons for withholding payment. No certificate issued or payment made shall constitute an acceptance of the Work or any part thereof.

42.2. The Owner reserves the right, prior to making final payment to the CMAR, to conduct a final audit of the expenditures by the CMAR on the Project for assurances that the final payment to the CMAR does not exceed the amounts properly payable to the CMAR for the Cost of the Work, General Conditions, the CMAR Fee, any special allowances, and CMAR-GMP Contingency savings. In the event an audit determines that the CMAR has been paid more than it is entitled to be paid under the Contract, the CMAR will refund the overpayment to the Owner.

42.3. Prior to submitting request for final payment to the Designer for approval, the CMAR shall fully comply with all requirements specified in the "Project closeout" section of the specifications. These requirements include but are not limited to the following:

42.3.1. Submittal of Product and Operating Manuals, Warranties and Bonds, Guarantees, Maintenance Agreements, As-Built Drawings, Certificates of Inspection or Approval

from agencies having jurisdiction. (The Designer must approve the Manuals prior to delivery to the Owner).

42.3.2. Transfer of required attic stock material and all keys in an organized manner.

42.3.3. Record of Owner's training.

42.3.4. Resolution of any final inspection discrepancies.

42.4. The CMAR shall forward to the Designer the final application for payment along with the following documents:

42.4.1. List of minority business subcontractors and material suppliers showing breakdown of contracts amount.

42.4.2. Affidavit of Release of Liens.

42.4.3. Affidavit of Subcontractors' payment to material suppliers and subcontractors.

42.4.4. Consent of Surety to Final Payment.

42.4.5. Certificates of state agencies required by state law.

42.5. The Designer will not authorize final payment until the Work under Contract has been certified by Designer, certificates of compliance issued, and the CMAR has complied with the closeout requirements. The Designer shall forward the CMAR's final application for payment to the Owner along with respective certificate(s) of compliance required by law.

43. CONTRACTOR'S AFFIDAVIT:

43.1. The final payment of retained amounts due the CMAR on account of the Contract shall not become due until the CMAR has furnished to the Owner through the Designer an affidavit signed, sworn and notarized to the effect that all payments for materials, services or contracted Work to Subcontractors in connection with this Contract and included in prior Owner payments have been satisfied, that all payments for materials, services or contracted Work to Subcontractors in connection with this Contract will be satisfied within seven days' of receipt of final payment from the Owner, and that no claims or liens exist against the CMAR in connection with this Contract. In the event that the CMAR cannot obtain similar affidavits from Subcontractors to protect the CMAR and the Owner from possible liens or claims against the CMAR, the CMAR shall state in its affidavit that no claims or liens exist against any Subcontractor to the best of its (the CMAR's) knowledge, and if any appear afterward, the CMAR shall save the Owner harmless from all claims by any Subcontractor or other claimant for payment or any other compensation for Work on the Project.

44. AUDIT OF RECORDS:

44.1. The CMAR agrees to maintain all information pertaining to billing for Services performed under this Contract in accordance with State Law for public records. The CMAR shall afford the Owner access to these records for audit during the design and construction phases at such intervals as may be desired by the Owner. The CMAR shall also preserve the records for a period of three (3) years after final payment during which time the Owner will have access for audit purposes.

45. TAXES:

45.1. North Carolina sales tax and use tax, as required by law, do apply to materials entering into municipal work and such costs shall be included in all bid proposals and contract sums.

45.2. Local option sales and use taxes, as required by law, do apply to materials entering into municipal work and such costs shall be included in all bid proposals and contract sums.

45.3. The CMAR shall give the Owner a signed tax statement containing the information listed in G.S. 105-164.14(e) before any payment requests submitted will be due.

45.4. The Department of Revenue has agreed as of April 1, 1991 that in lieu of obtaining copies of sales receipts from Subcontractors, an agency may obtain a certified statement from the Subcontractor setting forth the date, the type of property and the cost of the property purchased from each vendor, the county in which the vendor made the sale and the amount of local sales and use taxes paid thereon. If the property was purchased out-of-state, the county in which the property was delivered should be listed. The Subcontractor should also be notified that the certified statement may be subject to audit.

45.5. In the event the CMAR makes several purchases from the same vendor, such certified statement must indicate the invoice numbers, the inclusive dates of the invoices, the total amount of the invoices, the counties, and the county sales and use taxes paid thereon. The position of a sale is the retailer's place of business located within a taxing county where the vendor becomes contractually obligated to make the sale. Therefore, it is important that the county tax be reported for the county of sale rather than the county of use. When property is purchased from out-of-state vendors and the county tax is charged, the county should be identified where delivery is made when reporting the county tax. Such statement must also include the cost of any tangible personal property withdrawn from the CMAR's warehouse stock and the amount of county sales or use tax paid thereon by the CMAR. Similar certified statements by its Subcontractors must be obtained by the CMAR and furnished.

45.6. The CMAR and its Subcontractors are not to include any tax paid on supplies, tools and equipment which they use to perform their contracts and should include only those building materials, supplies, fixtures and equipment which actually become a part of or annexed to the building or structure.

45.7. Any sales tax refunds paid to the Owner shall be exclusively for the Owner's use and shall not in any way reduce the cost of the Project or impact the GMP.

46. PAYMENTS WITHHELD:

46.1. The Designer may withhold a certificate for payment in whole or in part, to the extent reasonably necessary to protect the Owner. If the Designer is unable to certify payment in the amount of the application, the Designer will notify the CMAR and the Owner in writing. If the CMAR and Designer cannot agree on a revised amount, the Designer will promptly issue a certificate for payment for the amount for which the Designer is able to make such representations to the Owner. The Designer may also withhold a certificate for payment, in whole or in part, to such extent as may be necessary in the Designer's opinion to protect the Owner from loss for which the CMAR or the Subcontractor(s) is responsible, including loss resulting from acts and omissions, because of:

46.1.1. Defective Work not remedied;

46.1.2. Third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the CMAR;

46.1.3. Failure of the CMAR or Subcontractor(s) to make payments properly to Subcontractors or sub-subcontractors or for labor, materials or equipment;

46.1.4. Reasonable evidence that the Work cannot be completed for the unpaid balance of the GMP;

46.1.5. Damage to the Owner or another Subcontractor;

46.1.6. Reasonable evidence that the Work will not be completed within the contract time, and that the unpaid balance would not be adequate to cover liquidated damages for the anticipated delay;

46.1.7. Failure to carry out the Work in accordance with the Contract Documents;

46.1.8. Failure to provide sales tax documentation as required by the Owner;

46.1.9. Failure or refusal of the CMAR or Subcontractors to submit the required information on minority business enterprises;

46.1.10. Failure to provide supporting documentation of general condition payments with the monthly pay application;

46.1.11. Any other reason deemed necessary by the Designer to protect the Owner unless arbitrary and unreasonable ; or

46.1.12. Subsequently discovered evidence that Work previously approved was not performed in accordance with the Contract Documents.

46.2. When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

47. INSURANCE REQUIREMENTS:

47.1. The Work under this Contract shall not commence until the CMAR has verified to the Owner that all required insurance coverage as described herein has been obtained and verifying certificates of insurance have been provided to the Owner. These certificates shall contain a provision that coverage afforded under the policies will not be cancelled, reduced in amount or coverage eliminated until at least thirty (30) days after mailing written notice, by certified mail, return receipt requested, to the insured and the Owner of such alteration or cancellation.

All insurance companies must be licensed in North Carolina and be acceptable to the Town of Apex's Risk Manager.

47.2. The CMAR shall provide documentation evidencing that it maintains the following insurance:

47.2.1. The CMAR shall be required under this Contract to provide or maintain any insurance during the life of the contract as shall protect him and any Subcontractor performing work under the contract from claims for damages from Bodily Injury including accidental death, as well as from claims for Property Damage which may arise from operations under the contract, whether such operations be by himself or by any subcontractor or anyone directly or indirectly employed by either of them. Such insurance shall be of the kinds and have limits of liability and coverage not less than the minimum limits hereinafter specified or required by law, whichever is greater.

47.2.2. The CMAR shall, without limiting its obligations or liabilities, procure, pay for and maintain such insurance as is required by law and as is required by the Contract to protect the CMAR, the Owner and the Designer from claims for damages for bodily injury, including death, and from claims for property damage which may arise out of or result from the CMAR's or its representatives, Consultants, Sub-contractors, agents, or employees operations under the Contract. Such insurance shall be of the kinds and have limits of liability and coverage not less than the minimum limits hereinafter specified or required by law, whichever is greater. The Owner makes no representation as to the adequacy or sufficiency of such coverage. The following requirements shall in no way be construed to limit or eliminate the liability of the CMAR that arises from performance of Work under the Agreement. The CMAR is strictly responsible for any losses, claims, and costs of any

kind which exceed the CMAR's limits of liability, or which may be outside the coverage scope of the policies.

47.2.2.1. The obligations of the CMAR under this section shall not extend to liability arising out of the acts or omissions of the Owner, the Designer, any of the Owner's or Designer's agents, elected officials, consultants, contractors, subcontractors, or employees, or any person or entity who is not under the CMAR's control. The obligations of the CMAR under this section shall not extend to liability arising out of Professional Services unless performed by the CMAR, including defects in design, performed by the Owner or Designer or their representatives, Consultants, Sub-contractors, agents and / or employees.

47.2.3. The Insurance specified shall be provided by an Insurer approved by the Owner, licensed to do such business in the State of North Carolina. Insurance companies utilized shall have a minimum rating of A- and Class VII as evaluated by the most current A M Best Rating Guide. All agents and brokers shall hold valid licenses from the State of North Carolina. The CMAR shall furnish to the Owner a certificate or certificates of insurance for their Sub-contractors in a form satisfactory to the Owner contemporaneously with the executed Contract with the Sub-contractor. Upon request of the Owner, the CMAR shall provide the Owner with redacted copies of the insurance policies required by this Section, including without limitation declaration pages, conditions, exclusions and additional insured endorsements, and confirmation that each policy premium has been paid for the required term of this Contract. Certificates of Insurance shall be signed by a person authorized by that insurer to bind coverage on its behalf.

47.2.4. All insurance policies shall provide that the insurance carrier shall not initiate cancellation, non-renewal or material limitation of coverage, without at least thirty (30) days prior written notice to the Owner (10 days for cancellation due to non-payment of premium). Direct Notice of Cancellation endorsement is to be attached to corresponding Certificates of Insurance. In the event of any such cancellation, non-renewal or material limitation, the CMAR is obligated to replace such insurance within seven (7) days without a gap in coverage and file accordingly such notice with the Owner and other interested parties. Failing immediate receipt of evidence of such replacement of insurance, the Owner reserves the right to procure comparable insurance and the CMAR shall pay or reimburse the cost of the premium in respect thereof without any rights to seek subsequent reimbursements from the Owner.

47.2.5. It is expressly provided, however, that any action or inaction on the part of the Owner shall in no way change or reduce the CMAR's responsibilities and liabilities under this Contract. Self-funded, policy fronting, or other non-risk transfer insurance mechanisms are not acceptable without prior written approval of the Owner. Full disclosure of such a program must be made prior to commencing mobilization to the Project site. Failure to make a full disclosure constitutes a breach of the Contract.

47.2.6. The CMAR shall name the Owner as additional insured under all its insurance contracts (except workers' compensation, employers liability and professional liability) with respect to and including liability for bodily Injury and property damage caused, in whole or in part, by the willful misconduct, negligent act or omission of the CMAR or those acting on the CMAR's behalf under the Contract, products and completed operations of the CMAR, and automobiles owned, hired, leased, or borrowed by the CMAR. Additional insured status is not required to extend to liability caused by the Owner's or Designer's negligence.

47.2.7. For any claims related to this Project, the CMAR's insurance or self-insurance shall be primary and non-contributory with respect to the Owner's insurance to the extent of the CMAR's liability hereunder. Any insurance or self-insurance maintained by the Owner shall be excess and non-contributory with respect to the CMAR's Insurance.

47.2.8. All policies of insurance shall contain a clause or endorsement waiving rights of subrogation against the Owner.

47.2.9. Limits of coverage are not to be amended by deductible clauses of any nature without the express written consent of the Owner. The CMAR shall be solely responsible for any deductible assumptions that may exist in any insurance policies required under this Contract. In addition, the CMAR shall be responsible and shall not be reimbursed for any losses arising from any risk or exposure not insured as required herein, or not covered as a result of normal policy exclusion or that falls within the self-insured retention, if the CMAR is self-insured. Notwithstanding any other provision in this Contract, the CMAR may include insurance policy premiums and deductibles in the CMAR General Conditions, Cost of the Work, or CMAR-GMP Contingency, as appropriate and subject to the GMP.

47.2.10. The CMAR's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

47.2.11. The claim provisions in the CMAR's insurance policies must specifically state the insurance company or CMAR's third party administrator. If self-insured, CMAR has both the right and duty to adjust a claim and provide defense.

47.2.12. If the policies contain any warranty stating that coverage is null and void (or words to that effect), or if the CMAR does not comply with the most stringent regulations governing the Work, policies shall be modified so that coverage shall be afforded in all cases except for the CMAR's willful or intentional non-compliance with applicable government regulations.

47.2.13. Any failure by any person to comply with reporting or other provisions of the policy, including breach of warranties, shall not affect coverage provided to the Owner and its respective representatives, officials, and employees. The Builder's Risk coverage does not include a Separation of Insured's provisions.

47.2.14. The insolvency or bankruptcy of the insured or of the insured's estate shall not relieve the insurance companies of their obligations under these policies. Any clauses to the contrary are unacceptable and must be stricken

47.2.15. The Work under this Contract shall not commence until the CMAR has verified to the Owner that all required insurance coverage as described herein, have been obtained and verifying Certificates of Insurance have been provided to the Owner.

47.3. Worker's Compensation and Employer's Liability:

47.3.1. The CMAR shall ensure that it and all its Subcontractors shall procure and maintain Workers' Compensation Insurance in the amount and type required by the State of North Carolina and federal law for all employees employed under this Contract who may come within the protection of Workers' Compensation Laws and covering all operations under the Contract whether performed by the CMAR or by its Sub-contractors. In jurisdictions not providing complete Workers' Compensation protection, the CMAR shall ensure that it and its Subcontractors shall maintain employers' liability insurance in an amount, form, company, and agency satisfactory to the State of North Carolina and the Owner for the benefit of all employees not protected by Workers' Compensation Laws and covering all operations under this Contract whether performed by the CMAR or by its Subcontractors.

47.3.1.1. The CMAR shall pay such assessments as will protect the CMAR and the Owner from claims under the Workers' Compensation Laws, workers' or workmen's compensation disability benefits, and other similar employee benefit acts.

47.3.1.2. Coverage under this section shall be as required by federal and state Workers' Compensation and Occupational Disease Statutes, and shall have minimum limits as follows:

a.	Coverage A	Statutory, State of North Carolina
b.	Employers' Liability	Each Accident $1,000,000
c.	Disease -	Policy Limit $1,000,000
d.	Disease -	Each Employee $1,000,000

47.3.1.3. Such Insurance shall Include Voluntary Compensation coverage, a Waiver of Subrogation in favor of the Owner as well as other endorsements that may be required by applicable jurisdictions, e.g., United States Longshoremen and Harbor Workers Act and maritime coverage (Jones Act).

47.4. Automobile Liability Insurance:

47.4.1. The CMAR shall procure and maintain automobile insurance against liability for bodily injury and property damage as described below, that may arise out of or result from the Work being performed under this Contract, and will provide protection from claims which may arise out of or result from the CMAR's performance of the Work and the CMAR's other obligations under this Contract, whether such performance of the Work is by the CMAR, by any representative or Subcontractor, by anyone, both officially and personally, directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

47.4.1.1. This policy of insurance shall carry the following minimum Limit of Liability

Combined Single Limit - $2,000,000

47.4.1.2. The policy of insurance shall contain or be endorsed to include owned, hired, and non-owned automobile liability coverage.

47.4.1.3. If the policy contains a warranty stating that coverage is null and void (or words to that effect) or if the transporter does not comply with the most stringent regulations governing the Work, it shall be modified so that coverage shall be afforded in all cases except for the transporter's willful or intentional non-compliance with applicable government regulations.

47.5. General Liability:

47.5.1. This policy must be written on an occurrence basis, with the following minimum Limits of Liability:

a.	General Aggregate per project	$5,000,000
b.	Products / Completed Operations Aggregate	$5,000,000
c.	Bodily Injury & Property Damage / each occurrence	$5,000,000
d	Personal Injury and Advertising Injury	$2,000,000

47.5.2. The policy shall contain or be endorsed to include the coverages shown in Sections 47.5.3 through 47.5.5 below:

47.5.3. Blanket Contractual Liability covering the CMAR's indemnification obligations under this Contract in accordance with ISO policy form CG 00 01. Modifications to the standard provisions will not be acceptable if they serve to reduce coverage:

a. Premises/Operations Liability

b. Explosion, collapse, and underground fault
c. Independent Contractors and Independent Sub-contractors coverage
d. Broad Form Property Damage
e. Personal Injury
f. Cross Liability / Severability of Interest clause
g. Employer's Stop-Gap Liability endorsement, if applicable
h. Amendment of the Pollution Exclusion Endorsement to allow coverage for bodily injury or property damage caused by heat, smoke, or fumes from a hostile fire
i. Designated General Aggregate Limit Endorsement if required by the Supplementary Condition

47.5.4. The CMAR and all Subcontractors shall provide the Owner additional Insured endorsements CG 20 10 07 04 or CG D3 61 03 05 for ongoing and premise operations and CG 20 37 07 04 for completed operations, except as may otherwise be approved by the Town to meet SDMWOB goals.

47.5.5. Umbrella or Excess Liability Insurance coverage may be used to meet or exceed the minimum insurance limits under this Contract. Coverage shall remain continuously in effect and without interruption for at least five (5) years from the date of the Contract and shall include coverage for exposures arising from operations that have been completed. The CMAR shall furnish the Owner and each other additional insured listed in this Contract to whom the Certificates of Insurance have been issued, evidence satisfactory to the Owner of continuation of such insurance at the date of Substantial Completion and each year thereafter.

47.6. Property Insurance:

47.6.1. The CMAR shall be responsible for purchasing and maintaining Builder's Risk insurance to protect the Project from perils of physical loss. The Builder's Risk policy must be an "All Risk" (Special Perils) coverage form, have no co-insurance penalty provisions and be endorsed to increase the limit of insurance for all Change Orders. There shall be no exclusion for theft, collapse, or damage to foundations or underground structures, pipes or conduits.

47.6.2. The insurance shall provide for the cost of replacement for the Work at the time of any loss. The insurance shall insure against the loss from the perils of fire and all risk coverage for physical loss or damage due to theft, vandalism, collapse, malicious mischief, transit, flood, earthquake, testing, damages resulting from defective design, negligent workmanship or defective material. The Owner, Designer and all tiers of Subcontractors will be additional insureds on the Builder's Risk policy. The CMAR will be the named insured (responsible for premium payments, policy changes, etc.). The CMAR shall increase the coverage limits as necessary to reflect changes in the estimated replacement cost of the Project.

47.6.3. Certain collapse and damage to foundation exclusions (settling, shrinking, cracking, etc.) are standard Builder's Risk exclusions. Additional premium may apply to eliminate these, if possible. Theft is excluded when the only indicator is mysterious disappearance or shortage from inventory. Outward signs of theft must be present. Cold Testing will be automatically included in the policy. If any Hot Testing exposures apply to the project, additional premium may apply to add this coverage.

47.6.3.1. WAIVERS OF SUBROGATION. The Owner and CMAR waive all rights against (1) each other and any of their Subcontractors, Sub-subcontractors, elected officials, agents and employees, each of the other, and (2) the Designer, Designer's Consultants, separate Subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent

covered by property insurance pursuant to this section or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or CMAR, as appropriate, shall require of the Designer, Designer's, Consultants, separate Sub-contractors, agents and employees, if any, and the Sub-contractors, separate Sub-sub-contractors, agents, and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

47.7. Public Liability:

47.7.1. The CMAR shall ensure that it and all its Subcontractors provide and maintain, during the life of the Contract, comprehensive Public Liability Insurance, including coverage for premises operations, independent Subcontractors, completed operations, products and contractual exposures. Such insurance shall protect the CMAR and the Subcontractors from claims arising out of or resulting from any bodily Injury, including accidental death, and claims for property damages which may arise out or result from operations under this Contract, whether such operations are by the CMAR or by any Subcontractor, or by anyone directly or indirectly employed by either of them. The minimum limits of such insurance shall be:

a. $2,000,000 for each occurrence and $4,000,000 aggregate, or such lower limits as may be agreed to by the Owner in writing on a case-by-case basis.

b. Such coverage for completed operations must be maintained for at least five (5) years following final acceptance of the Work performed under this Contract.

47.8. Professional Liability:

47.8.1. The CMAR shall provide and maintain Professional Liability Insurance coverage to protect Owner from liability arising out of or resulting from the performance of professional services by CMAR or its Subcontractors, if any, under the Contract. Such coverage shall be in the sum of not less than Five Million Dollars ($5,000,000.00).

47.8.2. Policies for Professional Liability coverage must be provided by the CMAR or its independent design professional if the CMAR is required to provide any professional design services under this Contract or the Contract Documents. The limits of coverage required for professional liability shall be included herein.

47.9. Deductibles:

47.9.1. Any deductible, where applicable to loss covered by insurance provided, is to be borne by the CMAR or its Subcontractors; however, the CMAR may include insurance policy premiums, deductibles, and unreimbursed losses in the CMAR General Conditions, Cost of the Work, or CMAR-GMP Contingency, as appropriate and subject to the GMP.

47.10. Proof of Coverage:

47.10.1. The CMAR shall ensure that it furnishes the Owner with satisfactory proof of carriage of the insurance required above before written approval of the CMAR's insurance for its Subcontractors is granted by the Owner.

47.11. Claims:

47.11.1. The CMAR shall notify the Owner within twenty-four (24) hours of any claims or alleged claims received by the CMAR, or by its Subcontractors, that is covered by any of the policies of insurance required of CMAR or its Subcontractors. The CMAR shall provide a written copy of the claim or alleged claim to the Owner within three (3) days of the CMAR's receipt of the claim or alleged claim. If a claim is settled to the satisfaction of the claimant, the CMAR shall submit a copy of the claimant's release to the Owner.

If a claim or alleged claim is rejected by the CMAR and / or its insurance company, the CMAR shall immediately report this fact to the Owner. Should thirty (30) days elapse after the claim or alleged claim has been received by the CMAR, and the CMAR is not able to report a settlement or rejection of the claim, it shall report to the Owner the steps being taken with respect to the claim without limiting the foregoing. The CMAR shall notify the Owner in writing of any paid or incurred claims which may impair annual aggregate or general liability.

47.12. RESERVED

47.13. The Owner may elect to purchase certain insurance, specifically Pollution Legal Liability and / or Builder's Risk Insurance covering the Owner, CMAR, all Subcontractors and all Sub-subcontractors. In this event, the CMAR and its Subcontractors are not required to purchase insurance provided by the Owner. If the Owner elects to purchase either Pollution Legal Liability and / or Builder's Risk Insurance, this Contract shall be amended accordingly. (The CMAR shall provide the cost of the "Builder's Risk Insurance" coverage to the Owner for determination as to whether this coverage may be obtained by the Owner).

48. PERFORMANCE BOND AND PAYMENT BOND:

48.1. Within 15 days of the establishment of each GMP, the CMAR shall provide a performance bond and payment bond, each in the amount of the GMP plus the Owner's allowance. The amount of the performance and payment bonds may be adjusted if the guaranteed maximum price is reduced or increased after the bids are received. Each time a new GMP is established and approved by the Owner, the CMAR shall increase the amount of the performance and payment bonds to the amount of the cumulative GMP, including remaining Owner's allowances, so that at all times a single performance bond and a single payment bond shall be in effect for the entire Project under contract at that time.

48.2. The performance bond and payment bond shall be executed by a surety company authorized to do business in North Carolina. Bonds shall be executed in a form acceptable to Owner.

48.3. All bonds shall be countersigned by an authorized agent and attorney-in-fact for the bonding company who is licensed to do business in North Carolina. The title "Licensed Resident Agent" shall appear after the signature. There shall be attached to each copy of the bond a certified copy of power of attorney properly executed and dated. The seal of the bonding company shall be impressed on each signature page of the bonds.

49. ASSIGNMENTS:

49.1. The CMAR shall not delegate or subcontract its duties under this Contract or any portion of this Contract except as expressly set forth herein for general conditions and construction

subcontracts. The CMAR may not make a general assignment of its rights under this Contract to any third party without the express consent of the Owner. Except as may be required under terms of the performance bond or payment bond, no funds or sums of money due or to become due to the CMAR under the Contract may be assigned or pledged as collateral for a loan or other debt without the consent of the Owner. In the event the CMAR has prior to execution of this Contract pledged payments hereunder as collateral for any loan or debt, the CMAR shall advise the Owner of the circumstances of the loan or debt, and arrange for the subordination of the security interest of the creditor or lender to the Owner's rights under this Contract.

50. DISPUTE RESOLUTION:

50.1. In the event that a dispute of any nature cannot be resolved by the Project Team pursuant to the terms and conditions herein, the parties shall endeavor to resolve the dispute pursuant to the Rules Implementing Mediated Settlement Conferences in North Carolina Public Construction Projects, as adopted by the State Building Commission on February 26, 2002, as amended and in effect when the procedures are invoked. The Rules relating to non-State projects shall apply. Mediation in accordance with those procedures shall be a condition precedent that must occur before any party may bring a civil action against the Owner, Designer, or CMAR.

50.2. Should a dispute arise that cannot be finally settled through the claims and dispute resolution procedures in this Contract, then any civil action brought by either party shall be brought only in the General Court of Justice of North Carolina, Superior Court Division, in Wake County, North Carolina, which shall be the sole and exclusive venue for the resolution of any dispute arising out of or any way relating to this Contract.

51. CONTRACTOR EVALUATION:

51.1. The CMAR's overall Work performance on the Project shall be fairly evaluated for determining qualifications to bid on future Town of Apex capital improvement projects. In addition to final evaluation, interim evaluation may be prepared during the progress of the Project. The Owner may request the CMAR's comments to evaluate the Designer.

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Vance Holloman, Finance Director & Dennis Brown, Construction Project Manager

Department(s): Finance, Administration

Requested Motion

A motion to approve Capital Project Ordinance Amendment No. 2020-8 and Contract Amendment #1 for the construction of the Apex Senior Center and authorize the Town Manager to execute same.

Approval Recommended?

Yes

Item Details

The Contract Amendment is necessary to establish the Guaranteed Maximum Price for construction and Construction Manager at Risk (CMAR) services to be provided pursuant to the approved CMAR Pre-Construction and Construction Services Contract. The budgetary source for the project will be Parks and Recreational Facilities General Obligation Bonds to be sold at a future date. The Parks Bonds have previously been approved by the voters and the Local Government Commission. The Town currently has $19.6 million of unexpended bond proceeds and earnings on hand from the 2018 Parks Bond sale to provide cash flow for this and other projects. There are currently $24 million of authorized but unissued Park Bonds.

Attachments

- Capital Project Ordinance Amendment 2020-08
- Contract Amendment #1 with Exhibits A & B

Town of Apex

CAPITAL PROJECT ORDINANCE AMENDMENT 2020-08

67 - Recreation Capital Project Fund

BE IT ORDAINED, by the Council of the Town of Apex that the Capital Project Ordinance previously entitled "Recreation Capital Project Fund" be amended as follows:

Section 1. The revenues anticipated for the projects are:

Bond Proceeds	$4,650,000
Total Revenues	**$4,650,000**

Section 2. The expenditures anticipated are:

Senior Center/Community Center Expansion	$4,650,000
Total Expenditures	**$4,650,000**

Section 3. Within five (5) days after adoption, copies of this Amendment shall be filed with the Finance Officer and Town Clerk.

Adopted this the 17th day of December, 2019.

Attest:

Jacques Gilbert, Mayor

Donna B. Hosch, Town Clerk

CONTRACT AMENDMENT #1
DATE:_____

NORTH CAROLINA
WAKE COUNTY

CONTRACT AMENDMENT #1

THIS CONTRACT AMENDMENT, dated December _____, 2019, is entered into by and between the Town of Apex, a North Carolina municipal corporation, (hereinafter referred to as the "Town") and Barnhill Contracting Company (hereinafter referred to as the "Construction Manager at Risk" or "CMAR"). Town and CMAR may be collectively referred to as "Parties" hereinafter.

WHEREAS, the Town and the CMAR entered into a Construction Manager at Risk Pre-Construction and Construction Services Contract on or about November 7, 2019 (hereinafter the "Contract") for the CMAR to provide construction management services for the construction of the Town of Apex Community Center Expansion and Senior Center (hereinafter "Project") to be located at 83 Hunter St., Apex, NC 27502; and

WHEREAS, the Parties desire to amend the Contract to establish the Guaranteed Maximum Price (hereinafter "GMP") as provided for in the Contract and to reduce the terms of this amendment to writing; and

NOW THEREFORE, for and in consideration of the mutual promises and covenants as hereinafter set forth, the Parties hereto do mutually agree to amend the Contract as follows:

1. The Contract is hereby amended to establish the GMP in accordance with the terms of the Contract. The GMP for the Town of Apex Community Center Expansion and Senior Center is $13,527,129.00.

2. The GMP includes the entire scope of work for the Project as described in the Contract, in the attached Exhibit A, and in the Drawings and Specifications identified in the Contract Document Log (attached as Exhibit B). The GMP includes general conditions, cost of the work with accepted alternates, contingencies, bonds & insurances, value engineering, and fees & allowances as further detailed in the attached Exhibit A. Exhibits A and B are incorporated into this Amendment as if fully set forth herein.

3. The Contract Amount as amended is as follows:

Original Pre-Construction Amount:	$117,817.00
Contract Amendment #1 GMP:	$13,527,129.00
PROJECT TOTAL:	$13,644,946.00

Except as specifically modified by this Contract Amendment #1, all other terms, conditions and other provisions of the Contract remain in full force and effect.

IN WITNESS WHEREOF, the contracting parties, by their authorized agents, affix their signatures and seals this _____day of December, 2019.

Construction Manager at Risk

Name:_____
Barnhill Contracting Company

By:_____
(Signature)

Printed Name/Title:_____

Attest:

_____
(Secretary, if a corporation)

_____
Printed Name/Title

Town of Apex

_____
Andrew L. Havens, Town Manager

Attest:

_____
Donna Hosch, Town Clerk

This instrument has been preaudited in the manner required by the Local Government Budget and Fiscal Control Act.

_____
Vance Holloman, Finance Director

TOWN OF APEX - SENIOR CENTER
GUARANTEED MAXIMUM PRICE

BARNHILL CONTRACTING COMPANY



WE MAKE COMPLEX PROJECTS SIMPLE

SUBMITTED BY:
Barnhill Contracting Company
4325 Pleasant Valley Rd.
Raleigh, NC 27612
www.barnhillcontracting.com

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SECTION 1

GMP SUMMARY



November 25, 2019

Mr. Dennis Brown, PE
Town of Apex
73 Hunter Street
Apex, NC 27502

RE: Apex Senior Center
Guaranteed Maximum Price Final

Dear Dennis,

Barnhill Contracting Company submits the following Guaranteed Maximum Price Proposal for Apex Senior Center. This GMP is based upon drawings and specifications from Smith Sinnett Architecture dated September 30, 2019. This GMP proposal including Trade Contractor Bid Costs, General Conditions, CM Fee and Contingencies is $13,527,129.00.

We have conducted a thorough scope review with each of the apparent low bid contractors. We reviewed the total value of Minority Business participation in all bids received and are pleased to note that this GMP proposal includes 33.87% Subcontractor Minority Participation.

We appreciate the opportunity and look forward to working with Town of Apex on this project. Please call should you have any comments or questions regarding this Guaranteed Maximum Price.

Best Regards,
BARNHILL CONTRACTING COMPANY

Ryan Weaver
Project Manager, Building Division

cc: File
Jay Sikes, AIA – Smith Sinnett Architecture
Robert Carmac, AIA – Smith Sinnett Architecture
Tim Miller – Director of Preconstruction, Building Division, Barnhill Contracting Company
Barry Harden – Vice President of Operations, Building Division, Barnhill Contracting Company
Mike Lutz – Vice President Triangle Division, Building Division, Barnhill Contracting Company

BARNHILL CONTRACTING COMPANY

GUARANTEED MAXIMUM PRICE FINAL ESTIMATE

November 25, 2019

Apex Senior Center

Town of Apex

Building Area = 29,475 SQFT

		Amount	Total	Cost/SF
General Conditions				
Labor		$0		$0.00
Materials		$0		$0.00
Equipment		$0		$0.00
Subcontractors		$0		$0.00
Subtotal General Conditions		**$1,104,205**	**$1,104,205**	**$37.46**
Cost of the Work with Accepted Alternates				
Labor		$0		$0.00
Materials		$0		$0.00
Equipment		$0		$0.00
Subcontract Base Bid		$10,568,688		$358.56
Subcontract Alternates		$638,934		$21.68
Accepted Value Engineering		($30,760)		
Subtotal Cost of Work with Accepted Alternates		**$11,176,862**	**$12,281,067**	**$379.20**
Contingencies				
CM Contingency	3.00%	$335,306		$11.38
Owner Contingency	0.00%	$0		$0.00
Subtotal Contingencies		**$335,306**	**$12,616,372**	**$11.38**
Bonds & Insurances				
CMAR Insurances & Bonds	2.20%	$297,597		$10.10
Project Subguard	1.25%	$139,711		$4.74
Subtotal Bonds & Insurances		**$437,308**	**$13,053,680**	**$14.84**
Fees & Allowances				
Construction Management Fees	3.500%	$473,450		$16.06
Subtotal Fees & Allowances		**$473,450**	**$13,527,129**	**$16.06**

ESTIMATE TOTAL	**$13,527,129**	**$458.94**

BARNHILL CONTRACTING COMPANY

Post Bid Summary GMP

November 25, 2019

Apex Senior Center

Town of Apex

Bid Packages		Bid Results		Comments
		Building Cost Bid Day	Cost/SF Bid Day	
100	General Trades	$ 177,000	$ 6.01	
105	Final Cleaning	$ 11,200	$ 0.38	Alternates #4, #5 INCLUDED
200	Earthwork & Storm Drainage	IN BP280	$ -	
225	Concrete Paving & Sidewalks	$ 196,451	$ 6.67	Alternate #5 INCLUDED
230	Asphalt Paving, Stone Base & Concrete Curbs	IN BP280	$ -	
250	Site Utilities	IN BP280	$ -	
280	Turnkey Sitework	$ 1,889,523	$ 64.11	Alternates #5, #6 INCLUDED
290	Landscaping & Hardscapes	$ 487,873	$ 16.55	Alternate #7 INCLUDED
390	Turnkey Concrete Package	$ 494,535	$ 16.78	Alternates #5, #6 INCLUDED
400	Turnkey Masony	$ 810,210	$ 27.49	Alternates #5, #6 INCLUDED
500	Structural & Miscellaneous Steel	$ 1,023,678	$ 34.73	Alternates #5, #6 INCLUDED
740	Roofing	$ 526,300	$ 17.86	Alternates #5, #6 INCLUDED
750	Metal Wall Panels	$ 127,500	$ 4.33	Alternates #5, #6 INCLUDED
790	Caulking & Waterproofing	$ 125,956	$ 4.27	Alternates #4, #5, #6 INCLUDED
800	Doors/Frames/Hardware	$ 156,204	$ 5.30	Alternates #1D, #5 INCLUDED
840	Glass & Glazing	$ 593,420	$ 20.13	Alternates #5, #6 INCLUDED
925	Drywall	$ 678,700	$ 23.03	Alternate #5 INCLUDED
930	Ceramic Tile	$ 94,000	$ 3.19	
960	Resilient, Carpet, Base	$ 91,157	$ 3.09	
963	Terrazzo	$ 262,006	$ 8.89	Alternates #4, #5 INCLUDED
980	Acoustical Ceilings + Wall Panels	$ 92,810	$ 3.15	
990	Painting	$ 65,073	$ 2.21	Alternate #5 INCLUDED
1005	Misc. Specialties & Equipment	$ 99,812	$ 3.39	
1010	Signage	$ 19,927	$ 0.68	Alternate #5 INCLUDED
1065	Operable Partitions	$ 136,503	$ 4.63	
1230	Millwork - Casework & Tops	$ 118,340	$ 4.01	Alternate #4 INCLUDED
1250	Window Treatments	$ 11,117	$ 0.38	
1400	Elevators	$ 74,693	$ 2.53	
1530	Fire Protection	$ 163,804	$ 5.56	Alternate #B, #4, #5, #6 INCLUDED
1540	Plumbing	$ 355,980	$ 12.08	Alternates #4, #5 INCLUDED
1550	HVAC	$ 1,210,500	$ 41.07	Alternates #1A-1, #1B-2, #1E, # 2, #5 INCLUDED
1600	Electrical	$ 1,113,350	$ 37.77	Alternates #1C, #2, #4, #5, #6 INCLUDED
	ACCEPTED VALUE ENGINEERING	$ (30,760)	$ (1.04)	
SUBTOTAL COST OF WORK		**$ 11,176,862**	**$ 379.20**	
1.25%	SUBGUARD BONDING	$ 139,711	$ 4.74	
3.00%	CM CONTINGENCY	$ 335,306	$ 11.38	
3.50%	CM FEE	$ 473,450	$ 16.06	
	CMAR GENERAL CONDITIONS (LUMP SUM)	$ 1,104,205	$ 37.46	
2.20%	CMAR INSURANCES & BONDS	$ 297,597	$ 10.10	
CMAR ESTIMATE TOTAL		**$ 13,527,129**	**$ 458.94**	

BARNHILL CONTRACTING COMPANY

Post Bid Summary GMP - Building vs. Site Costs

November 25, 2019

Apex Senior Center

Town of Apex

Bid Packages		Bid Results				TOTALS	
		Building Cost	Cost/SF	Site Cost	Cost/SF	Total w/ Site	Cost/SF
BP100	GENERAL TRADES	$ 177,000	$ 6.01	$ -	$ -	$ 177,000	$ 6.01
BP105	FINAL CLEANING	$ 11,200	$ 0.38	$ -	$ -	$ 11,200	$ 0.38
BP200	EARTHWORK & STORM DRAINAGE	$ -	$ -	IN BP280			
BP225	CONCRETE PAVING & SIDEWALKS	$ -	$ -	$ 196,451	$ 6.67	$ 196,451	$ 6.67
BP230	ASPHALT PAVING, STONE BASE & CURBS	$ -	$ -	IN BP280			
BP250	SITE WATER & SEWER UTILITIES	$ -	$ -	IN BP280			
BP280	TURNKEY SITEWORK	$ -	$ -	$ 1,889,523	$ 64.11	$ 1,889,523	$ 64.11
BP290	LANDSCAPING & IRRIGATION	$ -	$ -	$ 487,873	$ 16.55	$ 487,873	$ 16.55
BP390	TURNKEY CONCRETE	$ 494,535	$ 16.78	$ -	$ -	$ 494,535	$ 16.78
BP400	TURNKEY MASONRY	$ 810,210	$ 27.49	$ -	$ -	$ 810,210	$ 27.49
BP500	STRUCTURAL STEEL	$ 1,023,678	$ 34.73	$ -	$ -	$ 1,023,678	$ 34.73
BP740	ROOFING	$ 526,300	$ 17.86	$ -	$ -	$ 526,300	$ 17.86
BP750	METAL WALL PANELS	$ 127,500	$ 4.33	$ -	$ -	$ 127,500	$ 4.33
BP790	CAULKING/ SEALANTS	$ 125,956	$ 4.27	$ -	$ -	$ 125,956	$ 4.27
BP800	TURNKEY DOORS/ FRAMES/ HARDWARE	$ 156,204	$ 5.30	$ -	$ -	$ 156,204	$ 5.30
BP840	CURTAINWALL/ STOREFRONT/ GLASS & GLAZING	$ 593,420	$ 20.13	$ -	$ -	$ 593,420	$ 20.13
BP925	DRYWALL	$ 678,700	$ 23.03	$ -	$ -	$ 678,700	$ 23.03
BP930	CERAMIC TILE	$ 94,000	$ 3.19	$ -	$ -	$ 94,000	$ 3.19
BP960	RESILIENT FLOORING / CARPET / BASE	$ 91,157	$ 3.09	$ -	$ -	$ 91,157	$ 3.09
BP963	TERRAZZO FLOORING	$ 262,006	$ 8.89	$ -	$ -	$ 262,006	$ 8.89
BP980	ACOUSTICAL CEILINGS	$ 92,810	$ 3.15	$ -	$ -	$ 92,810	$ 3.15
BP990	PAINTING AND WALLCOVERINGS	$ 65,073	$ 2.21	$ -	$ -	$ 65,073	$ 2.21
BP1005	TOILET SPECIALTIES / ACCESSORIES / DIV 10	$ 99,812	$ 3.39	$ -	$ -	$ 99,812	$ 3.39
BP1010	IDENTIFICATION DEVICES	$ 19,927	$ 0.68	$ -	$ -	$ 19,927	$ 0.68
BP1065	OPERABLE PARTITIONS	$ 136,503	$ 4.63	$ -	$ -	$ 136,503	$ 4.63
BP1230	MILLWORK - CASEWORK & TOPS	$ 118,340	$ 4.01	$ -	$ -	$ 118,340	$ 4.01
BP1250	WINDOW TREATMENTS	$ 11,117	$ 0.38	$ -	$ -	$ 11,117	$ 0.38
BP1400	ELEVATORS	$ 74,693	$ 2.53	$ -	$ -	$ 74,693	$ 2.53
BP1530	FIRE PROTECTION	$ 163,804	$ 5.56	$ -	$ -	$ 163,804	$ 5.56
BP1540	PLUMBING	$ 355,980	$ 12.08	$ -	$ -	$ 355,980	$ 12.08
BP1550	HVAC SYSTEMS	$ 1,210,500	$ 41.07	$ -	$ -	$ 1,210,500	$ 41.07
BP1600	ELECTRICAL	$ 1,113,350	$ 37.77	$ -	$ -	$ 1,113,350	$ 37.77
	ACCEPTED VALUE ENGINEERING	$ (30,760)	$ (1.04)	$ -	$ -	$ (30,760)	$ (1.04)
SUBTOTAL COST OF WORK		**$ 8,603,015**	**$ 291.87**	**$ 2,573,847**	**$ 87.32**	**$ 11,176,862**	**$ 379.20**
1.25%	SUBGUARD BONDING	$ 107,538	$ 3.65	$ 32,173	$ 1.09	$ 139,711	$ 4.74
3.00%	CM CONTINGENCY	$ 258,090	$ 8.76	$ 77,215	$ 2.62	$ 335,306	$ 11.38
3.50%	CM FEE	$ 364,422	$ 12.36	$ 109,028	$ 3.70	$ 473,450	$ 16.06
	CMAR GENERAL CONDITIONS (LUMP SUM)	$ 849,925	$ 28.84	$ 254,280	$ 8.63	$ 1,104,205	$ 37.46
2.20%	CMAR INSURANCES & BONDS	$ 229,065	$ 7.77	$ 68,531	$ 2.33	$ 297,596	$ 10.10
CMAR ESTIMATE TOTAL		**$10,412,055**	**$ 48.97**	**$ 3,115,074**	**$ 14.65**	**$ 13,527,129**	**$ 458.94**

BARNHILL CONTRACTING COMPANY

APEX TOWN COUNCIL SUMMARY

November 25, 2019

Apex Senior Center

Town of Apex

BID PACKAGE	BID PACKAGE DESCRIPTION	Number of Bidders	APPARENT LOW BIDDER	CONTRACT AMOUNT	TOTAL $ HUB	TOTAL % HUB
100	General Trades	5	CB&H Contracting	$ 177,000	$ 177,000	100.00%
105	Final Cleaning	4	CB&H Contracting	$ 11,200	$ 11,200	100.00%
200	Earthwork & Storm Drainage	4	**IN BP280**	$ -	$ -	
225	Concrete Paving & Sidewalks	2	Superior Concrete	$ 196,451	$ -	0.00%
230	Asphalt Paving, Stone Base & Concrete Curbs	4	**IN BP280**	$ -	$ -	
250	Site Utilities	2	**IN BP280**	$ -	$ -	
280	Turnkey Sitework	6	BridgePoint Civil	$ 1,889,523	$ 20,000	1.06%
290	Landscaping & Hardscapes	4	Landart Solutions	$ 487,873	$ 487,873	100.00%
390	Turnkey Concrete Package	3	Honducom Concrete	$ 494,535	$ 494,535	100.00%
400	Turnkey Masony	3	Edgar Boettcher Mason Contractor	$ 810,210	$ 191,574	23.64%
500	Structural & Miscellaneous Steel	6	Structural Steel of Carolina	$ 1,023,678	$ 1,023,678	100.00%
740	Roofing	5	Hamlin Roofing	$ 526,300	$ -	0.00%
750	Metal Wall Panels	5	Bardi-Davis	$ 127,500	$ -	0.00%
790	Caulking & Waterproofing	3	Water Proofing Specialties	$ 125,956	$ 125,956	100.00%
800	Doors/Frames/Hardware	2	Martin Architectural	$ 156,204	$ -	0.00%
840	Glass & Glazing	3	GlassTech Commercial Glazing Services	$ 593,420	$ 593,420	100.00%
925	Drywall	7	Precision Walls	$ 678,700	$ -	0.00%
930	Ceramic Tile	4	Concordia Building Company	$ 94,000	$ 9,400	10.00%
960	Resilient, Carpet, Base	4	Southeastern interiors	$ 91,157	$ 14,000	15.36%
963	Terrazzo	3	David Allen Co.	$ 262,006	$ -	0.00%
980	Acoustical Ceilings + Wall Panels	4	Acousti Engineering	$ 92,810	$ -	0.00%
990	Painting	4	Venecon	$ 65,073	$ 65,073	100.00%
1005	Misc. Specialties & Equipment	2	Martin Architectural	$ 99,812	$ -	0.00%
1010	Signage	5	A-B Sign Systems	$ 19,927	$ 2,660	13.35%
1065	Operable Partitions	3	M. Michael Elkis Co.	$ 136,503	$ 136,503	100.00%
1230	Millwork - Casework & Tops	3	Blankenship Associates	$ 118,340	$ 118,340	100.00%
1250	Window Treatments	4	United Supply Company	$ 11,117	$ -	0.00%
1400	Elevators	4	Thyssenkrupp Elevator Corporation	$ 74,693	$ -	0.00%
1530	Fire Protection	3	Associated Fire Protection	$ 163,804	$ -	0.00%
1540	Plumbing	5	Haire Plumbing	$ 355,980	$ -	0.00%
1550	HVAC	9	Mechworks Mechanical Contractors	$ 1,210,500	$ 64,363	5.32%
1600	Electrical	5	Vaughan Electric	$ 1,113,350	$ 250,000	22.45%
	ACCEPTED VALUE ENGINEERING			$ (30,760)		
SUBTOTAL COST OF WORK				**$ 11,176,862**	**$ 3,785,575**	**33.87%**
	PROJECT SUBGUARD	1.25%		$ 139,711		
	OWNER CONTINGENCY	0.00%		$ -		
	CM CONSTRUCTION CONTINGENCY	3.00%		$ 335,306		
	CM FEE	3.50%		$ 473,450		
	CM GENERAL CONDITIONS			$ 1,104,205		
	CM BONDS/INSURANCE	2.20%		$ 297,597		
CMAR ESTIMATE TOTAL				**$ 13,527,129**		

BARNHILL CONTRACTING COMPANY

FINAL GMP ALTERNATES SUMMARY

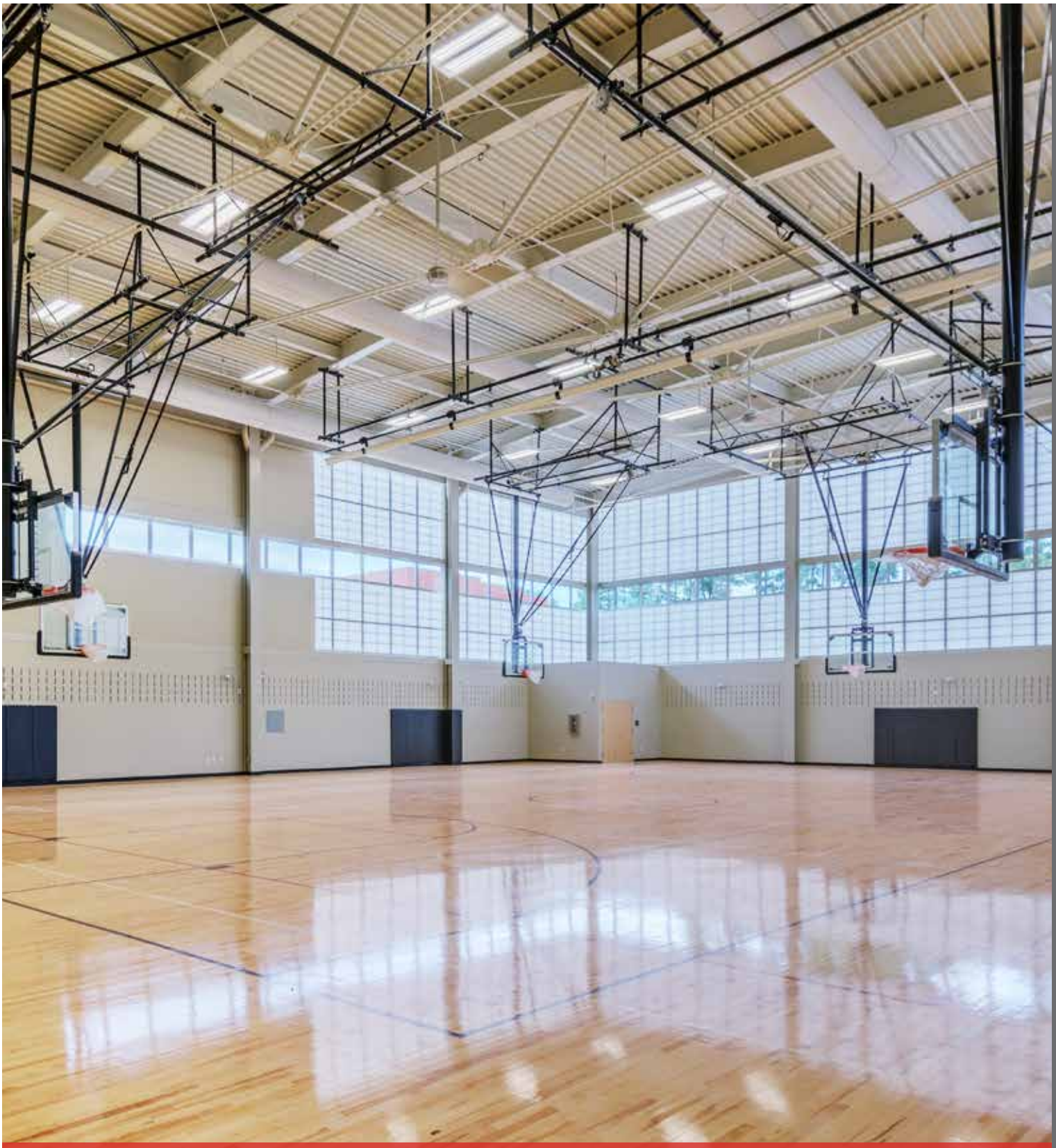
November 25, 2019

Apex Senior Center

Town of Apex

Alternate No.	Alternate Description	Packages Affected	Alternate Cost	Owner Approved
B	25 Additional Sprinkler Heads	1530	$ 6,250.00	APPROVED
1A-1	Chillers by Trane	1550	$ -	APPROVED
1A-2	Chillers by Carrier	1550	$ 52,000.00	TBD
1B-1	AHU's by York	1550	$ 2,500.00	TBD
1B-2	AHU's by Trane	1550	$ 2,000.00	APPROVED
1C	Fire Alarm System by Siemens	1600	$ -	APPROVED
1E	Building Automation System by Siemens	1550	$ 47,000.00	APPROVED
1D	Lock Cylinders by Sargent	800	$ 2,775.00	APPROVED
2	Furnish and Install Haiku Ceiling Fans	1550, 1600	$ 31,000.00	APPROVED
3	2nd Floor & Monumental Stair Polished Concrerte in lieu of Terrazzo	105, 790, 963, 990	($63,593.00)	TBD
4	Coffee Bar & Monumental Stair Podium in Lobby	105, 790, 963, 1230, 1530, 1540, 1600	$ 23,876.00	APPROVED
5	Enclosed Connector between Senior Center & Community Center	105, 200, 225, 280, 390, 400, 500, 740, 750, 790, 800, 840, 925, 963, 990, 1010, 1530, 1540, 1550, 1600	$ 268,143.00	APPROVED
6	Main Entrance Drop-Off Canopy	200, 280, 390, 400, 500, 740, 750, 790, 840, 1530, 1600	$ 140,248.00	APPROVED
7	Site Furnishings	290	$ 117,642.00	APPROVED
		Alternates Bid Day Subtotal	**$ 575,341.00**	
		ACCEPTED Alternates Subtotal		**$ 638,934.00**

Project Grand Total Without Alternates	$ 10,568,688
Project Total Including TOA Accepted Alternates	**$ 11,207,622**



SECTION 2

BID RESULTS

BARNHILL CONTRACTING COMPANY

FINAL GMP BID ESTIMATE VARIANCE

November 25, 2019

Apex Senior Center

Town of Apex

BP No.	BP Description	Contractor	Contract Amount (Base Bid No Alt)	60% CD Estimate	Variance to Est
100	General Trades	CB&H Contracting	177,000.00	$ 51,470	$ 125,530
105	Final Cleaning	CB&H Contracting	10,000.00	$ 13,264	$ (3,264)
200	Earthwork & Storm Drainage	**IN BP280**		$ 545,265	$ (545,265)
225	Concrete Paving & Sidewalks	Superior Concrete	187,983.00	$ 169,957	$ 18,026
230	Asphalt Paving, Stone Base & Concrete Curbs	**IN BP280**		$ 340,464	$ (340,464)
250	Site Utilities	**IN BP280**		$ 181,554	$ (181,554)
280	Turnkey Sitework	BridgePoint Civil	1,885,522.50	$ -	$ 1,885,523
290	Landscaping & Hardscapes	Landart Solutions	370,231.00	$ 231,459	$ 138,772
390	Turnkey Concrete Package	Honducom Concrete	458,244.00	$ 483,004	$ (24,760)
400	Turnkey Masony	Edgar Boettcher Mason Contractor	770,900.00	$ 748,104	$ 22,796
500	Structural & Miscellaneous Steel	Structural Steel of Carolina	946,241.00	$ 910,935	$ 35,306
550	Misc Steel / Stairs & Rails	**IN BP500**	0.00	$ 31,510	$ (31,510)
740	Roofing	Hamlin Roofing	485,500.00	$ 565,980	$ (80,480)
750	Metal Wall Panels	Bardi-Davis	82,200.00	$ 118,070	$ (35,870)
790	Caulking & Waterproofing	Water Proofing Specialties	123,456.00	$ 133,916	$ (10,460)
800	Doors/Frames/Hardware	Martin Architectural	141,446.00	$ 172,600	$ (31,154)
840	Glass & Glazing	GlassTech Commercial Glazing Services	564,825.00	$ 780,448	$ (215,623)
925	Drywall	Precision Walls	661,900.00	$ 602,934	$ 58,966
930	Ceramic Tile	Concordia Building Company	94,000.00	$ 96,990	$ (2,990)
960	Resilient, Carpet, Base	Southeastern interiors	91,157.00	$ 127,868	$ (36,711)
963	Terrazzo	David Allen Co.	241,863.00	$ 242,329	$ (466)
980	Acoustical Ceilings + Wall Panels	Acousti Engineering	92,810.00	$ 81,377	$ 11,433
990	Painting	Venecon	63,698.00	$ 100,447	$ (36,749)
1005	Misc. Specialties & Equipment	Martin Architectural	99,812.00	$ 97,671	$ 2,141
1010	Signage	A-B Sign Systems	19,787.00	$ 9,500	$ 10,287
1065	Operable Partitions	M. Michael Elkis Co.	136,503.00	$ 119,220	$ 17,283
1230	Millwork - Casework & Tops	Blankenship Associates	105,340.00	$ 177,937	$ (72,597)
1250	Window Treatments	United Supply Company	11,117.00	$ 12,500	$ (1,383)
1400	Elevators	Thyssenkrupp Elevator Corporation	74,693.00	$ 98,400	$ (23,707)
1530	Fire Protection	Associated Fire Protection	124,629.00	$ 179,810	$ (55,181)
1540	Plumbing	Haire Plumbing	355,980.00	$ 509,583	$ (153,603)
1550	HVAC	Mechworks Mechanical Contractors	1,119,500.00	$ 1,582,086	$ (462,586)
1600	Electrical	Vaughan Electric	1,072,350.00	$ 1,159,513	$ (87,163)
			0.00	$ -	$ -
Bid Day Total			**$ 10,568,688**	$ 10,676,165	$ (107,478)

		Bid Day	60% CD Estimate	Variance to Est
Base Bid Cost of Work		$ 10,568,688	$ 10,676,165	$ (107,478)
Alternate Cost of Work		$ 638,934		$ 638,934
Accepted Value Engineering		$ (30,760)	$ -	$ (30,760)
Construction Contingency	3.00%	$ 335,306	$ 216,192	$ 119,113
Pre-Construction Contingency	0.00%	$ -	$ -	$ -
Owner Contingency	0.00%	$ -	$ -	$ -
Escalation	1.50%	$ -	$ 162,144	$ (162,144)
Total Cost of Work Total		$ 11,512,167	$ 11,054,502	$ 457,665
CM Bonds/Insurance	2.20%	$ 297,597	$ 247,394	$ 50,203
Project Subguard	1.25%	$ 139,711	$ 133,452	$ 6,259
CM General Conditions		$ 1,104,205	$ 734,243	$ 369,962
CM Fee	3.50%	$ 473,450	$ 447,518	$ 25,931
Project Grand Total		**$ 13,527,129**	**$ 12,617,110**	**$ 910,020**

BARNHILL CONTRACTING COMPANY

November 25, 2019

Mr. Dennis Brown, PE
Town of Apex
73 Hunter Street
Apex, NC 27502

Re: Apex Senior Center
Non-Responsive / Non-Responsible Bidders

Dennis,

Listed below are the apparent low bid subcontractors that either withdrew their bids due to non-inclusive pricing, had missing scope items, or were deemed non-responsive or non-responsible.

1. ASI Signage submitted a bid of $5,651.00 on Bid Package 1010 – Signage. Upon review of their bid price and based upon post-bid discussions, it was determined that ASI Signage did not include the in-contract allowance for Specialty in their base bid as required per scope of work. Therefore, ASI Signage withdrew their bid. Next apparent low bidder for Bid Package 1010 is A-B Sign Systems at $19,787.00.
2. Poblocki Sign Systems submitted a bid of $13,662.11 on Bid Package 1010 – Signage. Upon review of their bid price and based upon post-bid discussions, it was determined that Poblocki Sign Systems did not include the in-contract allowance for Specialty in their base bid as required per scope of work. Therefore, Poblocki Sign Systems withdrew their bid. Next apparent low bidder for Bid Package 1010 is A-B Sign Systems at $19,787.00.
3. KAD Construction submitted a bid of $853,000.00 on Bid Package 1600 – Electrical & Fire Alarm. Upon review their bid price and based upon post-bid discussions, it was determined that KAD Construction did not include the conduit, fitting and wire for the branch circuits (approx. value $204,500) in their base bid as required per scope of work. Therefore, KAD Construction requested a withdrawal of their bid. Next apparent low bidder for Bid Package 1600 would be either Pitt Electric or Vaughan Electric depending on owner accepted Alternates.
4. Concordia Building Company (BP930): during the post-bid scope review meeting Barnhill discovered cementitious backer-board for wall tile was not accounted for in their estimate. Our estimate for the cost of this work is roughly $7,900. Concordia would still maintain apparent low bidder status with this amount added to their proposal. Concordia is also participating in our minority contractor inclusion plan. Based on the two reasons noted above, Barnhill recommends a post-bid cost modification to Concordia's proposal as outlined in Appendix A - Article 7.2 of our contract and proceeding with Concordia as apparent low bidder for BP930 – Ceramic Tile.

If you have any questions, please feel free to give me a call.

Sincerely,
Barnhill Contracting Company

Ryan Weaver
Project Manager

Barnhill Contracting Company
800 Tiffany Blvd. | Suite 200 | PO Box 7948
Rocky Mount, North Carolina 27804
PH 252-823-1021 | F 252-977-7512
www.barnhillcontracting.com

11/11/19

I regret to inform you I missed the instruction under “Allowances” on the bid form that the allowance was to be included in the base bid amount. As a result, our bid is inaccurate and I am requesting our bid for signage (BP1010 / Apex Community Center Expansion Senior Center) be withdrawn.

Apologies for the oversight.

Sincerely,



Jennifer Miller

Sr. Estimator

ASI, North Carolina
600 Irving Pkwy
Holly Springs, NC 27540

ph 919.362.9669
fx 919.387.9204

asisignage.com

POBLOCKI
SIGN COMPANY LLC

11/08/2019

Dear Mr. Ryan Weaver,

Poblocki Sign Company requests to withdraw their bid for BP1010 – Signage for the Apex Senior Center Renovation Project due to misunderstanding the language of the scope. We were under the impression that the total cost of the signage project had to be under the $15,000 allowance mentioned for signage. As such we priced our bid well within that amount. We did not understand that this $15,000 allowance was to be added on top of our base bid.

Please accept Poblocki's request to withdraw our bid.

Respectfully,

Scott Dennis
Senior Sales Consultant
sdennis@poblocki.com
919-600-9118

KAD Construction, Inc.
Electrical Contractor

5132 Departure Drive
Raleigh, NC 27616
Phone: (919) 790-2323
Fax: (919) 790-7077
E-Mail: khyatt@kadconstruction.com

November 11, 2019

Barnhill Contracting Company
4325 Pleasant Valley Rd.
Raleigh, NC 27612

Re: Apex Senior Center

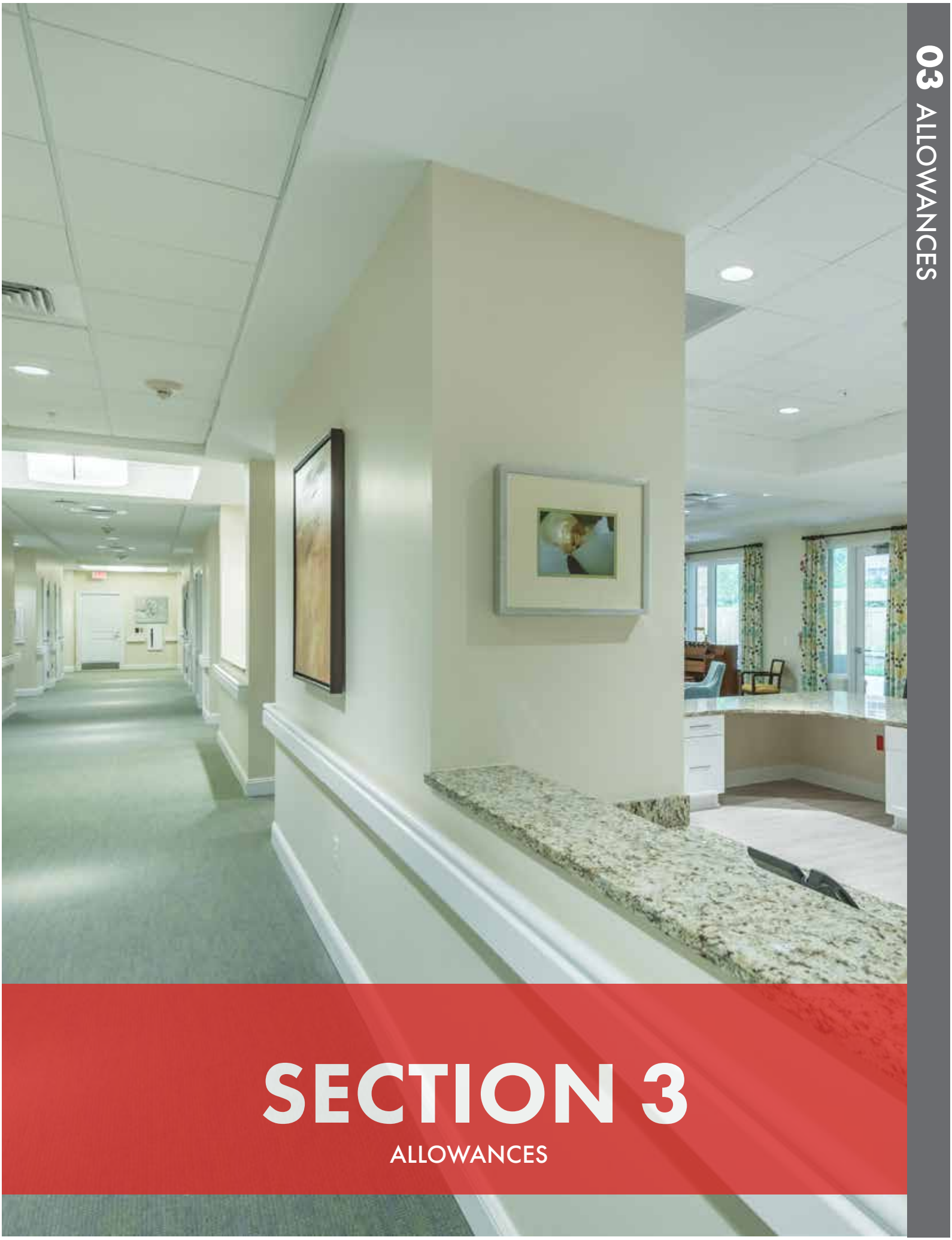
Attention: Davis Johnson, Project Manager

Unfortunately, after reviewing our bid on the Apex Senior Center, we have found that a significant quantity of work was left out of our quote.

The **Conduit, Fittings and Wire** for the **Branch Circuits** was left out of the estimate with a value of approximately of $204,500.

Based on that we hereby request approval to withdraw or bid.

Daniel P. Hyatt, Owner
KAD Construction



SECTION 3

ALLOWANCES

BARNHILL CONTRACTING COMPANY

FINAL GMP - SCHEDULE OF ALLOWANCES
November 25, 2019
Apex Senior Center
Town of Apex

BP No.	BID PACKAGE	DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT PRICE	ALLOWANCE TOTAL
BP100	**General Trades**	**GT Unit Price Allowance #1:** Foreman Supervisor - Provide regular time working Foreman man hours including tools, labor, burden, overhead and profit	2,080	HRS	$ 17.00	$ 35,360.00
BP100	**General Trades**	**GT Unit Price Allowance #2:** Laborer - Provide regular time "Laborer" man hours including tools, labor, burden, overhead and profit	4,160	HRS	$ 14.00	$ 58,240.00
BP100	**General Trades**	**GT Unit Price Allowance #3:** Male Port-a-John - Provide 6 standard or half high male port-a-john units, serviced twice per week	84	MO.	$ 115.00	$ 9,660.00
BP100	**General Trades**	**GT Unit Price Allowance #4:** Female Port-a-John - Provide 1 standard or half high female port-a-john unit, serviced twice per week	14	MO.	$ 115.00	$ 1,610.00
BP100	**General Trades**	**GT Unit Price Allowance #5:** Handicap Port-a-John - Provide 1 handicap port-a-john unit, serviced twice per week	14	MO.	$ 185.00	$ 2,590.00
BP100	**General Trades**	**GT Unit Price Allowance #6:** Construction Trailer Holding Tank - Provide 1 holding tank, serviced once per week	14	MO.	$ 250.00	$ 3,500.00
BP100	**General Trades**	**GT Unit Price Allowance #7:** Dumpster Fees per Ton	672	TON	$ 45.00	$ 30,240.00
BP100	**General Trades**	**GT Unit Price Allowance #8:** Dumpster Pulls - pulls for 30 cubic yard dumpster, includes overhead and profit	112	EA	$ 145.00	$ 16,240.00
BP100	**General Trades**	**GT Unit Price Allowance #9:** Dumpster Rental - monthly rental for 30 cubic yard dumpster, includes overhead and profit	28	MO.	$ 25.00	$ 700.00
BP100	**General Trades**	**GT Allowance #10:** Additional material needed as directed by CMAR	1	LSUM	$ 10,000.00	$ 10,000.00
BP105	**Final Cleaning**	**Allowance A:** Additional Work related to BP105 as directed by CMAR	1	LSUM	$ 3,000.00	$ 3,000.00
BP280	**Earthwork**	**Allowance A:** Gravel Crane Pad	1	LSUM	$ 15,000.00	$ 15,000.00
BP280	**Earthwork**	**Unit Price Allowance #1**: Rock Removal in Open Areas (Mass Rock) and Disposal Off-Site	10	CUYD	$ 500.00	$ 5,000.00
BP280	**Earthwork**	**Unit Price Allowance #2:** Rock Removal in Trenches and Pits (Trench Rock) and Disposal (Off-Site)	10	CUYD	$ 500.00	$ 5,000.00
BP280	**Earthwork**	**Uit Price Allowance #3**: Unsuitable Soils Removal and Disposal Off-Site	2,000	CUYD	$ 22.00	$ 44,000.00
BP280	**Earthwork**	**Unit Price Allowance #4:** Replacement of Removed Rock or Unsuitable Soils with Off-Site Suitable Soils	1,000	CUYD	$ 22.00	$ 22,000.00
BP280	**Earthwork**	**Unit Price Allowance #5:** Replacement of Removed Rock or Unsuitable Soils with On-Site Suitable Soils	500	CUYD	$ 8.00	$ 4,000.00
BP280	**Earthwork**	**Unit Price Allowance #6:** Replacement of Removed Rock or Unsuitable with No.57 Washed Stone	500	CUYD	$ 47.00	$ 23,500.00
BP280	**Earthwork**	**Unit Price Allowance #7**: Biaxial Geo-Grid	500	SQYD	$ 6.00	$ 3,000.00
BP280	**Earthwork**	**Unit Price Allowance #8:** Woven Geo-Textile (Separation) Fabric in Place	500	SQYD	$ 3.00	$ 1,500.00
BP280	**Earthwork**	**Unit Price Allowance #9:** Lime Stabilization for Unsuitable Soils	3,000	SQYD	$ 8.00	$ 24,000.00
BP280	**Asphalt Paving**	**Allowance #10:** Future On/Off-Site Asphalt Repair	1	LSUM	$ 10,000.00	$ 10,000.00
BP280	**Site Utilities**	**Allowance #A/B**: Irrigation Meter	1	LSUM	$ 8,500.00	$ 8,500.00
BP280	**Site Utilities**	**Unit Price Allowance #11:** Unsuitable Soils Removal and Disposal Off-Site	250	CUYD	$ 22.00	$ 5,500.00
BP280	**Site Utilities**	**Unit Price Allowance #12:** Replacement of Removed Unsuitable Soils with Off-Site Suitable Soils	250	CUYD	$ 25.00	$ 6,250.00
BP290	**Landscaping**	**Allownace A:** Irrigation System	1	LSUM	$ 75,000.00	$ 75,000.00
BP390	**Concrete**	**Unit Price Allowance A**: Replacement of Removed Rock or Unsuitable with No.57 Washed Stone	500	CUYD	$ 25.00	$ 12,500.00
BP740	**Roofing**	**Allowance A:** Temporary Roofing	1	LSUM	$ 10,000.00	$ 10,000.00
BP800	**Doors / Hardware**	**Allowance A:** Additional work or repairs related to BP800 as directed by CMAR	1	LSUM	$ 5,000.00	$ 5,000.00
BP840	**Curtainwall**	**Allowance A:** Additional Work related to BP840 as directed by CMAR	1	LSUM	$ 5,000.00	$ 5,000.00
BP925	**Metal Studs / Drywall**	**Allowance A:** Additional Work related to BP925 as directed by CMAR	1	LSUM	$ 5,000.00	$ 5,000.00
BP930	**Ceramic Tile**	**Allowance A:** Additional Work or Floor Leveling as directed by CMAR	1	LSUM	$ 2,500.00	$ 2,500.00
BP963	**Terrazzo Flooring**	**Allowance A:** Additional Work or Floor Leveling as directed by CMAR	1	LSUM	$ 2,500.00	$ 2,500.00
BP980	**Ceiling Tile**	**Allowance A:** Additional Work related to BP980 as directed by CMAR	1	LSUM	$ 2,000.00	$ 2,000.00
BP990	**Painting**	**Allowance A:** Additional Work or Touchup related to BP990 as directed by CMAR	1	LSUM	$ 3,000.00	$ 3,000.00
BP1005	**Misc. Specialties**	**Allowance A:** Residential Appliances Allowance	1	LSUM	$ 15,000.00	$ 15,000.00
BP1010	**Signage**	**Allowance A:** Specialty Signage Allowance	1	LSUM	$ 15,000.00	$ 15,000.00
BP1230	**Millwork**	**Allowance A:** Additional Work or Repairs related to BP1230 as directed by CMAR	1	LSUM	$ 2,000.00	$ 2,000.00
BP1530	**Sprinkler**	**Alternate B Allowance:** Provide Additional Heads as Required	25	EA	$ 250.00	$ 6,250.00
	TOTAL					**$ 509,140.00**



SECTION 4

VALUE ENGINEERING

BARNHILL CONTRACTING COMPANY

VALUE MANAGEMENT LOG

November 25, 2019

Apex Senior Center

Town of Apex

Item #	Description	Total	Status	Pending Amount	Rejected Amount	Accepted Amount	Remarks
General VE Items							
G 1	Use Polyisocyanurate Roof Insulation in lieu of Extruded Polystyrene	($30,760)	A	$0	$0	($30,760)	
	General Subtotal	**($30,760)**		**$0**	**$0**	**($30,760)**	

Proposal

Hamlin Roofing Company, Inc.
P.O. Box 465
Garner, NC 27529
Phone (919) 772-8780 - Fax (919) 779-5768

Proposal Submitted To:	Description of Job:	
Barnhill Contracting	Job:	Apex Senior Center
	Street:	83 Hunter Street
	City:	Apex, North Carolina
	Date:	November 19, 2019
Attention: Ryan Weaver	Page No.:	1 of 2 Pages

We hereby submit Value Engineering for the Apex Senior Center Project.

Value Engineering Roof Insulation Type.

- The primary VE item we discussed at the scope review was for the use of standard Polyisocyanurate insulation in lieu of Extruded Polystyrene. This option is much more affordable and practical and likewise is the most commonly used insulation type on a project such as this.
- In lieu of 6" of Extruded Polystyrene, we propose using (2) layers of 2.6" Polyisocyanurate insulation over structurally sloped roof areas. At non structurally sloped locations we will use (2) layers of 2.4" iso along with a ½" minimum tapered insulation.
- Polyisocyanurate insulation will meet R-30 minimum insulation requirement

The VE deduct for this will be $30,760.00

This proposal may be withdrawn by Hamlin Roofing Company, Inc. if not accepted within 31 days of proposal date shown above.

Authorized Signature: Caleb Smith

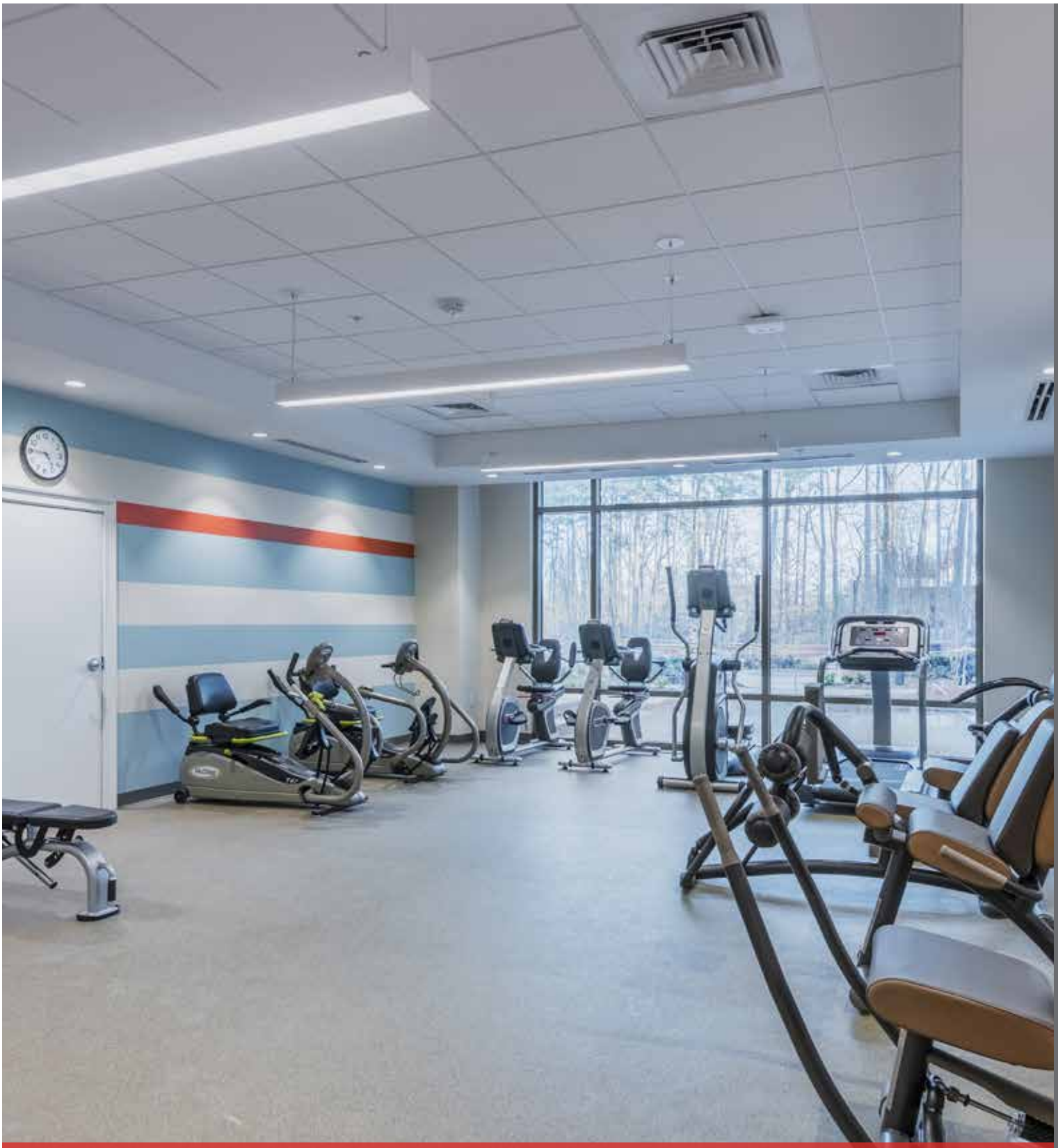
Caleb Smith, Estimator

ACCEPTANCE OF PROPOSAL

The above prices, specifications and conditions are satisfactory and are hereby accepted. Hamlin Roofing Company, Inc. is authorized to do the work as specified. Payment will be made as outlined above.

Company: _____

Date Accepted: _____Signature: _____



SECTION 5

MINORITY PARTICIPATION

BARNHILL CONTRACTING COMPANY

FINAL GMP Minority Contractor Participation Report

November 25, 2019

Apex Senior Center

Town of Apex

BID PACKAGE	BID PACKAGE DESCRIPTION	CONTRACTOR	CONTRACT AMOUNT	AFRICAN AMERICAN	WHITE FEMALE	HISPANIC	ASIAN AMERICAN	AMERICAN INDIAN	TOTAL $ HUB	TOTAL % HUB	Bid Day Affidavit	Post Bid Affidavit
100	General Trades	CB&H Contracting	$ 177,000	$ 177,000.00	$ -	$ -	$ -	$ -	$ 177,000.00	100.00%	B	C
105	Final Cleaning	CB&H Contracting	$ 11,200	$ 11,200.00	$ -	$ -	$ -	$ -	$ 11,200.00	100.00%	B	C
225	Concrete Paving & Sidewalks	Superior Concrete	$ 196,451	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	A	D
280	Turnkey Sitework	BridgePoint Civil	$ 1,889,523	$ -	$ 20,000.00	$ -	$ -	$ -	$ 20,000.00	1.06%	A	C
290	Landscaping & Hardscapes	Landart Solutions	$ 487,873	$ -	$ 487,873.00	$ -	$ -	$ -	$ 487,873.00	100.00%	A	C
390	Turnkey Concrete Package	Honducom Concrete	$ 494,535	$ -	$ -	$ 494,535.00	$ -	$ -	$ 494,535.00	100.00%	A / B	N/A
400	Turnkey Masony	Edgar Boettcher Mason Contractor	$ 810,210	$ -	$ 191,574.00	$ -	$ -	$ -	$ 191,574.00	23.64%	A	C
500	Structural & Miscellaneous Steel	Structural Steel of Carolina	$ 1,023,678	$ -	$ 1,023,678.00	$ -	$ -	$ -	$ 1,023,678.00	100.00%	A	C
740	Roofing	Hamlin Roofing	$ 495,540	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	A	D
750	Metal Wall Panels	Bardi-Davis	$ 127,500	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	A	D
790	Caulking & Waterproofing	Water Proofing Specialties	$ 125,956	$ -	$ -	$ 125,956.00	$ -	$ -	$ 125,956.00	100.00%	A	C
800	Doors/Frames/Hardware	Martin Architectural	$ 156,204	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	B	N/A
840	Glass & Glazing	GlassTech Commercial Glazing Services	$ 593,420	$ -	$ 593,420.00	$ -	$ -	$ -	$ 593,420.00	100.00%	A	C
925	Drywall	Precision Walls	$ 678,700	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	A	D
930	Ceramic Tile	Concordia Building Company	$ 94,000	$ -	$ -	$ -	$ 9,400.00	$ -	$ 9,400.00	10.00%	A	C
960	Resilient, Carpet, Base	Southeastern interiors	$ 91,157	$ -	$ 14,000.00	$ -	$ -	$ -	$ 14,000.00	15.36%	A	C
963	Terrazzo	David Allen Co.	$ 262,006	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	B	D
980	Acoustical Ceilings + Wall Panels	Acousti Engineering	$ 92,810	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	B	D
990	Painting	Venecon	$ 65,073	$ -	$ -	$ 65,073.00	$ -	$ -	$ 65,073.00	100.00%	B	D
1005	Misc. Specialties & Equipment	Martin Architectural	$ 99,812	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	B	N/A
1010	Signage	A-B Sign Systems	$ 19,927	$ -	$ 2,660.00	$ -	$ -	$ -	$ 2,660.00	13.35%	B	C / D
1065	Operable Partitions	M. Michael Elkis Co.	$ 136,503	$ -	$ 136,503.00	$ -	$ -	$ -	$ 136,503.00	100.00%	B	C
1230	Millwork - Casework & Tops	Blankenship Associates	$ 118,340	$ -	$ 118,340.00	$ -	$ -	$ -	$ 118,340.00	100.00%	A	C
1250	Window Treatments	United Supply Company	$ 11,117	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	A	C / D
1400	Elevators	Thyssenkrupp Elevator Corporation	$ 74,693	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	A	D
1530	Fire Protection	Associated Fire Protection	$ 163,804	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	B	D
1540	Plumbing	Haire Plumbing	$ 355,980	$ -	$ -	$ -	$ -	$ -	$ -	0.00%	A / B	D
1550	HVAC	Mechworks Mechanical Contractors	$ 1,210,500	$ -	$ 64,362.50	$ -	$ -	$ -	$ 64,362.50	5.32%	A	C
1600	Electrical	Vaughan Electric	$ 1,113,350	$ -	$ 250,000.00	$ -	$ -	$ -	$ 250,000.00	22.45%	A	C / D
HUB Participation % of Total Subcontract Work			**$ 11,176,862**	$ 188,200.00	$ 2,902,410.50	$ 685,564.00	$ 9,400.00	$ -	**$ 3,785,575**	**33.87%**		
				1.68%	25.97%	6.13%	0.08%	0.00%				



SECTION 6

CERTIFIED BID TABS

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 100
Bid Package: General Trades

Certification By:

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Sparkle & Shine	AAC	Venecon	CB&H Contracting	Classic Cleaning	Active Construction	Honducom Concrete	TCS Services			
Base Bid Amount		$ 203,017.00		$ 276,172.00	$ 177,000.00	$ 247,400.00	$ 288,000.00					
Alternates:												
A	P&P Bonds	$ 6,090.51		$ 4,142.58	$ 7,500.00	$ -	$ -					
Total Bid Estimate with Accepted Alternates		$ 203,017.00	$ -	$ 276,172.00	$ 177,000.00	$ 247,400.00	$ 288,000.00	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		no		yes	yes	yes	yes					
Addendum 2		no		yes	yes	yes	yes					
Sign Bid Form		yes		yes	yes	yes	yes					
Certificate of non-collusion		yes		yes	yes	yes	yes					
Identification of Minority Business Participation		yes		yes	yes	yes	yes					
State of NC Affidavit A or Affidavit B		B		B	A/B	B	B					
Unit Price Allowance 1	Regular Time - Foreman Supervision 2080 mh	$ 39,520.00		$ 39,520.00	$ 35,360.00	$ 43,680.00	$ 33,280.00					
Unit Price Allowance 2	Regular Time - Laborer - 4160 mh	$ 79,040.00		$ 70,720.00	$ 58,240.00	$ 78,624.00	$ 62,400.00					
Unit Price Allowance 3	Port-a-john - Male - 84mth	$ 10,626.00		$ 23,100.00	$ 9,660.00	$ 9,660.00	$ 9,261.00					
Unit Price Allowance 4	Port-a-john - Female - 14mth	$ 1,771.00		$ 3,850.00	$ 1,610.00	$ 1,770.00	$ 1,543.00					
Unit Price Allowance 5	Port-a-john- Handicap - 14mth	$ 3,095.40		$ 4,270.00	$ 2,590.00	$ 2,800.00	$ 2,866.50					
Unit Price Allowance 6	Construction Trailer Holding Tank - 14mth	$ 2,294.60		$ 5,250.00	$ 3,500.00	$ 4,850.00	$ 5,071.00					
Unit Price Allowance 7	Disposal Fees per Ton - 672 tons	$ 21,436.80		$ 68,544.00	$ 30,240.00	$ 29,000.00	$ 31,046.40					
Unit Price Allowance 8	Dumpster Pulls - 30cy - 112 ea	$ 18,356.80		$ 16,016.00	$ 16,240.00	$ 21,000.00	$ 21,756.00					
Unit Price Allowance 9	Dumpster Rental - 30cy - 28mth	$ -		$ -	$ 7,000.00	$ 40,000.00	$ -					
Allowance 10	Material Allowance - $10,000	$ 10,000.00		$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00					
Comments & Recommendation:												
			DID NOT BID		APPARENT LOW BIDDER			DID NOT BID	DID NOT BID			

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 105
Bid Package: Final Cleaning

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		Bidder #1	Bidder #2	Bidder #3	Bidder #4	Bidder #5	Bidder #6	Bidder #7	Bidder #8	Bidder #9	Bidder #10	Bidder #11
Bidder Name		Sparkle & Shine	AAC	CB&H Contracting	Dave & Sons	Classic Cleaning	Oneliance	TCS Services				
Base Bid Amount		$ 12,654.89		$ 10,000.00	$ 9,995.00	$ 11,900.00						
Alternates:												
A	P&P Bonds	$ 379.65		$ 5,000.00	$ 1,000.00	$ -						
3	2nd FL polished concrerte, Terrazzo monumental stair	$ -		$ 300.00	$ 1,500.00	$ 3,000.00						
4	finish coffee bar and stair podium include flooring/casework	$ 200.00		$ 500.00	$ 1,000.00	$ 7,500.00						
5	enclosed connector between senior center & community center	$ 300.00		$ 700.00	$ 1,000.00	$ 10,000.00						
Total Bid Estimate with Accepted Alternates		$ 13,154.89	$ -	$ 11,500.00	$ 13,495.00	$ 32,400.00	$ -	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes		yes	yes	yes						
Addendum 2		yes		yes	yes	yes						
Sign Bid Form		yes		yes	yes	Yes						
Certificate of non-collusion		yes		yes	yes	yes						
Identification of Minority Business Participation		yes		yes	yes	yes						
State of NC Affidavit A or Affidavit B		B		A/B	A/B	B						
Allowance A	Additional Work - $3000	$ 3,000.00		$ 3,000.00	$ 3,000.00	$ 3,000.00						
Comments & Recommendation:												
			DID NOT BID	APPARENT LOW BIDDER			DID NOT BID	DID NOT BID				

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 200
Bid Package: Earthwork & Storm Drainage

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Triangle Grading & Paving	Carolina Sunrock	BridgePoint Civil	Sullivan Eastern	Mid-Atlantic Infrastructure	Bruce Allen	Fred Smith Company	Mellott Contractors			
Base Bid Amount		$ 2,573,960.08		$ 1,588,409.00	$ 2,113,000.00			$ 1,980,000.00				
Alternates:												
A	P&P Bonds	$ 51,480.00		$ 15,000.00	$ 21,000.00			$ 16,000.00				
5	enclosed connector between senior center & community center	$ 1,000.00		$ 2,000.00	$ -			$ -				
6	Main entrance drop off canopy	$ 1,500.00		$ 2,000.00	$ -			$ 3,500.00				
Total Bid Estimate with Accepted Alternates		$ 2,576,460.08	$ -	$ 1,592,409.00	$ 2,113,000.00	$ -	$ -	$ 1,983,500.00	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes		yes	yes			yes				
Addendum 2		yes		yes	yes			yes				
Sign Bid Form		yes		yes	yes			yes				
Certificate of non-collusion		yes		yes	yes			yes				
Identification of Minority Business Participation		yes		yes	yes			yes				
State of NC Affidavit A or Affidavit B		A		A	A			A				
Allowance A	Temp gravel pad for construction crane - $15000	$ 15,000.00		$ 15,000.00	$ 15,000.00			$ 15,000.00				
Unit Price Allowance 1	Rock Removal in open site, offsite disposal 10-cy	$ 1,350.00		$ 5,000.00	$ 250.00			$ 1,500.00				
Unit Price Allowance 2	Rock removal in trenches and pits, offsite disposal 10-cy	$ 2,100.00		$ 5,000.00	$ 1,150.00			$ 3,500.00				
Unit Price Allowance 3	Unsuitable soils removal, offsite diposal 2000-cy	$ 40,000.00		$ 44,000.00	$ 50,000.00			$ 48,000.00				
Unit Price Allowance 4	Replacement of removed rock or unsuitable soils with off-site suitable soils 1000-cy	$ 20,000.00		$ 22,000.00	$ 25,000.00			$ 20,000.00				
Unit Price Allowance 5	Replacement of removed rock or unsuitable soils with on-site suitable soils 500-cy	$ 4,000.00		$ 4,000.00	$ 4,000.00			$ 6,000.00				
Unit Price Allowance 6	Replacement of removed rock or unsuitable with No. 57 washed stone 500-cy	$ 40,000.00		$ 23,500.00	$ 26,000.00			$ 32,500.00				
Unit Price Allowance 7	Biaxial Geo-Grid 500-sy	$ 3,500.00		$ 3,000.00	$ 3,000.00			$ 3,500.00				
Unit Price Allowance 8	Woven Geo-textile fabric in place 500-sy	$ 2,500.00		$ 1,500.00	$ 2,000.00			$ 1,250.00				
Unit Price Allowance 9	Lime stabilization for unsuitable soils 3000-sy	$ 37,200.00		$ 24,000.00	$ 45,000.00			$ 69,000.00				
Unit Price 01	Replacement of removed rock or unsuitable soil with ABC Stone	70/cy		46.00/cy	50.00/cy			50.00/cy				
Comments & Recommendation:												
			DID NOT BID			DID NOT BID	DID NOT BID		DID NOT BID			

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Re-Bid Date: 11/14/2019
Bid Time: 2:00 PM

Bid Package No.: 225
Bid Package: Concrete Paving & Sidewalks

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:	**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name	Triangle Grading & Paving	BridgePoint Civil	Central Concrete	Martinez Company	Select Concrete	Honducom Concrete	Mellott Contractors	Superior Concrete			
Base Bid Amount						$ 218,945.00		$ 187,983.00			
Alternates:											
A P&P Bonds						$ 4,379.00		$ 2,750.00			
5 enclosed connector between senior center & community center						$ 25,553.00		$ 8,468.00			
Total Bid Estimate with Accepted Alternates	$ -	$ -	$ -	$ -	$ -	$ 244,498.00	$ -	$ 196,451.00	$ -	$ -	$ -
Bid Inclusion Items:											
Addendum 1						yes		yes			
Addendum 2						yes		yes			
Sign Bid Form						yes		yes			
Certificate of non-collusion						yes		yes			
Identification of Minority Business Participation						yes		yes			
State of NC Affidavit A or Affidavit B						A/B		A			
Comments & Recommendation:											
	DID NOT BID	DID NOT BID	DID NOT BID	DID NOT BID	DID NOT BID		DID NOT BID	APPARENT LOW BIDDER			

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 230
Bid Package: Asphalt Paving, Stone Base & Concrete Curbs

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Gelder & Associates	Triangle Grading & Paving	Carolina Sunrock	BridgePoint Civil	Sullivan Eastern	Fred Smith Company	Mellott Contractors				
Base Bid Amount				$ 303,577.00	$ 312,010.00	$ 538,000.00	$ 368,000.00					
Alternates:												
A	P&P Bonds			$ 2,602.00	$ 6,240.00	$ 5,000.00	$ 2,400.00					
Total Bid Estimate with Accepted Alternates		$ -	$ -	$ 303,577.00	$ 312,010.00	$ 538,000.00	$ 368,000.00	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1				yes	yes	yes	yes					
Addendum 2				yes	yes	yes	yes					
Sign Bid Form				yes	yes	yes	yes					
Certificate of non-collusion				yes	yes	yes	yes					
Identification of Minority Business Participation				yes	yes	yes	yes					
State of NC Affidavit A or Affidavit B				A	A	A	A					
Allowance 10	Asphalt Repairs $10,000			$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00					
Unit Price 1	Asphalt Tonnage and Price			488.93/ton	496.07/ton	488.93/ton	488.93/ton 1,702ton					
Comments & Recommendation:												
		DID NOT BID	DID NOT BID					DID NOT BID				

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 250
Bid Package: Site Utilities

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Carolina Civilworks	Triangle Grading & Paving	BridgePoint Civil	Sullivan Eastern	Mid-Atlantic Infrastructure	Bruce Allen	Fred Smith Company				
Base Bid Amount				$ 242,262.00	$ 383,000.00							
Alternates:												
A	P&P Bonds			$ 4,850.00	$ 4,000.00							
Total Bid Estimate with Accepted Alternates		$ -	$ -	$ 242,262.00	$ 383,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1				yes	yes							
Addendum 2				yes	yes							
Sign Bid Form				yes	yes							
Certificate of non-collusion				yes	yes							
Identification of Minority Business Participation				yes	yes							
State of NC Affidavit A or Affidavit B				A	A							
Allowance A	Irrigation Water Meter etc $8500			$ 8,500.00	$ 8,500.00							
Unit Price Allowance 11	Unsuitable soils removal and disposal off-site 250-cy			$ 5,500.00	$ 6,250.00							
Unit Price Allowance 12	Replacement of removed unsuitable soils with off-site suitable soils 250-cy			$ 6,250.00	$ 6,250.00							
Comments & Recommendation:												
		DID NOT BID	DID NOT BID			DID NOT BID	DID NOT BID	DID NOT BID				

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 280
Bid Package: Turnkey Sitework

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		Bidder #1	Bidder #2	Bidder #3	Bidder #4	Bidder #5	Bidder #6	Bidder #7	Bidder #8	Bidder #9	Bidder #10	Bidder #11	Bidder #12
Bidder Name		Hine Sitework	Triangle Grading & Paving	Carolina Sunrock	BridgePoint Civil	Muter Construction	Sullivan Eastern	Mid-Atlantic Infrastructure	Faulconer Construction Company	Bruce Allen	Fred Smith Company	Mellott Contractors	LPS Enterprises
Base Bid Amount		$ 2,568,400.00	$ 3,446,868.54		$ 1,885,522.50		$ 2,683,000.00		$ 2,656,500.00		$ 2,500,000.00		
Alternates:													
A	P&P Bonds	$ 33,900.00	$ 68,940.00		$ 18,860.00		$ 26,000.00		$ 20,000.00		$ 22,000.00		
5	enclosed connector between senior center & community center	$ 5,000.00	$ 1,000.00		$ 2,000.00		$ -		$ 4,500.00		$ -		
6	Main entrance drop off canopy	$ 2,500.00	$ 1,500.00		$ 2,000.00		$ -		$ 4,500.00		$ 3,500.00		
Total Bid Estimate with Accepted Alternates		$ 2,575,900.00	$ 3,449,368.54	$ -	$ 1,889,522.50	$ -	$ 2,683,000.00	$ -	$ 2,665,500.00	$ -	$ 2,503,500.00	$ -	$ -
Bid Inclusion Items:													
Addendum 1		yes	yes		yes		yes		yes		yes		
Addendum 2		yes	yes		yes		yes		yes		yes		
Sign Bid Form		yes	yes		yes		yes		yes		yes		
Certificate of non-collusion		yes	yes		yes		yes		yes		yes		
Identification of Minority Business Participation		yes	yes		yes		yes		yes		yes		
State of NC Affidavit A or Affidavit B		A	A		A		A		A		A		
Allowance A	Temp gravel pad for construction crane - $15000	$ 15,000.00	$ 15,000.00		$ 15,000.00		$ 15,000.00		$ 15,000.00		$ 15,000.00		
Allowance B	Irrigation Water Meter etc $8500	$ 8,500.00	$ 8,500.00		$ 8,500.00		$ 8,500.00		$ 8,500.00		$ 8,500.00		
Unit Price Allowance 1	Rock Removal in open site, offsite disposal 10-cy	$ 1,500.00	$ 1,350.00		$ 5,000.00		$ 250.00		$ 1,600.00		$ 1,500.00		
Unit Price Allowance 2	Rock removal in trenches and pits, offsite disposal 10-cy	$ 2,500.00	$ 2,100.00		$ 5,000.00		$ 1,150.00		$ 2,700.00		$ 3,500.00		
Unit Price Allowance 3	Unsuitable soils removal, offsite diposal 2000-cy	$ 30,000.00	$ 40,000.00		$ 44,000.00		$ 50,000.00		$ 70,000.00		$ 46,000.00		
Unit Price Allowance 4	Replacement of removed rock or unsuitable soils with off-site suitable soils 1000-cy	$ 20,000.00	$ 20,000.00		$ 22,000.00		$ 25,000.00		$ 34,000.00		$ 19,000.00		
Unit Price Allowance 5	Replacement of removed rock or unsuitable soils with on-site suitable soils 500-cy	$ 7,500.00	$ 4,000.00		$ 4,000.00		$ 4,000.00		$ 7,500.00		$ 6,000.00		
Unit Price Allowance 6	Replacement of removed rock or unsuitable with No. 57 washed stone 500-cy	$ 42,500.00	$ 40,000.00		$ 23,500.00		$ 26,000.00		$ 29,000.00		$ 30,000.00		
Allowance 7	Biaxial Geo-Grid 500-sy	$ 5,000.00	$ 3,500.00		$ 3,000.00		$ 3,000.00		$ 1,500.00		$ 3,500.00		
Unit Price Allowance 8	Woven Geo-textile fabric in place 500-sy	$ 2,500.00	$ 2,500.00		$ 1,500.00		$ 2,000.00		$ 1,000.00		$ 1,250.00		
Unit Price Allowance 9	Lime stabilization for unsuitable soils 3000-sy	$ 15,000.00	$ 37,200.00		$ 24,000.00		$ 45,000.00		$ 48,000.00		$ 66,000.00		
Allowance 10	Additional Work $10,000	$ 10,000.00	$ 10,000.00		$ 10,000.00		$ 10,000.00		$ 10,000.00		$ 10,000.00		
Unit Price Alllowance 11	Unsuitable soils removal and disposal off-site 250-cy	$ 3,750.00	$ 5,000.00		$ 5,500.00		$ 6,250.00		$ 10,750.00		$ 12,500.00		
Unit Price Allowance 12	Replacement of removed unsuitable soils with off-site suitable soils 250-cy	$ 5,000.00	$ 5,000.00		$ 6,250.00		$ 6,250.00		$ 10,500.00		$ 10,000.00		
Unit Price 1	Asphalt Tonnage and Price	488.93/ton	523.15/ton		496.07/ton		488.93/ton		488.93/ton		488.93/ton		
Comments & Recommendation:													
				DID NOT BID	APPARENT LOW BIDDER	DID NOT BID		DID NOT BID		DID NOT BID		DID NOT BID	DID NOT BID

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 290
Bid Package: Landscaping & Hardscapes

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		David Landscape	Southern Garden	Twin Oaks	LR Griffin & Assoc	Landart Solutions	Cardinal Landscaping	Ideal Landscaping				
Base Bid Amount			$ 384,483.00			$ 370,231.00	$ 430,753.00	$ 399,900.00				
Alternates:												
A	P&P Bonds		$ 7,000.00			$ 9,256.00	$ 6,900.00	$ 4,800.00				
7	Furnish & Install site furnishings		$ 122,316.00			$ 117,642.00	$ 118,800.00	$ 113,900.00				
Total Bid Estimate with Accepted Alternates		$ -	$ 506,799.00	$ -	$ -	$ 487,873.00	$ 549,553.00	$ 513,800.00	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1			yes			yes	yes	yes				
Addendum 2			yes			yes	yes	yes				
Sign Bid Form			yes			yes	yes	yes				
Certificate of non-collusion			yes			yes	yes	yes				
Identification of Minority Business Participation			yes			yes	yes	yes				
State of NC Affidavit A or Affidavit B			A			A	A	A				
Allowance A	Irrigation System $75,000		$ 75,000.00			$ 75,000.00	$ 75,000.00	$ 75,000.00				
Comments & Recommendation:												
		DID NOT BID		DID NOT BID	DID NOT BID	APPARENT LOW BIDDER						

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Re-Bid Date: 11/14/2019
Bid Time: 2:00 PM

Bid Package No.: 390
Bid Package: Turnkey Concrete Package

Certification By:

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Muter Construction	Central Concrete	Martinez Company	Select Concrete	Honducom Concrete	Superior Concrete					
Base Bid Amount				$ 598,400.00		$ 458,244.00	$ 528,610.00					
Alternates:												
A	P&P Bonds			$ 9,570.00		$ 9,164.00	$ 7,865.00					
5	enclosed connector between senior center & community center			$ 9,300.00		$ 25,553.00	$ 25,135.00					
6	Main entrance drop off canopy			$ 9,970.00		$ 10,738.00	$ 21,100.00					
Total Bid Estimate with Accepted Alternates		$ -	$ -	$ 617,670.00	$ -	$ 494,535.00	$ 574,845.00	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1				yes		yes	yes					
Addendum 2				yes		yes	yes					
Sign Bid Form				yes		yes	yes					
Certificate of non-collusion				yes		yes	yes					
Identification of Minority Business Participation				yes		yes	yes					
State of NC Affidavit A or Affidavit B				B		A/B	A					
Allowance A	Replacement of Removed Rock or Unsuitable with No.57 Washed Stone - 500cy			$ 37,500.00		$ 12,500.00	$ 48,750.00					
Comments & Recommendation:												
		DID NOT BID	DID NOT BID		DID NOT BID	APPARENT LOW BIDDER						

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 400
Bid Package: Turnkey Masony

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:	Bidder #1	Bidder #2	Bidder #3	Bidder #4	Bidder #5	Bidder #6	Bidder #7	Bidder #8	Bidder #9	Bidder #10	Bidder #11
Bidder Name	Manning Masonry	Brodie Constractors	Edgar Boettcher Mason Contractor	Joner Masonry							
Base Bid Amount	$ 804,000.00		$ 770,900.00	$ 921,806.00							
Alternates:											
A P&P Bonds	$ 10,000.00		$ 6,900.00	$ 9,000.00							
5 enclosed connector between senior center & community center	$ 28,000.00		$ 39,310.00	$ 44,161.00							
6 Main entrance drop off canopy	$ 1.00		$ -	$ -							
Total Bid Estimate with Accepted Alternates	$ 832,001.00	$ -	$ 810,210.00	$ 965,967.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:											
Addendum 1	yes		yes	yes							
Addendum 2	yes		yes	yes							
Sign Bid Form	yes		yes	yes							
Certificate of non-collusion	yes		yes	yes							
Identification of Minority Business Participation	yes		yes	yes							
State of NC Affidavit A or Affidavit B	A		A	A							
Comments & Recommendation:											
		DID NOT BID	APPARENT LOW BIDDER								

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 500
Bid Package: Structural & Miscellaneous Steel

Certification By:

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Structrual Steel of Carolina	Sanford Steel Corporation	Lyndon Steel Company	North State Steel	SteelFab of Virginia	Weldon Steel	Apex Steel Corp	Universal Steel			
Base Bid Amount		$ 946,241.00	$ 1,054,381.00	$ 1,179,800.00	$ 1,060,000.00		$ 978,410.00	$ 959,882.00				
Alternates:												
A	P&P Bonds	$ 9,835.00	$ 17,000.00	$ 11,800.00	$ 8,000.00		$ 10,415.00	$ 14,408.00				
5	enclosed connector between senior center & community center	$ 31,564.00	$ 39,379.00	$ 32,400.00	$ 30,000.00		$ 32,870.00	$ 35,239.00				
6	Main entrance drop off canopy	$ 45,873.00	$ 37,695.00	$ 38,300.00	$ 35,000.00		$ 30,410.00	$ 35,529.00				
Total Bid Estimate with Accepted Alternates		$ 1,023,678.00	$ 1,131,455.00	$ 1,250,500.00	$ 1,125,000.00	$ -	$ 1,041,690.00	$ 1,030,650.00	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes	yes	yes	yes		yes	yes				
Addendum 2		yes	yes	yes	yes		yes	yes				
Sign Bid Form		yes	yes	yes	yes		yes	yes				
Certificate of non-collusion		yes	yes	yes	yes		yes	yes				
Identification of Minority Business Participation		yes	no	yes	yes		yes	yes				
State of NC Affidavit A or Affidavit B		A	A	A	A		A	A				
Comments & Recommendation:												
		APPARENT LOW BIDDER				DID NOT BID			DID NOT BID			

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 740
Bid Package: Roofing

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Hamlin Roofing	Service Roofing & Sheet Metal	Bardi-Davis	Muter Construction	Phoenix Roofing	Baker Roofing	Curtis Construction	Martin Roofing	Eastern Corporation	AAR of NC	Fortis Roofing & Solar
Base Bid Amount		$ 485,500.00		$ 535,900.00			$ 622,450.00		$ 498,000.00	$ 521,000.00		
Alternates:												
A	P&P Bonds	$ 4,855.00		$ 7,600.00			$ 7,780.00		$ 7,500.00	$ 10,420.00		
5	enclosed connector between senior center & community center	$ 19,900.00		$ 18,700.00			$ 35,785.00		$ 22,000.00	$ 22,000.00		
6	Main entrance drop off canopy	$ 20,900.00		$ 21,000.00			$ 20,225.00		$ 17,000.00	$ 20,000.00		
Total Bid Estimate with Accepted Alternates		$ 526,300.00	$ -	$ 575,600.00	$ -	$ -	$ 678,460.00	$ -	$ 537,000.00	$ 563,000.00	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes		yes			yes		yes	yes		
Addendum 2		yes		yes			yes		yes	yes		
Sign Bid Form		yes		yes			yes		yes	yes		
Certificate of non-collusion		yes		yes			yes		yes	yes		
Identification of Minority Business Participation		yes		yes			yes		yes	yes		
State of NC Affidavit A or Affidavit B		A		A/B			B		A	B		
Allowance A	Temporary Roofing $10,000	$ 10,000.00		$ 10,000.00			$ 10,000.00		$ 10,000.00	$ 10,000.00		
Comments & Recommendation:												
		APPARENT LOW BIDDER	DID NOT BID		DID NOT BID	DID NOT BID		DID NOT BID			DID NOT BID	WITHDRAWN

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/6/2019
Bid Time: 2:00 PM

Bid Package No.: 750
Bid Package: Metal Wall Panels

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Bontiz	Advanced Exterior Systems	Sears Contract	Bardi-Davis	Martin Roofing	MSJ Glass & Glazing	Eastern Corporation	Performance Glass	Metal Roofing Corporation		
Base Bid Amount			$ 157,400.00		$ 82,200.00	$ 147,000.00		$ 110,000.00		$ 152,000.00		
Alternates:												
A	P&P Bonds		$ 1,600.00		$ -	$ 2,200.00		$ 2,200.00		$ 1,000.00		
5	Enclosed connector between senior center & community center		$ 20,200.00		$ 26,500.00	$ 36,000.00		$ 20,000.00		$ 31,000.00		
6	Main entrance drop off canopy		$ 29,800.00		$ 18,800.00	$ 10,800.00		$ 18,000.00		$ 21,600.00		
Total Bid Estimate with Accepted Alternates		$ -	$ 207,400.00	$ -	$ 127,500.00	$ 193,800.00	$ -	$ 148,000.00	$ -	$ 204,600.00	$ -	$ -
Bid Inclusion Items:												
Addendum 1			yes		yes	yes		yes		yes		
Addendum 2			yes		yes	yes		yes		yes		
Sign Bid Form			yes		yes	yes		yes		yes		
Certificate of non-collusion			yes		yes	yes		yes		yes		
Identification of Minority Business Participation			yes		yes	yes		yes		yes		
State of NC Affidavit A or Affidavit B			B		A/B	A		B		A		
Comments & Recommendation:												
		DID NOT BID		DID NOT BID	APPARENT LOW BIDDER		DID NOT BID		DID NOT BID			

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Re-Bid Date: 11/14/2019
Bid Time: 2:00pm

Bid Package No.: 790
Bid Package: Caulking & Waterproofing

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		Bidder #1	Bidder #2	Bidder #3	Bidder #4	Bidder #5	Bidder #6	Bidder #7	Bidder #8	Bidder #9	Bidder #10	Bidder #11
Bidder Name		Water Proofing Specialties	Strickland Waterproofing Co.	Triangle Caulking & Waterproofing	JT Murphy Construction							
Base Bid Amount		$ 123,456.00		$ 209,090.00	$ 130,000.00							
Alternates:												
A	P&P Bonds	$ 2,500.00		$ -	$ 4,550.00							
3	2nd FL polished concrerte, Terrazzo monumental stair	$ 500.00		$ -	$ 500.00							
4	finish coffee bar and stair podium include flooring/casework	$ 500.00		$ -	$ -							
5	enclosed connector between senior center & community center	$ 1,500.00		$ 5,550.00	$ -							
6	Main entrance drop off canopy	$ 500.00		$ 500.00	$ -							
Total Bid Estimate with Accepted Alternates		$ 126,456.00	$ -	$ 215,140.00	$ 130,500.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes		yes	yes							
Addendum 2		yes		yes	yes							
Sign Bid Form		yes		yes	yes							
Certificate of non-collusion		yes		yes	yes							
Identification of Minority Business Participation		yes		yes	yes							
State of NC Affidavit A or Affidavit B		A		B	B							
Comments & Recommendation:												
		APPARENT LOW BIDDER	DID NOT BID									

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Re-Bid Date: 11/14/2019
Bid Time: 2:00pm

Bid Package No.: 800
Bid Package: Doors/Frames/Hardware

Certification By:

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Martin Architectural	DH Pace	Hardware Specialties								
Base Bid Amount		$ 141,446.00		$ 160,000.00								
Alternates:												
A	P&P Bonds	$ 1,414.00		$ 2,600.00								
1D	Use Lock Cylinders by Sargent in lieu of manf. Spec	$ 2,755.00		$ 100.00								
5	enclosed connector between senior center & community center	$ 11,983.00		$ 12,800.00								
Total Bid Estimate with Accepted Alternates		$ 156,184.00	$ -	$ 172,900.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes		yes								
Addendum 2		yes		yes								
Sign Bid Form		yes		yes								
Certificate of non-collusion		yes		yes								
Identification of Minority Business Participation		yes		yes								
State of NC Affidavit A or Affidavit B		B		B								
Allowance A	Additional Work or Repairs $5000	$ 5,000.00		$ 5,000.00								
Comments & Recommendation:												
		APPARENT LOW BIDDER	DID NOT BID									

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Re-Bid Date: 11/14/2019
Bid Time: 2:00pm

Bid Package No.: 840
Bid Package: Glass & Glazing

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		GlassTech Commercial Glazing Services	Cook & Boardman	Carolina Classic Window & Glass	MSJ Glass & Glazing	Eastern Corporation	Performance Glass	East Coast Glass				
Base Bid Amount		$ 564,825.00			$ 599,907.00		$ 579,700.00					
Alternates:												
A	P&P Bonds	$ 6,434.20			$ 8,399.00		$ 5,700.00					
5	enclosed connector between senior center & community center	$ 28,595.00			$ 22,963.00		$ 41,900.00					
6	Main entrance drop off canopy	$ -			$ -		$ -					
Total Bid Estimate with Accepted Alternates		$ 593,420.00	$ -	$ -	$ 622,870.00	$ -	$ 621,600.00	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes			yes		yes					
Addendum 2		yes			yes		yes					
Sign Bid Form		yes			yes		yes					
Certificate of non-collusion		yes			yes		yes					
Identification of Minority Business Participation		yes			yes		yes					
State of NC Affidavit A or Affidavit B		A			A		B					
Allowance A	Additional Work $5000	$ 5,000.00			$ 5,000.00		$ 5,000.00					
Comments & Recommendation:												
		APPARENT LOW BIDDER	DID NOT BID	DID NOT BID		DID NOT BID						

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/7/2019
Bid Time: 10:00Am

Bid Package No.: 925
Bid Package: Drywall

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:	**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name	Precision Walls	Sears Contract	Chavez Interiors	Shields	WASPCO	Grey Interiors	Acousti Engineering	DG Gilchrist Drywall	AmTech	Interior Enterprises	
Base Bid Amount	$ 661,900.00		$ 957,250.00	$ 836,500.00	$ 735,210.00	$ 715,000.00			$ 784,000.00	$ 993,100.00	
Alternates:											
A P&P Bonds	$ 6,620.00		$ 10,000.00	$ 6,950.00	$ 11,030.00	$ 5,486.00			$ 12,000.00	$ 9,685.00	
5 enclosed connector between senior center & community center	$ 16,800.00		$ 38,800.00	$ 13,700.00	$ 30,290.00	$ 16,500.00			$ 15,000.00	$ 35,000.00	
Total Bid Estimate with Accepted Alternates	$ 678,700.00	$ -	$ 996,050.00	$ 850,200.00	$ 765,500.00	$ 731,500.00	$ -	$ -	$ 799,000.00	$ 1,028,100.00	$ -
Bid Inclusion Items:											
Addendum 1	yes		yes	yes	yes	yes			yes	yes	
Addendum 2	yes		yes	yes	yes	yes			yes	yes	
Sign Bid Form	yes		yes	yes	yes	yes			yes	yes	
Certificate of non-collusion	yes		yes	yes	yes	yes			yes	yes	
Identification of Minority Business Participation	yes		yes	yes	yes	yes			yes	yes	
State of NC Affidavit A or Affidavit B	A		A	A	A	A			A/B	A/B	
Allowance A Additional Work $5000	$ 5,000.00		$ 5,000.00	$ 5,000.00	$ 5,000.00	$ 5,000.00			$ 5,000.00	$ 5,000.00	
Comments & Recommendation:											
	APPARENT LOW BIDDER	DID NOT BID					DID NOT BID	DID NOT BID			

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/7/2019
Bid Time: 10:00Am

Bid Package No.: 930
Bid Package: Ceramic Tile

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Atlanta Flooring Design	Bonitz	Lomax Tile & Marble	Concordia Building Company	TileSetters	Shields	Terry's Floor Fashions	David Allen Co.	Diamond Touch		
Base Bid Amount				$ 104,167.00	$ 86,100.00	$ 99,580.00			$ 107,966.00			
Alternates:												
A	P&P Bonds			$ 1,500.00	$ 2,090.00	$ -			$ 1,079.00			
Total Bid Estimate with Accepted Alternates		$ -	$ -	$ 104,167.00	$ 86,100.00	$ 99,580.00	$ -	$ -	$ 107,966.00	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1				yes	yes	yes			yes			
Addendum 2				yes	yes	yes			yes			
Sign Bid Form				yes	yes	yes			yes			
Certificate of non-collusion				yes	yes	yes			yes			
Identification of Minority Business Participation				yes	yes	yes			yes			
State of NC Affidavit A or Affidavit B				A	A	B			A			
Allowance A	Additional Work (Floor Leveling) $2500			$ 2,500.00	$ 2,500.00	$ 2,500.00			$ 2,500.00			
Comments & Recommendation:												
		DID NOT BID	DID NOT BID		APPARENT LOW BIDDER		DID NOT BID	DID NOT BID		DID NOT BID		

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Bid Date: 11/7/2019
Bid Time: 10:00Am

Bid Package No.: 960
Bid Package: Resilient, Carpet, Base

Certification By:

Bids Received:	**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name	Atlantic Flooring Design	Bonitz	Shields	Southeastern Interiors	AB Denning	Terry's Floor Fashions	David Allen Co				
Base Bid Amount			$ 177,350.00	$ 91,157.00	$ 123,186.00		$ 95,810.00				
Alternates:											
A P&P Bonds			$ 1,702.00	$ 2,917.00	$ 6,159.00		$ 958.00				
Total Bid Estimate with Accepted Alternates	$ -	$ -	$ 177,350.00	$ 91,157.00	$ 123,186.00	$ -	$ 95,810.00	$ -	$ -	$ -	$ -
Bid Inclusion Items:											
Addendum 1			yes	yes	yes		yes				
Addendum 2			yes	yes	yes		yes				
Sign Bid Form			yes	yes	yes		yes				
Certificate of non-collusion			yes	yes	yes		yes				
Identification of Minority Business Participation			yes	yes	yes		yes				
State of NC Affidavit A or Affidavit B			A	B	A		A				
Comments & Recommendation:											
	DID NOT BID	DID NOT BID		APPARENT LOW BIDDER		DID NOT BID					

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Re-Bid Date: 11/14/2019
Bid Time: 2:00pm

Bid Package No.: 963
Bid Package: Terrazzo

Certification By:

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Bonitz	Doyle Dickerson Terrazzo	David Allen Co.								
Base Bid Amount		$ 335,987.00	$ 238,000.00	$ 241,863.00								
Alternates:												
A	P&P Bonds	$ 2,620.00	$ 2,618.00	$ 2,418.00								
3	2nd FL polished concrerte, Terrazzo monumental stair	$ (131,938.00)	$ (84,000.00)	$ (68,284.00)								
4	finish coffee bar and stair podium include flooring/casework	$ 25,976.00	$ 11,200.00	$ 8,376.00								
5	enclosed connector between senior center & community center	$ 35,171.00	$ 14,000.00	$ 11,767.00								
Total Bid Estimate with Accepted Alternates		$ 397,134.00	$ 263,200.00	$ 262,006.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes	yes	yes								
Addendum 2		yes	yes	yes								
Clarification 1		no	yes	yes								
Sign Bid Form		yes	yes	yes								
Certificate of non-collusion		yes	yes	yes								
Identification of Minority Business Participation		yes	yes	yes								
State of NC Affidavit A or Affidavit B		B	B	B								
Allowance A	Additional Work $2500	$ 2,500.00	$ 2,500.00	$ 2,500.00								
Comments & Recommendation:												
				APPARENT LOW BIDDER								

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/7/2019
Bid Time: 10:00Am

Bid Package No.: 980
Bid Package: Acoustical Ceilings + Wall Panels

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Bonitz	Mid-Atlantic Specialties	Precision Walls	Chavez Interiors	Shields	Southeastern Interiors	Acousti Engineering	AB Denning	Paul Barbour & Sons		
Base Bid Amount				$ 128,920.00			$ 98,957.00	$ 92,810.00	$ 106,000.00			
Alternates:												
A	P&P Bonds			$ 1,290.00			$ 3,166.00	$ 1,392.00	$ 5,300.00			
Total Bid Estimate with Accepted Alternates		$ -	$ -	$ 128,920.00	$ -	$ -	$ 98,957.00	$ 92,810.00	$ 106,000.00	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1				yes			yes	yes	yes			
Addendum 2				yes			yes	yes	yes			
Sign Bid Form				yes			yes	yes	yes			
Certificate of non-collusion				yes			yes	yes	yes			
Identification of Minority Business Participation				yes			yes	yes	yes			
State of NC Affidavit A or Affidavit B				A			B	B	B			
Allowance A	Additional Work $2,000			$ 2,000.00			$ 2,000.00	$ 2,000.00	$ 2,000.00			
Comments & Recommendation:												
		DID NOT BID	DID NOT BID		DID NOT BID	DID NOT BID		APPARENT LOW BIDDER		DID NOT BID		

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Bid Date: 11/7/2019
Bid Time: 10:00Am

Bid Package No.: 990
Bid Package: Painting

Certification By:

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		PaintMaster	Venecon	Kenna Custom Painting	Diamond Touch							
Base Bid Amount		$ 125,120.00	$ 63,698.00	$ 132,600.00	$ 80,250.00							
Alternates:												
A	P&P Bonds	$ 3,754.00	$ 960.00	$ 4,250.00	$ -							
3	2nd FL polished concrerte, Terrazzo monumental stair	$ 5,000.00	$ 23,470.00	$ 20,500.00	$ -							
5	enclosed connector between senior center & community center	$ 1,850.00	$ 1,375.00	$ 2,000.00	$ 800.00							
Total Bid Estimate with Accepted Alternates		$ 125,120.00	$ 63,698.00	$ 132,600.00	$ 80,250.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes	yes	yes	yes							
Addendum 2		yes	yes	yes	yes							
Sign Bid Form		yes	yes	yes	yes							
Certificate of non-collusion		yes	yes	yes	yes							
Identification of Minority Business Participation		yes	yes	yes	yes							
State of NC Affidavit A or Affidavit B		B	B	B	A/B							
Allowance A	Additional Work $3000	$ 3,000.00	$ 3,000.00	$ 3,000.00	$ 3,000.00							
Comments & Recommendation:												
			APPARENT LOW BIDDER									

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Re-Bid Date: 11/14/2019
Bid Time: 2:00pm

Bid Package No.: 1005
Bid Package: Misc. Specialties & Equipment

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:	**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name	AAC	Venecon	Martin Architectural	Hardware Specialties	TCS Services						
Base Bid Amount			$ 99,812.00		$ 124,425.00						
A P&P Bonds			$ 998.00		$ 6,221.00						
Total Bid Estimate with Accepted Alternates	$ -	$ -	$ 99,812.00	$ -	$ 124,425.00	$ -	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:											
Addendum 1			yes		yes						
Addendum 2			yes		yes						
Sign Bid Form			yes		yes						
Certificate of non-collusion			yes		yes						
Identification of Minority Business Participation			yes		yes						
State of NC Affidavit A or Affidavit B			B		A/B						
Allowance A Residential Appliances $15,000			$ 15,000.00		$ 15,000.00						
Comments & Recommendation:											
			APPARENT LOW BIDDER								

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Bid Date: 11/7/2019
Bid Time: 10:00Am

Bid Package No.: 1010
Bid Package: Signage

Certification By:

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		AOA Signs	American Sign Craft	Modulex Carolinas	A-B Sign Systems	Poblocki Sign Company	ASI Signage					
Base Bid Amount		$ 21,312.00		$ 20,075.40	$ 19,787.00	$ 13,662.11	$ 5,651.00					
Alternates:												
A	P&P Bonds	$ -		$ -	$ -	$ 204.93	$ 521.00					
5	enclosed connector between senior center & community center	$ 93.00		$ -	$ 140.00	$ 105.80	$ 191.00					
Total Bid Estimate with Accepted Alternates		$ 21,405.00	$ -	$ 20,075.40	$ 19,927.00	$ 13,767.91	$ 5,842.00	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes		yes	yes	yes	yes					
Addendum 2		yes		yes	yes	yes	yes					
Sign Bid Form		yes		yes	yes	yes	yes					
Certificate of non-collusion		yes		yes	yes	yes	yes					
Identification of Minority Business Participation		yes		yes	yes	yes	yes					
State of NC Affidavit A or Affidavit B		B		B	A	B	B					
Allowance A	Specialty Signage $15,000	$ 15,000.00		$ 15,000.00	$ 15,000.00	not included	not included					
			DID NOT BID		APPARENT LOW BIDDER	BID REJECTED	BID REJECTED					

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Re-Bid Date: 11/14/2019
Bid Time: 2:00pm

Bid Package No.: 1065
Bid Package: Operable Partitions

Certification By:

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Proven Products	M. Michael Elkis Co.	Precision Walls	Maxson & Associates							
Base Bid Amount		$ 138,070.00	$ 136,503.00	$ 199,360.00								
Alternates:												
A	P&P Bonds	$ 5,525.00	$ -	$ -								
Total Bid Estimate with Accepted Alternates		$ 138,070.00	$ 136,503.00	$ 199,360.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes	yes									
Addendum 2		yes	yes									
Sign Bid Form		yes	yes	incomplete								
Certificate of non-collusion		yes	yes	yes								
Identification of Minority Business Participation		yes	yes	yes								
State of NC Affidavit A or Affidavit B		A	B	A								
Comments & Recommendation:												
			APPARENT LOW BIDDER		DID NOT BID							

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Bid Date: 11/7/2019
Bid Time: 10:00Am

Bid Package No.: 1230
Bid Package: Millwork - Casework & Tops

Certification By:

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Blankenship Associates	Cabinets by Design	Basepoint	Stephenson Millwork	Northside Millwork	Trend Millwork					
Base Bid Amount		$ 105,340.00		$ 112,648.00			$ 139,400.00					
Alternates:												
A	P&P Bonds	$ 1,250.00		$ -			$ 2,000.00					
4	finish coffee bar and stair podium include flooring/casework	$ 13,000.00		$ 17,382.00			$ 18,500.00					
Total Bid Estimate with Accepted Alternates		$ 118,340.00	$ -	$ 130,030.00	$ -	$ -	$ 157,900.00	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes		yes			yes					
Addendum 2		yes		yes			yes					
Sign Bid Form		yes		yes			yes					
Certificate of non-collusion		yes		no			yes					
Identification of Minority Business Participation		yes		yes			yes					
State of NC Affidavit A or Affidavit B		A		B			A					
Allowance A	Additional Work $2,000	$ 2,000.00		$ 2,000.00			$ 2,000.00					
Comments & Recommendation:												
		APPARENT LOW BIDDER	DID NOT BID		DID NOT BID	DID NOT BID						

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Re-Bid Date: 11/14/2019
Bid Time: 2:00pm

Bid Package No.: 1250
Bid Package: Window Treatments

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Mid-Atlantic Specialties	Budget Blinds of Durham	Commonwealth Blinds & Shades	Contract Window Treatments	Precision Walls	United Supply Company	Custom Solar Control				
Base Bid Amount		$ 11,573.00		$ 11,500.00		$ 18,741.00	$ 11,117.00					
Alternates:												
A	P&P Bonds	$ -		$ 180.00		$ -	$ -					
Total Bid Estimate with Accepted Alternates		$ 11,573.00	$ -	$ 11,500.00	$ -	$ 18,741.00	$ 11,117.00	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes		yes		yes	yes					
Addendum 2		yes		yes		yes	yes					
Sign Bid Form		yes		yes		yes	yes					
Certificate of non-collusion		yes		yes		yes	yes					
Identification of Minority Business Participation		yes		yes		yes	yes					
State of NC Affidavit A or Affidavit B		B		A		A	A					
Comments & Recommendation:												
			DID NOT BID		DID NOT BID		APPARENT LOW BIDDER					

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/7/2019
Bid Time: 10:00Am

Bid Package No.: 1400
Bid Package: Elevators

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Delaware Elevators	Thyssenkrupp Elevator Corporation	Kone	Schindler	Resolute Elevator						
Base Bid Amount		$ 121,135.00	$ 74,693.00		$ 92,884.00	DID NOT READ						
Alternates:												
A	P&P Bonds	$ 1,090.00	$ 750.00		$ -							
Total Bid Estimate with Accepted Alternates		$ 121,135.00	$ 74,693.00	$ -	$ 92,884.00		$ -	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes	yes		yes							
Addendum 2		yes	yes		yes							
Sign Bid Form		yes	yes		yes	INCOMPLETE						
Certificate of non-collusion		yes	yes		yes	INCOMPLETE						
Identification of Minority Business Participation		yes	yes		yes	yes						
State of NC Affidavit A or Affidavit B		B	A / B		B	B						
Comments & Recommendation:												
			APPARENT LOW BIDDER	DID NOT BID		DID NOT READ						

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

Bid Date: 11/7/2019
Bid Time: 2:00 PM

Bid Package No.: 1530
Bid Package: Fire Protection

Certification By:

BARNHILL CONTRACTING COMPANY

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Allied Fire Protection	Associated Fire Protection	Bolton Construction	First Defense Fire Protection	Strategic Connections	ABL & Associates	VSC Fire & Security				
Base Bid Amount		$ 152,424.00	$ 124,629.00					$ 133,000.00				
Alternates:												
A	P&P Bonds	$ 2,250.00	$ -					$ -				
B	25 Additional Sprinkler Heads	$ 10,000.00	$ 6,250.00					$ 6,250.00				
4	finish coffee bar and stair podium include flooring/casework	$ 2,800.00	$ -					$ 1,000.00				
5	enclosed connector between senior center & community center	$ 2,400.00	$ 3,988.00					$ 1,500.00				
6	Main entrance drop off canopy	$ 7,850.00	$ 28,937.00					$ 19,000.00				
Total Bid Estimate with Accepted Alternates		$ 175,474.00	$ 163,804.00	$ -	$ -	$ -	$ -	$ 160,750.00	$ -	$ -	$ -	$ -
Bid Inclusion Items:												
Addendum 1		yes	yes					yes				
Addendum 2		yes	yes					yes				
Sign Bid Form		yes	Yes					yes				
Certificate of non-collusion		yes	yes					yes				
Identification of Minority Business Participation		yes	yes					yes				
State of NC Affidavit A or Affidavit B		B	B					A/B				
Comments & Recommendation:												
			APPARENT LOW BIDDER	DID NOT BID	DID NOT BID	DID NOT BID	DID NOT BID					

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Bid Date: 11/7/2019
Bid Time: 2:00 PM

Bid Package No.: 1540
Bid Package: Plumbing

Certification By:

Bids Received:	Bidder #1	Bidder #2	Bidder #3	Bidder #4	Bidder #5	Bidder #6	Bidder #7	Bidder #8	Bidder #9	Bidder #10	Bidder #11
Bidder Name	Bolton Construction	ABL & Associates	Keen Plumbing	Smith's Refrigeration	Haire Plumbing	SPC Mechanical					
Base Bid Amount		$ 604,000.00	$ 425,300.00	$ 460,000.00	$ 355,980.00	$ 620,000.00					
Alternates:											
A P&P Bonds		$ 8,900.00	$ 5,000.00	$ 6,000.00	$ 5,340.00	$ 4,380.00					
4 finish coffee bar and stair podium include flooring/casework		$ 4,500.00	$ -	$ 1,500.00	$ -	$ 1,000.00					
5 enclosed connector between senior center & community center		$ -	$ -	$ -	$ -	$ -					
Total Bid Estimate with Accepted Alternates	$ -	$ 608,500.00	$ 425,300.00	$ 461,500.00	$ 355,980.00	$ 621,000.00	$ -	$ -	$ -	$ -	$ -
Bid Inclusion Items:											
Addendum 1		yes	yes	yes	yes	yes					
Addendum 2		yes	yes	yes	yes	yes					
Sign Bid Form		yes	yes	yes	yes	yes					
Certificate of non-collusion		yes	yes	yes	Yes	yes					
Identification of Minority Business Participation		yes	yes	yes	yes	yes					
State of NC Affidavit A or Affidavit B		A	A	A	A/B	A					
Comments & Recommendation:											
	DID NOT BID				APPARENT LOW BIDDER						

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Bid Date: 11/7/2019
Bid Time: 2:00 PM

Bid Package No.: 1550
Bid Package: HVAC

Certification By:

Bids Received:		**Bidder #1**	**Bidder #2**	**Bidder #3**	**Bidder #4**	**Bidder #5**	**Bidder #6**	**Bidder #7**	**Bidder #8**	**Bidder #9**	**Bidder #10**	**Bidder #11**
Bidder Name		Bolton Construction	WATCO	Mechworks Mechanical Contractors	ABL & Associates	Comfort Mechanical Contractors	Smith's Refrigeration	Haire Plumbing	Hockaday Mechanical Corporation	Allred Mechanical Services	SPC Mechanical	
Base Bid Amount			$ 1,348,000.00	$ 1,119,500.00	$ 1,393,000.00	$ 1,572,000.00	$ 1,361,261.00	$ 1,758,000.00	$ 1,628,000.00	$ 1,521,300.00	$ 1,255,000.00	
Alternates:												
A	P&P Bonds		$ 10,900.00	$ 9,000.00	$ 14,000.00	$ 15,000.00	$ 12,500.00	$ 26,300.00	$ 47,000.00	$ 14,100.00	$ 7,700.00	
1A-1	Chillers by Trane		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
1A-2	Chillers by Carrier		$ 51,600.00	$ 52,000.00	$ 43,000.00	$ 49,000.00	$ 74,000.00	$ 52,500.00	$ 45,370.00	$ 48,215.00	$ 47,000.00	
1B-1	AHU by York		$ -	$ 3,000.00	$ 2,500.00	$ 2,800.00	$ 3,600.00	$ -	$ 5,430.00	$ -	$ 5,500.00	
1B-2	AHU by Trane		$ -	$ 2,000.00	$ 10,000.00	$ 6,400.00	$ -	$ -	$ -	$ 3,950.00	$ 8,900.00	
1E	Building Automation System by Siemens		$ -	$ 47,000.00	$ 50,000.00	$ 21,700.00	$ 13,000.00	$ -	$ 18,320.00	$ -	$ 19,300.00	
2	Furnish and install Haiku Ceiling Fans		$ -	$ 26,000.00	$ -	$ -	$ -	$ 26,500.00	$ 25,910.00	$ 27,690.00	$ 22,000.00	
5	enclosed connector between senior center & community center		$ 15,000.00	$ 16,000.00	$ 9,200.00	$ 19,400.00	$ 9,500.00	$ 10,200.00	$ 10,000.00	$ 12,500.00	$ 11,000.00	
Total Bid Estimate with Accepted Alternates		$ -	$ 1,414,600.00	$ 1,218,500.00	$ 1,457,700.00	$ 1,649,600.00	$ 1,448,361.00	$ 1,847,200.00	$ 1,714,710.00	$ 1,613,655.00	$ 1,349,400.00	$ -
Bid Inclusion Items:												
Addendum 1			yes	yes	yes	yes	yes	yes	yes	yes	yes	
Addendum 2			yes	yes	yes	yes	yes	yes	yes	yes	yes	
Sign Bid Form			yes	yes	yes	yes	yes	yes	yes	yes	yes	
Certificate of non-collusion			yes	yes	yes	yes	yes	yes	yes	yes	yes	
Identification of Minority Business Participation			yes	yes	yes	yes	yes	yes	yes	yes	yes	
State of NC Affidavit A or Affidavit B			A	A	A	A	A	A/B	A	A	A	
Unit Price 1	Undercut/Replace w/ABC per CY		155/cy	200/cy	80/cy	150/cy	180/cy	115/cy	no bid	135/cy	408/cy	
Unit Price 2	Trench Rock/Replace w/ABC per CY		250/cy	600/cy	200/cy	350/cy	360/cy	550/cy	175/cy	249/cy	408/cy	
Comments & Recommendation:												
		DID NOT BID		APPARENT LOW BIDDER								

Town of Apex
Apex, NC

Apex Community Center Expansion/ Senior Center
BID TABULATION RECORD

BARNHILL CONTRACTING COMPANY

Bid Date: 11/7/2019
Bid Time: 2:00 PM

Bid Package No.: 1600
Bid Package: Electrical

Certification By:

Bids Received:		Bidder #1	Bidder #2	Bidder #3	Bidder #4	Bidder #5	Bidder #6	Bidder #7	Bidder #8	Bidder #9	Bidder #10	Bidder #11
Bidder Name		LJ Electrical Company	McCarter Electrical	KAD Construction Inc	Watson Electrical	Pitt Electric	Triple R	Hewitt Power	Moonlite Electric & Construction	WB Moore	Vaughan Electric	
Base Bid Amount		$ 1,180,960.00		$ 853,000.00		$ 1,050,000.00			$ 1,185,000.00		$ 1,072,350.00	
Alternates:												
A	P&P Bonds	$ 11,590.00		$ 20,000.00		$ 12,000.00			$ 15,480.00		$ 19,000.00	
1C	Fire Alarm System by Siemens	no bid		$ -		$ -			$ -		no bid	
2	Furnish and install Haiku Ceiling Fans	$ 25,275.00		$ 19,000.00		$ 20,000.00			$ 22,000.00		$ 5,000.00	
4	finish coffee bar and stair podium include flooring/casework	$ 1,075.00		$ 1,400.00		$ 2,000.00			$ 300.00		$ 1,500.00	
5	enclosed connector between senior center & community center	$ 30,465.00		$ 31,500.00		$ 42,000.00			$ 38,000.00		$ 22,000.00	
6	Main entrance drop off canopy	$ 16,220.00		$ 9,000.00		$ 12,500.00			$ 7,500.00		$ 12,500.00	
Total Bid Estimate with Accepted Alternates		$ 1,253,995.00	$ -	$ 913,900.00	$ -	$ 1,126,500.00	$ -	$ -	$ 1,252,800.00	$ -	$ 1,113,350.00	$ -
Bid Inclusion Items:												
Addendum 1		yes		yes		yes			yes		yes	
Addendum 2		yes		yes		yes			yes		yes	
Sign Bid Form		yes		yes		yes			yes		yes	
Certificate of non-collusion		yes		yes		yes			yes		yes	
Identification of Minority Business Participation		yes		yes		yes			yes		yes	
State of NC Affidavit A or Affidavit B		A		A		A			A		A/B	
			DID NOT BID	BID REJECTED	DID NOT BID		DID NOT BID	DID NOT BID		DID NOT BID	APPARENT LOW BIDDER	



BARNHILL

Barnhill Contracting Company
4325 Pleasant Valley Rd, Raleigh, NC 27612
919.781.7210
barnhillcontracting.com

BARNHILL CONTRACTING COMPANY

CONTRACT DOCUMENT LOG

December 9, 2019

Apex Senior Center

Town of Apex

SUPPLEMENTAL DOCUMENTS				
Number	**Description**	**Date Issued**	**Date Received**	**Notes**
ADD1	Addendum #1	10/14/19	10/14/19	
ADD2	Addendum #2	10/21/19	10/21/19	
ADD3	Addendum #3	10/28/19	10/28/19	

DRAWING LIST

Discipline	Drawing No.	Drawing Title	Current Drawing Rev.	Addendum #3 (10/28/19)	Addendum #2 (10/21/19)	Addendum #1 (10/14/19)	Apex Senior Center Bid Set (09/30/19)
General	G0-01	COVER SHEET	1	1			0
General	G0-02	BUILDING CODE SUMMARY	0				0
General	G0-03	BUILDING CODE SUMM. - COMMUNITY CENTER	0				0
General	G0-04	UL DETAILS	0				0
General	G1-00	LIFE SAFETY PLAN - SITE	0				0
General	G1-01	LIFE SAFETY PLAN - FIRST FLOOR	0				0
General	G1-02	LIFE SAFETY PLAN - SECOND FLOOR	0				0
General	G1-03	LIFE SAFETY PLAN- COMMUNITY CENTER	0				0
General	G2-01	FIRST FLOOR FURNITURE PLAN - REFERENCE ONLY	0				0
General	G2-02	SECOND FLOOR FURNITUR E PLAN - REFERENCE ONLY	0				0
Civil	C0-00	COVER SHEET	0				0
Civil	C1-00	OVERALL SITE PLAN	0				0
Civil	C1-01	SITE STAKING PLAN AREA 1	1	1			0
Civil	C1-02	SITE STAKING PLAN AREA 2	1	1			0
Civil	C1-03	SITE STAKING PLAN AREA 3	1	1			0
Civil	C1-04	SITE STAKING PLAN AREA 4	1	1			0
Civil	C1-05	PAVEMENT MARKING AND SIGNAGE PLAN AREA 1	1	1			0
Civil	C1-06	PAVEMENT MARKING AND SIGNAGE PLAN AREA 2	1	1			0
Civil	C1-07	PAVEMENT MARKING AND SIGNAGE PLAN AREA 3	1	1			0
Civil	C1-08	PAVEMENT MARKING AND SIGNAGE PLAN AREA 4	1	1			0
Civil	C2-00	OVERALL EXISTING CONDITIONS AND DEMOLITION PLAN	3	3	1	1	0
Civil	C2-01	EXISTING CONDITIONS & DEMOLITION PLAN AREA 1	3	3	2	1	0
Civil	C2-02	EXISTING CONDITIONS & DEMOLITION PLAN AREA 2	3	3	2	1	0
Civil	C2-03	EXISTING CONDITIONS & DEMOLITION PLAN AREA 3	3	3	2	1	0
Civil	C2-04	EXISTING CONDITIONS & DEMOLITION PLAN AREA 4	3	3	2	1	0
Civil	C3-00	OVERALL SITE GRADING PLAN	1			1	0
Civil	C3-01	SITE GRADING PLAN AREA 1	1			1	0
Civil	C3-02	SITE GRADING PLAN AREA 2	1			1	0
Civil	C3-03	SITE GRADING PLAN AREA 3	1			1	0
Civil	C3-04	SITE GRADING PLAN AREA 4	1			1	0
Civil	C3-05	PRE-DEVELOPMENT DRAINAGE AREA	0				0
Civil	C3-06	POST DEVELOPMENT DRAINAGE AREA	0				0
Civil	C3-07	SCM DRAINAGE AREA	0				0
Civil	C3-08	STORMWATER PROFILE	0				0
Civil	C3-09	STORMWATER PROFILE	0				0

Civil	C4-00	OVERALL EROSION CONTROL INITIAL INSTALL PLAN	1	1			0
Civil	C4-01	EROSION CONTROL INITIAL INSTALL PLAN AREA 1	1	1			0
Civil	C4-02	EROSION CONTROL - INITIAL INSTALL PLAN AREA 2	1	1			0
Civil	C4-03	EROSION CONTROL INITIAL INSTALL PLAN AREA 3	1	1			0
Civil	C4-04	EROSION CONTROL INITIAL INSTALL PLAN AREA 4	1	1			0
Civil	C4-05	OVERALL EROSION CONTROL PLAN	1	1			0
Civil	C4-06	EROSION CONTROL PLAN AREA 1	1	1			0
Civil	C4-07	EROSION CONTROL PLAN AREA 2	1	1			0
Civil	C4-08	EROSION CONTROL PLAN AREA 3	1	1			0
Civil	C4-09	EROSION CONTROL PLAN AREA 4	1	1			0
Civil	C5-00	OVERALL SITE UTILITY PLAN	2	2		1	0
Civil	C5-01	SITE UTILITY PLAN AREA 1	2	2		1	0
Civil	C5-02	SITE UTILITY PLAN AREA 2	2	2		1	0
Civil	C5-03	SITE UTILITY PLAN AREA 3	2	2		1	0
Civil	C5-04	SITE UTILITY PLAN AREA 4	2	2		1	0
Civil	C5-05	WATERLINE & FIRE PROTECTION LINE PROFILES	0				0
Civil	C6-00	OVERALL LANDSCAPE PLAN	2	2		1	0
Civil	C6-01	LANDSCAPE PLAN AREA 1	2	2		1	0
Civil	C6-02	LANDSCAPE PLAN AREA 2	1	1			0
Civil	C6-03	LANDSCAPE PLAN AREA 3	1	1			0
Civil	C6-04	LANDSCAPE PLAN AREA 4	1	1			0
Civil	C6-05	WET POND PLANTING PLAN	0				0
Civil	C7-01	SITE DETAILS	1	1			0
Civil	C7-02	SITE DETAILS	1	1			0
Civil	C7-03	SITE DETAILS	0				0
Civil	C7-04	SITE DETAILS	0				0
Civil	C7-05	SITE DETAILS	1			1	0
Civil	C7-06	SITE DETAILS	0				0
Civil	C7-07	SITE DETAILS	0				0
Civil	C7-08	SITE DETAILS	1	1			0
Civil	C7-09	SITE DETAILS	0				0
Civil	C7-10	SITE DETAILS	0				0
Civil	C7-11	SITE DETAILS	1	1		1	0
Civil	C7-12	SITE DETAILS	0				0
Civil	C7-13	SITE DETAILS	1			1	0
Structural	S0-01	GENERAL NOTES	0				0
Structural	S0-02	GENERAL NOTES	0				0
Structural	S0-03	GENERAL NOTES	0				0
Structural	S1-01	FOUNDATION PLAN	0				0
Structural	S1-02	SECOND FLOOR / LOW ROOF FRAMING PLAN	1	1			0
Structural	S1-03	ROOF FRAMING PLAN	0				0
Structural	S1-04	HIGH ROOF FRAMING PLAN	0				0
Structural	S1-05	PLANS - ENTRY VESTIBULE / CANOPY	1	1			0
Structural	S2-01	BRACED FRAME ELEVATIONS	0				0
Structural	S2-02	BRACED FRAME ELEVATIONS	0				0
Structural	S2-03	BRACED FRAME ELEVATIONS	0				0
Structural	S2-04	BRACED FRAME DETAILS	0				0
Structural	S2-05	SPECIAL JOIST ELEVATIONS	1	1			0
Structural	S3-01	SECTIONS	0				0
Structural	S3-02	SECTIONS	1	1			0

Structural	S3-03	SECTIONS	1	1			0
Structural	S3-04	SECTIONS	0				0
Structural	S3-05	SECTIONS	1	1			0
Structural	S3-06	SECTIONS	1	1			0
Structural	S4-01	STAIR FRAMING PLAN & DETAILS	0				0
Structural	S5-01	TYPICAL DETAILS	0				0
Structural	S5-02	TYPICAL DETAILS	0				0
Structural	S5-03	TYPICAL DETAILS	0				0
Structural	S5-04	TYPICAL DETAILS	0				0
Structural	S5-05	TYPICAL DETAILS	0				0
Structural	S5-06	TYPICAL DETAILS	0				0
Architectural	A0-01	DEMO PLANS & ELEVATION	1	1			0
Architectural	A1-00	OVERALL PLAN	0				0
Architectural	A1-01b	FIRST FLOOR- ANNOTATION PLAN	0				0
Architectural	A1-02a	SECOND FLOOR- PARTITION PLAN	0				0
Architectural	A1-02b	SECOND FLOOR- ANNOTATION PLAN	0				0
Architectural	A1-03	WALL TYPES	0				0
Architectural	A1-21	REFLECTED CEILING PLAN - FIRST FLOOR	0				0
Architectural	A1-22	REFLECTED CEILING PLAN - SECOND FLOOR	0				0
Architectural	A1-30	ROOF PLAN	1	1			0
Architectural	A2-01	BUILDING ELEVATIONS	0				0
Architectural	A2-02	BUILDING ELEVATIONS	0				0
Architectural	A3-01	BUILDING SECTIONS	0				0
Architectural	A3-02	BUILDING SECTIONS	0				0
Architectural	A3-03	BUILDING SECTIONS	0				0
Architectural	A3-04	BUILDING SECTIONS	0				0
Architectural	A3-10	WALL SECTIONS	0				0
Architectural	A3-11	WALL SECTIONS	0				0
Architectural	A3-12	WALL SECTIONS	0				0
Architectural	A3-13	WALL SECTIONS	0				0
Architectural	A3-14	WALL SECTIONS	0				0
Architectural	A3-15	WALL SECTIONS	0				0
Architectural	A3-16	WALL AND CURTAIN WALL SECTIONS	0				0
Architectural	A3-17	CONNECTOR SECTIONS	0				0
Architectural	A4-01	ENLARGED TOILET PLANS	0				0
Architectural	A4-02	ENLARGED PLANS & ELEVATIONS	0				0
Architectural	A4-03	CASEWORK ELEVATIONS AND DETAILS	0				0
Architectural	A4-04	CASEWORK AND INTERIOR ELEVATIONS	0				0
Architectural	A4-05	ENLARGED PLANS & DETAILS - ALT 4	1		1		0
Architectural	A4-06	ENLARGED PLANS & DETAILS	1	1			0
Architectural	A4-20	INTERIOR ELEVATIONS	0				0
Architectural	A4-21	INTERIOR ELEVATIONS	0				0
Architectural	A4-22	INTERIOR ELEVATIONS	0				0
Architectural	A5-01	STANDARD PLAN DETAILS	0				0
Architectural	A5-02	PLAN DETAILS	1	1			0
Architectural	A5-03	PLAN DETAILS	1	1			0
Architectural	A5-04	COLUMN BASE DETAILS	0				0
Architectural	A5-05	SITE DETAILS	0				0
Architectural	A5-06	SITE DETAILS	0				0
Architectural	A5-40	STANDARD ROOF DETAILS	0				0

Architectural	A5-41	ROOF DETAILS	0				0
Architectural	A5-42	ROOF DETAILS	1	1			0
Architectural	A5-50	STANDARD WALL DETAILS	1	1			0
Architectural	A5-51	WALL DETAILS	0				0
Architectural	A6-01	DOOR SCHEDULE	0				0
Architectural	A6-02	DOOR FRAME DETAILS	0				0
Architectural	A6-10	WINDOW ELEVATIONS	1	1			0
Architectural	A6-11	WINDOW ELEVATIONS	0				0
Architectural	A6-12	WINDOW ELEVATIONS	1	1			0
Architectural	A6-20	STANDARD FRAME DETAILS	0				0
Architectural	A6-21	STANDARD FRAME DETAILS	0				0
Architectural	A7-01	FINISH PLAN - FIRST FLOOR	1	1			0
Architectural	A7-02	FINISH PLAN - SECOND FLOOR	1	1			0
Architectural	A8-01	ENLARGED STAIR PLANS AND ELEVATIONS	0				0
Architectural	A8-02	ENLARGED STAIR PLANS AND ELEVATIONS	0				0
Architectural	A8-03	STAIR RAILING DETAILS	1	1			0
Architectural	A8-04	ELEVATOR PLAN, ELEVATIONS & DETAILS	0				0
Architectural	AI-01a	FIRST FLOOR PARTITION PLAN	0				0
Fire Protection	FP0-01	FIRE PROTECTION LEAD SHEET	0				0
Fire Protection	FP0-02	FIRE PROTECTION DETAILS	0				0
Fire Protection	FP1-01	FIRE PROTECTION - FIRST FLOOR PLAN	0				0
Fire Protection	FP1-02	FIRE PROTECTION - SECOND FLOOR PLAN	0				0
Plumbing	P0-01	LEAD SHEET	0				0
Plumbing	P1-01	FIRST FLOOR PLUMBING PLAN	0				0
Plumbing	P1-02	SECOND FLOOR PLUMBING PLAN	0				0
Plumbing	P1-03	ROOF PLUMBING PLAN	0				0
Plumbing	P4-01	FIRST FLOOR WASTE & VENT RISER	0				0
Plumbing	P4-02	SECOND FLOOR WASTE & VENT RISER	0				0
Plumbing	P4-03	FIRST FLOOR HOT & COLD WATER RISER	0				0
Plumbing	P4-04	SECOND FLOOR HOT & COLD WATER RISER	0				0
Plumbing	P4-05	ROOF DRAIN RISER & GAS RISER	0				0
Plumbing	P5-01	PLUMBING DETAILS	0				0
Plumbing	P5-02	PLUMBING DETAILS	0				0
Mechanical	M0-01	MECHANICAL LEAD SHEET	0				0
Mechanical	M1-01	FIRST FLOOR DUCTWORK PLAN	0				0
Mechanical	M1-02	SECOND FLOOR DUCTWORK PLAN	2	2			0
Mechanical	M1-03	ROOF MECHANICAL PLAN	0				0
Mechanical	M2-01	FIRST FLOOR PIPING PLAN	0				0
Mechanical	M2-02	SECOND FLOOR PIPING PLAN	0				0
Mechanical	M3-01	ENLARGED DUCTWORK PLANS	0				0
Mechanical	M3-02	ENLARGED PIPING PLANS	0				0
Mechanical	M3-03	MECHANICAL SECTIONS	0				0
Mechanical	M5-01	DETAILS	0				0
Mechanical	M5-02	DETAILS	0				0
Mechanical	M5-03	DETAILS	0				0
Mechanical	M5-04	DETAILS	0				0
Mechanical	M5-05	DETAILS	0				0
Mechanical	M5-06	UL DETAILS	0				0
Mechanical	M6-01	AHU CONTROLS	0				0
Mechanical	M6-02	CHILLED WATER SYSTEM CONTROLS	0				0

Mechanical	M6-03	HOT WATER SYSTEM CONTROLS	0				0
Mechanical	M6-04	MISCELLANOUS CONTROLS	0				0
Mechanical	M6-05	VAV BOX CONTROLS	0				0
Mechanical	M7-01	MECHANICAL SCHEDULES	0				0
Mechanical	M7-02	MECHANICAL SCHEDULES	0				0
Electrical	E0-01	ELECTRICAL LEAD SHEET	1			1	0
Electrical	E1-01	FIRST FLOOR LIGHTING PLAN	1			1	0
Electrical	E1-02	SECOND FLOOR LIGHTING PLAN	0				0
Electrical	E2-01	FIRST FLOOR POWER PLAN	1			1	0
Electrical	E2-02	SECOND FLOOR POWER PLAN	0				0
Electrical	E2-03	CHILLER YARD & ENLARGED POWER PLAN	2	2			0
Electrical	E2-04	ROOF POWER PLAN	0				0
Electrical	E3-01	FIRST FLOOR FIRE ALARM PLAN	0				0
Electrical	E3-02	SECOND FLOOR FIRE ALARM PLAN	0				0
Electrical	E4-01	ELECTRICAL DETAILS	0				0
Electrical	E4-02	FIXTURE SCHEDULE ELECTRICAL DETAILS	1	1			0
Electrical	E4-03	PARTIAL POWER RISER	1			1	0
Electrical	E4-04	PANEL SCHEDULES	0				0
Electrical	E4-05	FIRE ALARM RISER/MATRIX	0				0
Electrical	E5-01	SITE UTILITY PLAN	2	2		1	0
Electrical	E6-01	SITE LIGHTING PLAN	2	2		1	
Electrical	E6-02	SITE PHOTOMETRICS	1			1	
Electrical	E6-03	ENLARGED SITE PHOTOMETRICS	1			1	
Electrical	E6-04	ENLARGED SITE PHOTOMETRICS	1			1	

SPECIFICATION LIST

Division	Number	Description	Current Rev.	Addendum #3 (10/28/19)	Addendum #2 (10/21/14)	Addendum #1 (10/14/19)	Bid Set (09/30/19)
00 - Procurement and Contracting Requirements	00 00 00	COVER PAGE	0				0
00 - Procurement and Contracting Requirements	00 01 01	PROJECT TITLE PAGE	0				0
00 - Procurement and Contracting Requirements	00 01 07	SEALS PAGE	0				0
00 - Procurement and Contracting Requirements	00 01 10	TABLE OF CONTENTS	0				0
00 - Procurement and Contracting Requirements	00 31 32	GEOTECHNICAL DATA	0				0
01 - General Requirements	01 10 00	SUMMARY	0				0
01 - General Requirements	01 23 00	ALTERNATES	0				0
01 - General Requirements	01 25 00	SUBSTITUTION PROCEDURES	0				0
01 - General Requirements	01 31 00	PROJECT MANAGEMENT AND COORDINATION	0				0
01 - General Requirements	01 32 00	CONSTRUCTION PROGRESS DOCUMENTATION	0				0
01 - General Requirements	01 33 00	SUBMITTAL PROCEDURES	0				0
01 - General Requirements	01 40 00	QUALITY REQUIREMENTS	0				0
01 - General Requirements	01 41 00	SPECIAL INSPECTION SERVICES	0				0
01 - General Requirements	01 41 10	STATEMENT AND SCHEDULE OF SPECIAL INSPECTIONS	0				0
01 - General Requirements	01 42 00	REFERENCES	0				0
01 - General Requirements	01 60 00	PRODUCT REQUIREMENTS	0				0
01 - General Requirements	01 73 00	EXECUTION	0				0

01 - General Requirements	01 77 00	CLOSEOUT PROCEDURES	0				0
01 - General Requirements	01 78 23	OPERATION AND MAINTENANCE DATA	0				0
01 - General Requirements	01 78 39	PROJECT RECORD DOCUMENTS	0				0
01 - General Requirements	01 79 00	DEMONSTRATION AND TRAINING	0				0
02 - Existing Conditions	02 41 19	SELECTIVE DEMOLITION	0				0
03 - Concrete	03 30 00	CAST-IN-PLACE CONCRETE FOR BUILDING	0				0
03 - Concrete	03 35 43	POLISHED CONCRETE FINISHING	0				0
04 - Masonry	04 20 00	UNIT MASONRY	0				0
05 - Metals	05 12 00	STRUCTURAL STEEL FRAMING	0				0
05 - Metals	05 21 00	STEEL JOIST FRAMING	0				0
05 - Metals	05 31 00	STEEL DECKING	0				0
05 - Metals	05 40 00	COLD-FORMED METAL FRAMING	0				0
05 - Metals	05 50 00	METAL FABRICATIONS	0				0
05 - Metals	05 51 13	METAL PAN STAIRS	0				0
05 - Metals	05 52 13	PIPE AND TUBE RAILINGS	0				0
06 - Wood, Plastics, and Composites	06 10 53	MISCELLANEOUS ROUGH CARPENTRY	0				0
06 - Wood, Plastics, and Composites	06 16 00	SHEATHING	0				0
06 - Wood, Plastics, and Composites	06 20 23	INTERIOR FINISH CARPENTRY	0				0
06 - Wood, Plastics, and Composites	06 41 16	PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS	0				0
07 - Thermal and Moisture Protection	07 13 26	SELF-ADHERING SHEET WATERPROOFING	0				0
07 - Thermal and Moisture Protection	07 14 13	HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING	0				0
07 - Thermal and Moisture Protection	07 21 00	THERMAL INSULATION	0				0
07 - Thermal and Moisture Protection	07 21 19	FOAMED IN PLACE INSULATION	0				0
07 - Thermal and Moisture Protection	07 27 26	FLUID-APPLIED MEMBRANE AIR BARRIERS	0				0
07 - Thermal and Moisture Protection	07 41 13.16	STANDING-SEAM METAL ROOF PANELS	0				0
07 - Thermal and Moisture Protection	07 42 13.13	FORMED METAL WALL PANELS	0				0
07 - Thermal and Moisture Protection	07 42 93	SOFFIT PANELS	0				0
07 - Thermal and Moisture Protection	07 54 23	THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING	0				0
07 - Thermal and Moisture Protection	07 71 00	ROOF SPECIALTIES	0				0
07 - Thermal and Moisture Protection	07 72 00	ROOF ACCESSORIES	0				0
07 - Thermal and Moisture Protection	07 84 13	PENETRATION FIRESTOPPING	0				0
07 - Thermal and Moisture Protection	07 91 00	PREFORMED JOINT SEALS	0				0
07 - Thermal and Moisture Protection	07 92 00	JOINT SEALANTS	0				0

08 - Openings	08 11 13	HOLLOW METAL DOORS AND FRAMES	0				0
08 - Openings	08 14 16	FLUSH WOOD DOORS	0				0
08 - Openings	08 31 13	ACCESS DOORS AND FRAMES	0				0
08 - Openings	08 33 13	COILING COUNTER DOORS	0				0
08 - Openings	08 41 13	ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS	0				0
08 - Openings	08 42 29.23	SLIDING AUTOMATIC ENTRANCES	0				0
08 - Openings	08 44 13	GLAZED ALUMINUM CURTAIN WALLS	0				0
08 - Openings	08 71 00	DOOR HARDWARE	0				0
08 - Openings	08 80 00	GLAZING	0				0
08 - Openings	08 91 19	FIXED LOUVERS	0				0
09 - Finishes	09 05 61.13	MOISTURE VAPOR EMISSION CONTROL	0				0
09 - Finishes	09 22 16	NON-STRUCTURAL METAL FRAMING	0				0
09 - Finishes	09 29 00	GYPSUM BOARD	0				0
09 - Finishes	09 30 00	TILING	0				0
09 - Finishes	09 51 13	ACOUSTICAL PANEL CEILINGS	0				0
09 - Finishes	09 65 13	RESILIENT BASE AND ACCESSORIES	0				0
09 - Finishes	09 65 66	RESILIENT ATHLETIC FLOORING	0				0
09 - Finishes	09 66 23	TERRAZZO FLOORING	0				0
09 - Finishes	09 68 13	TILE CARPETING	0				0
09 - Finishes	09 84 00	ACOUSTIC WALL AND CEILING PANELS	0				0
09 - Finishes	09 91 00	PAINTING AND STAINING	0				0
10 - Specialties	10 11 00	VISUAL DISPLAY UNITS	0				0
10 - Specialties	10 21 13.19	PLASTIC TOILET COMPARTMENTS	0				0
10 - Specialties	10 22 39	FOLDING PANEL PARTITIONS	0				0
10 - Specialties	10 28 00	TOILET ACCESSORIES	0				0
10 - Specialties	10 44 00	FIRE PROTECTION SPECIALTIES	0				0
11 - Equipment	11 32 13	CEILING FANS	0				0
11 - Equipment	11 40 00	FOODSERVICE EQUIPMENT	0				0
11 - Equipment	11 52 13	PROJECTION SCREENS	0				0
11 - Equipment	11 54 13	KILNS	0				0
12 - Furnishings	12 24 13	ROLLER WINDOW SHADES	0				0
12 - Furnishings	12 36 61.16	SOLID SURFACING COUNTERTOPS	0				0
14 - Conveying Equipment	14 24 00	HYDRAULIC ELEVATORS	0				0
21 - Fire Suppression	21 05 00	COMMON WORK RESULTS FOR FIRE SUPPRESSION	0				0
21 - Fire Suppression	21 05 23	GENERAL-DUTY VALVES FOR WATER-BASED FIE-SUPPRESSION PIPING	0				0
21 - Fire Suppression	21 11 00	FACILITY FIRE-SUPPRESSION WATER-SERVICE PIPING	0				0
21 - Fire Suppression	21 13 00	FIRE-SUPPRESSION SPRINKLER SYSTEMS	0				0
22 - Plumbing	22 01 00	PLUMBING GENERAL PROVISIONS	0				0
22 - Plumbing	22 05 17	SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING	0				0
22 - Plumbing	22 05 19	METERS AND GAUGES FOR PLUMBING PIPING	0				0
22 - Plumbing	22 05 23	VALVES (DOMESTIC SUPPLY LEADFREE)	0				0
22 - Plumbing	22 05 29	PIPE HANGERS AND SUPPORTS	0				0
22 - Plumbing	22 05 33	HEAT TRACING FOR PLUMBING PIPING	0				0
22 - Plumbing	22 05 53	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT	0				0
22 - Plumbing	22 05 63	ELECTRICAL WORK	0				0
22 - Plumbing	22 05 70	PLUMBING COORDINATION DRAWINGS	0			0	
22 - Plumbing	22 07 16	PLUMBING EQUIPMENT INSULATION	0				0
22 - Plumbing	22 07 19	PLUMBING PIPING INSULATION	0				0
22 - Plumbing	22 08 00	COMMISSIONING OF PLUMBING SYSTEMS	0				0
22 - Plumbing	22 10 05	PLUMBING PIPING	0				0

22 - Plumbing	22 10 06	PLUMBING PIPING SPECIALTIES	0				0
22 - Plumbing	22 11 23	PLUMBING PUMPS RECIRCULATING	0				0
22 - Plumbing	22 14 20	PLUMBING PUMPS SUMPS	0				0
22 - Plumbing	22 16 13	GAS PIPE AND PIPE FITTINGS	0				0
22 - Plumbing	22 16 15	GAS PIPE AND PIPE FITTINGS BELOW GRADE	0				0
22 - Plumbing	22 30 00	PLUMBING EQUIPMENT	0				0
22 - Plumbing	22 42 00	PLUMBING FIXTURES	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 00 00	MECHANICAL ALTERNATES	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 01 00	HVAC GENERAL PROVISIONS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 12	ELECTRICAL WORK	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 13	COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 17	SLEEVES AND SLEEVE SEALS FOR HVAC PIPING	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 19	METERS AND GAUGES FOR HVAC PIPING	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 23	GENERAL-DUTY VALVES FOR HVAC PIPING	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 31	COIL HOOKUPS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 33	HEAT TRACING FOR HVAC PIPING	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 48	VIBRATION AND SEISMIC CONTROLS FOR HVAC	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 53	IDENTIFICATION FOR HVAC PIING AND EQUIPMENT	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 70	MECHANICAL COORDINATION DRAWINGS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 05 93	TESTING, ADJUSTING AND BALANCING FOR HVAC	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 07 13	DUCT INSULATION	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 07 16	HVAC EQUIPMENT INSULATION	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 07 19	HVAC PIPING INSULATION	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 08 00	COMMISSIONING OF HVAC	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 09 00.10	BUILDING AUTOMATION SYSTEM	1	1			0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 09 13.13	BAS ACTUATORS AND OPERATIONS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 09 13.33	BAS CONTROL VALVES	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 09 13.43	BAS CONTROL DAMPERS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 09 33	VARIABLE FREQUENCY DRIVE	0				0

23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 11 23	FACILITY NATURAL-GAS PIPING	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 21 13	HYDRONIC PIPING	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 21 14	HYDRONIC SPECIALTIES	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 21 23	HYDRONIC PUMPS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 25 00	HVAC WATER TREATMENT	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 31 00	HVAC DUCTS AND CASINGS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 33 00	AIR DUCT ACCESSORIES	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 34 20	PRE-MANUFACTURED ROOF PENETRATION HOUSING	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 34 23	HVAC POWER VENTILATORS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 36 00	AIR TERMINAL UNITS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 37 00	AIR OUTLETS AND INLETS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 52 16	CONDENSING BOILERS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 64 23	SCROLL WATER CHILLERS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 73 13	MODULAR INDOOR CENTRAL-STATION AIR-HANDLING UNITS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 81 26.13	SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS	0				0
23 - Heating, Ventilating, and Air Conditioning (HVAC)	23 82 00	CONVECTION HEATING AND COOLING UNITS	0				0
26 - Electrical	26 00 01	ELECTRICAL PREFERRED ALTERNATES	0				0
26 - Electrical	26 01 00	ELECTRICAL GENERAL PROVISIONS	0				0
26 - Electrical	26 05 19	POWER CONDUCTORS AND CABLES	0				0
26 - Electrical	26 05 26	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS	0				0
26 - Electrical	26 05 29	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS	0				0
26 - Electrical	26 05 33.13	CONDUIT FOR ELECTRICAL SYSTEMS	0				0
26 - Electrical	26 05 33.16	BOXES AND CABINETS	0				0
26 - Electrical	26 05 36	CABLE TRAYS FOR ELECTRICAL SYSTEMS	0				0
26 - Electrical	26 05 53	IDENTIFICATION FOR ELECTRICAL SYSTEMS	0				0
26 - Electrical	26 05 70	ELECTRICAL COORDINATION DRAWINGS	0				0
26 - Electrical	26 05 73	POWER SYSTEM STUDIES	0				0
26 - Electrical	26 08 00	COMMISSIONING OF ELECTRICAL SYSTEMS	0				0
26 - Electrical	26 09 19	ENCLOSED CONTACTORS	0				0
26 - Electrical	26 09 23	LIGHTING CONTROL DEVICES	0				0
26 - Electrical	26 24 16	PANELBOARDS	0				0
26 - Electrical	26 27 26	WIRING DEVICES	0				0
26 - Electrical	26 28 13	FUSES	0				0
26 - Electrical	26 28 16.16	ENCLOSED SWITCHES AND CIRCUIT BREAKERS	0				0
26 - Electrical	26 43 00	SURGE PROTECTIVE DEVICES	0				0

26 - Electrical	26 51 00	INTERIOR AND EXTERIOR LIGHTING	0				0
~~27 - Communications~~	~~27 10 00~~	~~STRUCTURED CABLING FOR VOICE AND DATA~~	~~0~~			Deleted	~~0~~
28 - Electronic Safety and Security	28 46 00	FIRE DETECTION AND ALARM	0				0
31 - Earthwork	31 10 00	SITE CLEARING	0				0
31 - Earthwork	31 20 00	EARTH MOVING FOR SITE	0				0
31 - Earthwork	31 20 01	EARTH MOVING FOR STRUCTURES	0				0
31 - Earthwork	31 25 00	EROSION &amp SEDIMENT CONTROLS	0				0
31 - Earthwork	31 31 16	TERMITE CONTROL	0				0
32 - Exterior Improvements	32 12 16	ASPHALT PAVING	0				0
32 - Exterior Improvements	32 13 13	CONCRETE PAVING	0				0
32 - Exterior Improvements	32 14 00	UNIT PAVING	0				0
32 - Exterior Improvements	32 31 19	DECORATIVE METAL FENCES AND GATES	0				0
32 - Exterior Improvements	32 40 00	SITE FURNISHINGS	0				0
32 - Exterior Improvements	32 90 00	PLANTING	0				0
33 - Utilities	33 10 00	WATER SYSTEMS	0				0
33 - Utilities	33 30 00	SANITARY SEWERAGE UTILITIES	0				0
33 - Utilities	33 40 00	SITE STORM DRAINAGE UTILITIES	0				0

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Jose Martinez, Public Work & Transportation Director

Department(s): Public Works & Transportation

Requested Motion

Motion to purchase the implementation of software in current fiscal year (FY 19/20) and to authorize the Town Manager to execute the contract on behalf of the town.

Approval Recommended?

Yes

Item Details

The Town current uses an old software for fleet maintenance (TMT) that does not meet the demands of the Town. The town has spoken with neighboring towns and have investigated the top fleet management software programs that are being used by our peers (Fleetio, Faster, and Chevon). Fleetio was chosen as the software that best meets the Town's needs. The investigation was done in tandem with our IT department

Fleetio's startup will take up to three (3) months to fully implement. Therefore, we need to start implementation in the current fiscal year so that there is no gap in service. Fleetio has also negotiated with the Town and has agreed to give the town three (3) free months of service (April through June) to work out any issues with the implementation and to get adjusted to the new software. Therefore, the Town will have an overlap of three (3) months of two operational systems at no additional cost. Standard service and payment for service will begin on July 1st, 2020. The software will be hosted on Fleetio's servers and should require minimal internal IT support.

The one-time implementation cost will be $3,000 and the annual payment will be $33,320/year (based on the number of assets the Town owns). The current cost of TMT is $27,000/year. The Town has the $3,000 in

operations and thus, will NOT need a budget amendment. The Annual fee will be in next fiscal year's budget as a line item replacing the TMT software line item.

The Fleetio contract includes both the implementation cost for FY 19/20 and the annual fee for FY 20/21. However, the addendum adds terminology where if council does not approve the budgeted line item for FY 20/21, the software contract may be canceled thus not obligating funds for future fiscal years.

Attachments

- Fleetio Partnership Overview
- Fleetio Contract
- Town of Apex Addendum to Fleetio Contract

Modern Fleet Management Software

Apex, North Carolina: Partnership Overview

Proposal Expires December 31, 2019

Fleetio
1900 2nd Avenue North
Suite 300
Birmingham, Alabama 35203
1.800.975.5304
www.fleetio.com

Town of Apex and Fleetio

Fleetio is a web-based software platform that is changing how teams manage a fleet through three guiding principles:

1. **Mobility** - Access the platform from anywhere using our Fleetio Go app.
2. **Collaboration** - Work better together with unlimited users accessing the system.
3. **Automation** - Integrate with GPS, fuel card, and other services through our open API.

We understand you have a lot of choices when it comes to your partnerships, and we appreciate the opportunity to present Fleetio as a solution for managing the complex fleet operations for the Town of Apex.

The Fleetio Difference

We have a fresh philosophy for managing a fleet and we built Fleetio based on our unique mindset.

- Software should make fleet management easier, not harder. Many of the tools we saw on the market were complex, antiquated and didn't seem to help fleet managers - but instead made their jobs harder in a lot of ways.
- Fleet management should be more collaborative. Fleetio comes with unlimited users, so many different stakeholders can access the system. With everyone on the same page, fleets last longer, remain safer and run smoother. Fleetio allows unlimited users at no additional cost.
- Fleet information should be accessible anywhere. Fleets are mobile by nature, so fleet information needs to be accessible on the go. Fleetio can be used on any device with an internet connection. You can use smartphones, tablets and anything else that comes in the future. Plus, Fleetio will automate communications so you can cut down on email and get back to more important things.
- Updates and enhancements - **ALWAYS INCLUDED**. Our business model is subscription-based, allowing us to continue delivering maximum value to our customers through frequent releases, upgrades, and enhancements that make our system even better. You are never charged for upgrades and our pricing is all-inclusive. As long as we partner together, we will continue to improve, together.
- Customer service - Our customer support is unrivaled in our space. We invest highly in our customers and their success and deploy a variety of tools and resources to ensure high adoption and utilization. Our "customer happiness score" is measured on every customer interaction and is rated nearly 100%.

Updated Enterprise Pricing

The investment includes full software documentation, ongoing maintenance, customer support, continuous updates, and product development. The proposal below includes all requirements necessary for the full implementation of Fleetio.

Pricing below offered if Agreement is signed before Tuesday, December 31st, 2019

Asset Tier	Annual Cost
501 - 600	$33,320
Additional Costs/Services One-Time Implementation Fee**: $3,000**	

*Fleetio is an all-inclusive software system. All upgrades, enhancements, maintenance, and support are included in the price.

Full list of features listed at www.fleetio.com/manage/features

- Fully integrated, native mobile applications for iOS and Android.
- Premier support (phone, email, customer portal, ongoing webinars, adoption services).
- Open, agnostic system that allows for tight integration with other systems via open API.
- Sandbox Environment, SAML Connection, and Custom Branding

Fleetio Fast Track ($3,000 one-time)

Quickly launch Fleetio at your organization with the help of our Customer Success Team. You can learn more about this offering at the end of this proposal and it is a planned implementation organized by the customer and Fleetio. These sessions provide instruction and consultation to configure your Fleetio account to best meet your fleet's specific needs.

Billing and Rollout Plan

For the Town of Apex to smoothly roll out Fleetio without being charged simultaneously for Fleetio and TMT, we will provide access to your Fleetio account from April 1 - June 30th. The one-time implementation fee of $3,000 will be due upon execution of the agreement, and the annual payment of $33,320 will be due on July 1, 2020.

Onboarding and Post-Launch Activities

Enterprise customers are assigned a dedicated Customer Success Manager (CSM). The CSM is responsible for onboarding and implementation, which includes product training and consultation. Your Customer Success Manager will review your existing data with you, to ensure it's ready to import. They will assist with all of the admin configuration and any GPS and fuel card integrations. They'll consult with you on the setup and configuration of each feature, and provide train-the-trainer education to make sure that you're ready to onboard your team.

To us, a strong partnership involves collaboration, and after initial implementation, your CSM will be proactively reaching out to you to ensure we are collaborating on four key areas:

- Delivering product functionality that meets your needs, as identified during the sales process.
- Collecting and understanding customer feedback. This is significant to the evolution of our products. We want to hear product suggestions that customers feel will increase efficiency and help meet ROI goals. Chances are, other customers will benefit from these ideas as well. Product improvements help the industry, overall.
- Ensuring the product helps you reach ROI/KPI goals. We'd like to understand the goals our customers plan to achieve using Fleetio and work closely with them to ensure we are meeting those needs.
- Best Practices by Industry. In addition to white papers on our website, we share best practices from Fleetio and other industry experts, on processes and workflows to streamline usage by industry.

Customer Success Managers assist with the growth of the fleet, feature requests, consulting, performance on the system, etc. They monitor each customer's account and reach out with suggestions for how to see more value from the Fleetio investment. They also conduct regular system reviews with their customers.

Support Services and Maintenance Includes:

1. **Online self-help tools** - Detailed documentation, videos, user guides.
2. **Live customer support** - Phone & email, customer portal for ticket tracking (average response time ~30 minutes).
3. **Ongoing development, upgrades, and maintenance** - Feature enhancements, bug fixes, functional additions, system maintenance all included at no additional cost.

Fleetio Manage - Enterprise
Software Subscription Agreement

Customer

Account Legal Name:	Town of Apex	**Billing Address:**	105 Upchurch St Apex NC 27502 United States Of America
Contact Name:	Andrew L. Havens, Town Manager		
Email Address:	drew.havens@apexnc.org	**Phone:**	919-249-3400

Company

Rarestep, Inc. d/b/a Fleetio
Attn: Legal Department
1900 2nd Avenue North, Suite 300
Birmingham, AL 35203
legal@fleetio.com

Effective Date:	Date of last signature by Customer or Company

This agreement (the "**Agreement**") is entered into by and between Rarestep, Inc., d/b/a Fleetio (the "**Company**") and Town of Apex (the "**Customer**") as of the Effective Date set forth above. In consideration of the mutual promises made herein and for other good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, Company and Customer agree as follows:

1. Services provided to customer

Company will provide the following services (collectively, “Services”):

a. License: Company shall grant Customer a nonexclusive, nontransferable license for an unlimited number of users during the term of this Agreement for the use of **Fleetio Manage**, a fleet management platform for managing Customer’s assets. Fleetio Manage shall be configured as described below:

- **Enterprise** (specific modules are listed in the attached Schedule A)

b. Configuration and Training: Customer and Company agree the **Launch Date** shall be **July 1, 2020** unless mutually agreed to be an earlier date. Company shall grant Customer access to a Fleetio Manage trial account 90 days prior to the Launch Date to complete configuration and training. Company shall provide data conversion services necessary to convert Customer’s vehicle information from a CSV file. Company shall supply Customer with a template format to which the data must adhere. Further, Company shall provide **(6) six hours** of web-based training on using the Services.

c. Hosting and Support: Company shall be responsible for the hosting, maintenance, and support of all Company-hosted software and Company-hosted equipment used to provide the Services. Company shall provide Customer with ongoing technical support for the Services by providing Customer with the support services listed below during the term of this Agreement:

- Phone, online chat, and email support provided to Customer during normal business hours (7 a.m. to 8 p.m. EST Monday to Friday, exclusive of holidays).
- Access to documentation of the Services.

d. Service Usage: All services shall be provided by Company to Customer pursuant to the Terms of Service, attached hereto as Schedule B ("Terms of Service"), which are incorporated as part of this Agreement. In the event of any conflict between this Agreement and the Terms of Service, this Agreement shall override the conflicting provisions of the Terms of Service.

Fleetio

2. Prices and payments for services

a. Configuration and Training Fees: Customer shall pay a one-time fee in the amount of **$3,000** for configuration and training services as listed in Section 1 with payment due in full upon execution of this Agreement. If Company provides Customer with on-site training or consulting, Company shall invoice Customer for reimbursement of the reasonable travel and per day expenses of each trainer or consultant following the performance of any such on-site services. Customer shall pay such invoice within fifteen (30) days.

b. Service Fees: Customer shall pay Company the recurring Service Fees listed below beginning on July 1, 2020 for the license, hosting, and support services listed in Section 1, plus applicable sales or value added tax (based on Customer's address). Payment will be invoiced on July 1, 2020 and will apply to the next 12 months of service. Payment will be due within 30 days of invoice being issued.

Initial Tier	Initial Pricing
Enterprise 600 (Manage up to 600 assets)	List price: $33,320 per year

Payment Frequency	Payment Method
Annual payments	Invoice

The amount of the recurring Service Fees listed in the table above is applicable until Customer upgrades to a higher asset count tier or the end of the Initial Term, whichever occurs first. If Customer desires to upgrade to a higher asset count tier, Customer shall be presented with the pricing for the next applicable tier and be able to upgrade within the product interface. For each Renewal Term, Customer shall be charged the then current list pricing applicable for Customer's then current asset count tier at the beginning of such Renewal Term.

c. Past Due Payments: Company shall be entitled to block Customer's access to the Services without terminating this Agreement or affecting Customer's obligation to make payments under this Agreement if Customer is more than thirty (30) days delinquent on any undisputed fees.

Fleetio

3. Term and termination

The Initial Term of this Agreement shall commence on the Effective Date and shall continue for **12 Months** from the Launch Date unless earlier terminated as provided herein. After the expiration of the Initial Term, this Agreement will be automatically renewed for successive one-year Renewal Terms unless either party gives written notice to the other party of its intent not to renew at least ninety (90) days prior to the expiration of the then current term.

In the event either party has failed to substantially cure any material default or failure of performance under this Agreement within thirty (30) days after the breaching party's receipt of a written notice describing with reasonable specificity such alleged material default or failure of performance, then the non-breaching party may terminate this Agreement for cause by giving the breaching party a written notice of termination within fifteen (15) days after the expiration of the said thirty (30) day period.

If i) Customer terminates this Agreement before the end of the then-current term without cause, or ii) Company terminates this Agreement for cause (which includes a failure to pay any undisputed fees when due), then Customer will pay to Company and Company agrees to accept from Customer, as mutually negotiated liquidated damages and not as a penalty, seventy-five percent (75%) of the total service fees that would have accrued over the remainder of the then-current term of the Agreement, if such early termination had not occurred. The parties have bargained for and agreed to this provision, deeming it adequate and reasonable compensation for the damages and injuries suffered by Company because of such termination and giving consideration that calculating the actual damages from an early termination is impractical given the nature of a fast-growing software business. The liquidated damages agreed to by the parties are the best reasonable estimate of actual losses which would be suffered by Company based on its ability to adjust staffing and capital outlays, the length of the term of the Agreement, the evolving nature of the Services and other factors. Customer shall pay such sum to Company within thirty (30) days of such early termination and failure to timely pay such sum shall constitute a breach of this Agreement and such sum shall be recoverable, along with attorney's fees and costs, in any court of competent jurisdiction.

4. General

Customer consents to Company's use of Customer's name in Company's marketing and other materials and to announcing the execution of this Agreement.

The services ordered with this Agreement may be in addition to other subscriptions and services previously ordered by Customer. This Agreement, all schedules and attachments, including the Terms of Service incorporated by reference, collectively represent the complete agreement and understanding between Company and Customer with respect to the subject matter herein and supersede any other written or oral agreement. This Agreement may only be modified in writing and must be signed by Company and Customer. This Agreement may be executed with facsimile signatures and in multiple counterparts, and each of such counterparts shall constitute one and the same original agreement.

Customer acknowledges that 1) the pricing and terms contained in this Agreement are confidential information, 2) such information should not be shared with any third party other than Customer's employees, Customer's agents, or governmental authorities who have a reasonable need for this information, and 3) any disclosure not permitted by this Agreement shall be considered a breach of this Agreement by Customer.

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Fleetio

Customer

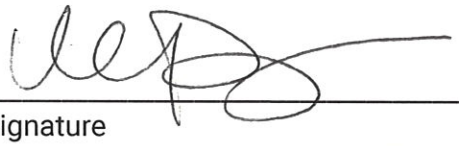
Signature

Date

Name

Title

Company



Signature

Date

Will Yarbrough

Name

Sales Director

Title

Schedule A

Fleetio Manage - Enterprise

Fleetio Manage Enterprise includes the following features*:

- Asset Profiles
- Service Entries
- Fuel Entries
- Vendors
- Issues & Defects Management
- User Permissions
- Fuel Card Integrations
- Import Data
- Work Orders
- Inventory Management
- Inspections Module
- SAML
- Service Reminders
- VIN Lookups
- Contacts
- Renewal Reminders
- Custom Fields
- Group Management
- Standard & Advanced GPS Integrations
- API Access
- Parts
- Purchase Orders
- Maintenance Shop Network Integration
- Custom Branding

** Customer acknowledges that modules listed above may be appended, modified, or replaced by the Company throughout the term of this Agreement as necessary to continue the never-ending evolution of the product. However, in no case, will such changes materially reduce the level of functionality available to Customer.*

Fleetio

Schedule B

Terms of Service

Last updated on May 9, 2018

THESE TERMS OF SERVICE ARE THE LEGALLY BINDING CONTRACT BETWEEN YOU AND RARESTEP, INC., AND GOVERN YOUR ACCESS TO ANY SERVICES WE PROVIDE TO YOU. PLEASE READ THESES TERMS CAREFULLY BEFORE SIGNING UP FOR OR USING THE SERVICES.

Rarestep, Inc. (“we”, “us”, or “our”) provide services (“Service”) to you (“you” or “your”) through our websites and through our mobile apps. By using the Service, you are agreeing to be bound by these terms and conditions (“Terms of Service”).

You represent and warrant that you have the full right and power to enter into and fully perform this agreement in accordance with these Terms of Service. If you are using the Service on behalf of a company or other legal entity, you represent and warrant that you have the authority to bind that company or other legal entity to these Terms of Service and, in such event, “You” will refer and apply to that company or other legal entity.

ACCOUNT TERMS

- You must be 13 years or older to use this Service.
- If you are between the ages of 13 and 18 then you must have a parent assist in registering for an account for the Service.
- You must be a human. Accounts registered by “bots” or other automated methods are not permitted.
- You must provide your full legal name, the legal name of your business (where applicable), a valid e-mail address, and any other information requested in order to complete the sign-up process. This information will be kept secure. You reserve the right to store and/or remove any personally identifiable information from your account.
- You are responsible for maintaining the security of your password. We cannot and will not be liable for any loss or damage from your failure to comply with this security obligation.

You will be solely responsible and liable for any activity that occurs within your account. In the event of any dispute between two or more parties about account ownership, you agree that we will be the sole arbiter of such dispute in our sole discretion and that our decision is final and binding.

- You can create multiple logins for a single account. However, your login may only be used by one person. A single login shared by multiple people is not permitted.
- You must not use the Service for any abusive or illegal purposes. You must not violate any laws, rules or regulations in your jurisdiction (including but not limited to copyright laws). You expressly agree and acknowledge that you will not submit information that would be a violation of your (or your employer's, as the case may be) policies, including without limitation, any data protection, privacy or security policies or any data privacy laws, rules or regulations.
- You may not attempt to modify, translate, adapt, edit, copy, decompile, disassemble, or reverse engineer any software used or provided by us in connection with the Service.
- The Service is always evolving and the form and nature of the Service may change from time to time. We reserve the right to modify the Service from time to time at any time, including adding or removing features.
- We reserve the right to access, read, preserve, and disclose any information as we reasonably believe is necessary to (i) satisfy any applicable law, regulation, legal process or governmental request, (ii) enforce the Terms of Service, including investigation of potential violations, (iii) detect, prevent, or otherwise address fraud, security or technical issues, (iv) respond to user support requests, or (v) protect our rights, property or safety as well as those of our users, customers, and the public.
- You may not do any of the following while accessing or using the Service: (i) access, tamper with, or use non-public areas of the Service, our computer systems, or the technical delivery systems of our providers; (ii) probe, scan, or test the vulnerability of any system or network or breach or circumvent any security measures; (iii) access or search or attempt to access or search the Service by any means (automated or otherwise) other than through our currently available, published interfaces; (iv) in any way use the Service to send altered, deceptive or false information; or (v) otherwise interfere with, or disrupt, (or attempt to do so), the access of any user, host or network, including, without limitation, sending a virus, overloading, flooding, spamming, mail-bombing the Service, or by scripting the creation of content in such a manner as to interfere with or create an undue burden on the Service.

TERM, BILLING AND PAYMENT

- We may grant you a limited trial period during which you will receive the Service free of charge. Thereafter, you will be charged a recurring service fee in advance of the applicable Service Period.
- Your account will be renewed automatically at the end of each Service Period until either you or we explicitly cancel the Service.
- You will be billed a non-refundable fee in advance of your applicable Service Period. There will be no refunds or credits for partial use of service, upgrade/downgrade refunds, account cancellations, or refunds for months unused with an open account. If you have any questions about charges made to your account, please contact us immediately. If the charges were made in error, we will credit your account for the appropriate amount. We have a zero tolerance policy for chargebacks. Any customer who disputes a credit card payment through a card issuer that is found to be valid will be permanently banned from the use of the Service.
- For any change in your recurring service fee, we will automatically charge your credit card or bank account that you provided or bill you via other payment methods for the new rate on your next billing cycle.
- You must provide us with accurate billing information and keep this information up to date.
- By subscribing to the Service you give us the right to charge your credit card, or bill you via other payment methods, for fees connected with the Service such as renewal fees or fees for extra services.
- We reserve the right to change prices for the Service and any connected extra services at any time upon a 30-day notice from us. Such notice may be provided at any time by posting the changes to the Service itself.
- You will pay any and all applicable international, federal, state, and local sales, use, value-added, excise, duty, and any other taxes, fees, or duties, not based on our net income, that are assessed on or as a result of the Service. Any such taxes, fees, and duties collected by us from you on behalf of a governmental agency shall not be considered a part of, a deduction from, or an offset against, payments due to us for the Service.

CANCELLATION AND TERMINATION

- You are solely responsible for properly canceling your account. You can cancel your account at any time through the Account Settings screen.

- All of your information will be immediately deleted from the Service (including our secure servers used to store your information) upon cancellation. If you want to preserve your information, you must export your information before canceling your account. Your information cannot be recovered once your account is canceled.
- Any abuse of the Service will lead to termination of your account. We reserve the right to decide what is considered abuse of the Service. If your account is terminated, your rights to use the Service will cease immediately. Termination is without prejudice to all other remedies available to us by law or under these Terms.
- All provisions of these Terms of Service relating to disclaimers of warranties, limitation of liability and remedies and damages shall survive termination.

PRIVACY

See our Privacy Policy at https://www.fleetio.com/privacy for information about our collection and use of your personally identifiable information (including Cookies). This Privacy Policy is expressly incorporated into these Terms of Service. For non-U.S. users, European Union General Data Protection Regulation (GDPR) compliance and Privacy Shield certification information can also be found in our Privacy Policy.

NO WARRANTIES OR REPRESENTATIONS

You understand and agree that the Service is provided “AS IS” and “AS AVAILABLE” and we expressly disclaim warranties of any kind, express or implied, including without limitation any warranty of accuracy, merchantability, fitness for a particular purpose, or non-infringement. We make no warranty or representation and disclaim all liability regarding the results that may be obtained from the use of the Service, the correctness or completeness of the data, the security, reliability or availability of the Service, or that the Service will meet any user’s requirements. Use of the Service is at your sole risk. Even though we use secure third party vendors and hosting partners (as detailed in our Privacy Policy) to provide the necessary hardware, software, networking, storage, and related technology required to run the Service, you understand and agree that you will be solely responsible for any damage to you (including loss of data) resulting from the use of the Service. The entire risk arising out of use, security, or performance of the Service remains with you. Without limiting the foregoing, the Service is not designed or licensed for use in hazardous environments requiring fail-safe controls.

The above disclaimer applies to any damages, liability or injuries caused by any failure of the performance, error, omission, interruption, deletion, defect, delay in operation or transmission, computer virus, communication line failure, theft or destruction of or unauthorized access to, alteration of, or use the Service, whether for breach of contract, tort, negligence or any other cause of action.

LIMITATIONS OF LIABILITY

IN NO EVENT WILL WE OR OUR SUBSIDIARIES, AFFILIATES, SHAREHOLDERS, OFFICERS, EMPLOYEES, AGENTS, PARTNERS AND LICENSORS BE LIABLE FOR LOST PROFITS OR ANY OTHER DAMAGES, INCLUDING WITHOUT LIMITATION ANY DIRECT, INDIRECT, CONSEQUENTIAL, SPECIAL, EXEMPLARY, INCIDENTAL, OR PUNITIVE DAMAGES ARISING OUT OF, BASED ON, OR RESULTING FROM THIS CONTRACT OR ARISING FROM OR CONNECTED IN ANY WAY WITH YOUR USE OF OR INABILITY TO USE THE SERVICE, OR FOR ANY CLAIM BY ANY OTHER PARTY, EVEN IF WE HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

THE EXCLUSION OF DAMAGES UNDER THIS SECTION IS INDEPENDENT OF YOUR EXCLUSIVE REMEDY AND SURVIVES IN THE EVENT SUCH REMEDY FAILS OF ITS ESSENTIAL PURPOSE OR IS OTHERWISE DEEMED UNENFORCEABLE. THESE LIMITATIONS AND EXCLUSIONS APPLY WITHOUT REGARD TO WHETHER THE DAMAGES ARISE FROM (1) BREACH OF CONTRACT, (2) BREACH OF WARRANTY, (3) NEGLIGENCE, OR (4) ANY OTHER CAUSE OF ACTION, TO THE EXTENT SUCH EXCLUSION AND LIMITATIONS ARE NOT PROHIBITED BY APPLICABLE LAW.

IF YOU ARE DISSATISFIED WITH THE SERVICE, YOU DO NOT AGREE WITH ANY PART OF THIS CONTRACT, OR YOU HAVE ANY OTHER DISPUTE OR CLAIM WITH OR AGAINST US WITH RESPECT TO THIS CONTRACT OR THE SERVICE, THEN YOUR SOLE AND EXCLUSIVE REMEDY IS TO DISCONTINUE USING THE SERVICE. THIS LIMITATION OF RELIEF IS A PART OF THE BARGAIN BETWEEN THE PARTIES.

In the event that, notwithstanding the foregoing disclaimers and indemnification, we are found responsible to you for any reason whatsoever, our responsibility shall be limited to the amounts actually paid by you for the Service during the twelve (12) months immediately preceding such event, and shall not include punitive damages or consequential or resulting damages of any nature.

Fleetio

INTELLECTUAL PROPERTY

All information that you post to the Service must comply with applicable copyright laws. We claim no intellectual property rights over the material you provide to the Service when such material is tagged with personally identifiable information. We may share aggregated information that does not include personally identifiable information and we may otherwise disclose non-identifying information with third parties for industry analysis, demographic profiling, and other purposes. Any aggregated information shared in these contexts will not contain your personally identifiable information.

We give you a personal, worldwide, royalty-free, non-assignable, non-transferable, revocable, limited and non-exclusive license to use the Service. This license is for the sole purpose of enabling you to use and enjoy the benefit of the Service as provided by us, in the manner permitted by these Terms of Service.

You shall not copy, sell, transfer, distribute, publish, or assign your license to our Service in any format to any third party. In addition, you may not use the Service in any way that violates applicable federal, state, or international law, or for any unlawful purpose.

All right, title, and interest in and to the Service are and will remain the exclusive property of us (and our licensors, if applicable). The Service is protected by copyright, trademark, and other laws of both the United States of America and foreign countries.

All of the content generated by us for the Service and the software used for the Service is the property of us, our affiliates, or our suppliers, and is protected by United States of America and international copyright laws.

Nothing should be construed as granting, by implication, estoppels, or otherwise, any license or right to use any of the copyrighted works displayed or contained in the Service without our express, written consent. Nothing in these Terms of Service gives you a right to use any of our, our affiliates', or our suppliers' trade names, trademarks, service marks, logos, domain names, and other distinctive brand features.

Any feedback, comments, or suggestions you may provide regarding the Services is entirely voluntary and we will be free to use such feedback, comments or suggestions as we see fit and

without any obligation to you.

INDEMNIFICATION

You agree to indemnify, defend, and hold harmless, us and our respective officers, directors, employees, agents, licensors, representatives, and third party providers, to and from and against all claims, losses, expenses, judgment, damages and costs, and consequences of whatever nature, including reasonable attorneys' fees, from any violation of this agreement by you or your violation of any rights of a third party. We reserve the right to assume, at our sole expense, the exclusive defense and control of any matter subject to indemnification by you, in which event you will fully cooperate with us in asserting any available defenses.

CHOICE OF LAW AND LOCATION FOR RESOLVING DISPUTES

These Terms of Service shall be governed and construed in accordance with the laws of the State of Alabama, without giving effect to its conflicts of law principles and without reference to the United Nations Convention on Contracts for the International Sale of Goods, the application of which is expressly excluded. You agree that any disputes arising with us or our affiliates, subsidiaries, employees, contractors, officers, directors, or third party providers from or related to these Terms of Service or your access to or use of the Service shall be resolved exclusively by binding arbitration conducted under the auspices of the American Arbitration Association in Birmingham, Alabama. You shall be responsible for initial payment of one-half of any arbitration fees, but upon final resolution, the prevailing party shall be entitled to recover its reasonable attorneys' fees and costs. However, each party retains the right to seek injunctive or other equitable relief in a court of competent jurisdiction to prevent the actual or threatened infringement, misappropriation or violation of a party's copyrights, trademarks, trade secrets, patents or other intellectual property rights.

NON-U.S. USERS

If you are in located outside the United States of America then by using the Service, you understand and consent to the processing of personally identifiable information on secure servers within the United States of America. For non-U.S. users, European Union General Data Protection Regulation (GDPR) compliance and Privacy Shield certification information can also be found in our Privacy Policy.

Fleetio

NOTICES

Any notices or other communications permitted or required of us under these Terms of Service, including those regarding modifications to these Terms of Service, will be in writing and given to you: i) by us via e-mail (to the address that you provide) or ii) by posting to the Service. For notices made by e-mail, the date of receipt will be deemed the date on which such notice is transmitt

By registering with us, you understand that we may send you communications or data from us regarding the Service, including but not limited to i) notices about your use of the Service, including any notices concerning violations of use, ii) updates, and iii) promotional information and materials regarding our products and services, via email and in-app message. We give you the opportunity to opt-out of receiving messaging from us at any time by following the opt-out instructions provided in the message.

GENERAL

If any part of these Terms of Service are determined to be invalid or unenforceable pursuant to applicable law including, but not limited to, the warranty disclaimers and liability limitations set forth above, then the invalid or unenforceable provision will be deemed superseded by a valid enforceable provision that most closely matches the intent of the original provision, and the remainder of this agreement shall continue in effect. A printed version of these Terms of Service and of any notice given in electronic form shall be admissible in judicial or administrative proceedings based upon or relating to these Terms of Service to the same extent and subject to the same conditions as other business documents and records originally generated and maintained in printed form. All rights not expressly granted herein are reserved.

No failure to exercise or enforce any right or provision of these Terms of Service shall constitute a waiver of such right or provision.

The section titles in these Terms of Service are for convenience only and have no legal or contractual effect.

You may not assign or transfer these Terms of Service, by operation of law or otherwise, without our prior written consent, which shall not be unreasonably withheld. Any attempt by you to assign or transfer these Terms of Service, without such consent, will be null and of no effect. We may assign or transfer these Terms of Service, at our sole discretion, without restriction. Subject to the foregoing, these Terms of Service will bind and inure to the benefit of the parties, their successors and permitted assigns.

Any claim related to this contract or the Service must be brought within one year. The one-year period begins on the date when the claim first could be filed. If it is not, then that claim is permanently barred. This applies to you and your successors. It also applies to us and our successors and assigns.

Neither party shall be responsible for any failure to perform or delay in performing any of its respective obligations under these Terms of Service, except for payment obligations, where and to the extent that such a failure or delay results from causes beyond the control of such party. Such causes shall include, without limitation, delays caused by the other party, failures caused by a third-party service, acts of God or of the public enemy, acts of the government in its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, freight embargoes, strikes, civil commotion, or the like.

These Terms of Service are the entire and exclusive understanding and agreement between you and us regarding the Service and these Terms of Service supersede and replace any and all prior oral or written understandings or agreements between you and us regarding the Service.

QUESTIONS

If you have any questions about these Terms of Service, please contact us.

Schedule C

STATE OF NORTH CAROLINA ADDENDUM TO SOFTWARE SUBSCRIPTION AGREEMENT

COUNTY OF WAKE

This Addendum to Software Subscription Agreement (the or this **"Addendum"**) is made and entered into this 12th day of December, 2019 by and between the Town of Apex, a municipal corporation of the State of North Carolina, ("hereinafter Customer") and Rarestep, Inc., d/b/a Fleetio, an Alabama company with its principal offices located at 1900 2nd Avenue North, Suite 300, Birmingham, AL 35203 (hereinafter "Company"). Customer and Company are sometimes hereinafter referred to collectively as the "Parties."

W I T N E S S E T H

WHEREAS, the Parties entered into an agreement entitled, "Fleetio Manage-Enterprise Software Subscription Agreement" (the **"Agreement"**) which incorporated certain "Terms of Service" through a web based link; and

WHEREAS, the Parties desire to modify certain provisions of the Agreement and Terms of Service; and

NOW, THEREFORE, in consideration of the foregoing, the Parties do hereby agree to amend the Agreement and Terms of Service as follows:

AGREEMENT:

1. **Term and Termination**. Section 3 is hereby modified to appear as follows:

> The Initial Term of this Agreement shall commence on the Effective Date and shall continue for **12 Months** from the Launch Date unless earlier terminated as provided herein. After the expiration of the Initial Term, this Agreement may be renewed for optional one-year Renewal Terms upon agreement of the parties. If either party does not wish to extend the agreement at the end of the Initial Term or an applicable Renewal Term, such party shall provide written notice to the other party of its intent not to renew at least ninety (90) days prior to the expiration of the then current term.
>
> In the event either party has failed to substantially cure any material default or failure of performance under this Agreement within thirty (30) days after the breaching party's receipt of a written notice describing with reasonable specificity such alleged material default or failure of performance, then the non- breaching party may terminate this Agreement for cause by giving the breaching party a

written notice of termination within fifteen (15) days after the expiration of the said thirty (30) day period.

2. **General**. The first sentence of Section 4 is hereby modified as follows:

> Customer does not consent to Company's use of Customer's name in Company's marketing and other materials but does consent to use of Customer's name in announcing the execution of this Agreement.

The following sentence is hereby added to the last paragraph in Section 4:

> Notwithstanding anything to the contrary in this paragraph or this Agreement, Chapter 132 of the North Carolina General Statutes governs the release of any information determined to be a public record and shall control in this Agreement without penalty or liability to either party, provided Company receives prompt notice of the request and Customer works in good faith to minimize disclosure permitted by the statute. Release, retention or copying of any document or information consistent with North Carolina law shall not be a breach of this Agreement.

3. **Miscellaneous.** The following Section is added to the Agreement as follows:

5. Miscellaneous

E-Verify. Company shall comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes (E-Verify). Company shall require all of its subcontractors for this Agreement to comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes (E-Verify).

Anti-Human Trafficking. Company warrants and agrees that no labor supplied by the Company or, to the best of Company's knowledge, the Company's subcontractors, in the performance of this Agreement shall be obtained by means of deception, coercion, intimidation or force, or otherwise in violation of North Carolina law, specifically Article 10A, Subchapter 3 of Chapter 14 of the North Carolina General Statutes, Human Trafficking.

Non-Appropriation. Company acknowledges that Customer is a governmental entity, and the contract validity is based upon the availability of public funding under the authority of its statutory mandate. In the event that public funds are unavailable and not appropriated for the performance of Customer's obligations under this contract, then this contract shall automatically expire without penalty to the Customer upon written notice to Company advising of the unavailability and non-appropriation of public funds. It is expressly agreed that the Customer shall not activate this non-appropriation provision for its convenience or to circumvent the requirements of this contract but only as a necessary fiscal measure.

Constitutional Limitation on Town Indemnification. The parties acknowledge and understand that an unlimited indemnification by the Town (Customer) constitutes a violation of the North Carolina Constitution, and is void and unenforceable by operation of law. Any indemnifications given by the Customer to any party under the Agreement shall be deemed to be given only to the fullest extent allowed by law.

Data. Company and Customer agree that all data submitted, entered, or otherwise provided by Customer in use of the Software is owned and possessed in whole by Customer. Notwithstanding the foregoing, Company may share aggregated information that does not include personally identifiable information and Company may otherwise disclose non-identifying information with third parties for industry analysis, demographic profiling, and other purposes. However, any aggregated information shared in these contexts will not contain your personally identifiable information.

TERMS OF SERVICE:

The Terms of Service, as linked to in the Agreement, are modified as follows. Any sections not noted below will remain in full force and effect:

TERM, BILLING AND PAYMENT

2. This account will not be renewed automatically.
4. Deleted.
7. We reserve the right to change prices for the Service and any connected extra services before the beginning of any Renewal Term. If you choose to renew the Service, we will invoice you at the then current pricing.

NO WARRANTIES OR REPRESENTATIONS

The second paragraph of this Section is modified as follows:

> To the extent permitted by law, the above disclaimer applies to any damages, liability or injuries caused by any failure of the performance, error, omission, interruption, deletion, defect, delay in operation or transmission, computer virus, communication line failure, theft or destruction of or unauthorized access to, alteration of, or use the Service, whether for breach of contract, tort, negligence or any other cause of action.

INDEMNIFICATION

This Paragraph is Intentionally Deleted.

Fleetio

CHOICE OF LAW AND LOCATION FOR RESOLVING DISPUTES

All matters relating to these Terms of Service shall be governed by the laws of the State of North Carolina, without regard to its choice of law provisions, and venue for any action relating to these Terms of Service shall be Wake County Civil Superior Court or the United States District Court for the Eastern District of North Carolina.

GENERAL

The fifth paragraph in this Section is deleted in its entirety.

Nothwithstanding anything to the contrary in the Agreement or the Terms of Service and in the event of any conflict between the terms of the Agreement or the Terms of Service and this Addendum, this Addendum shall control.

IN WITNESS WHEREOF, the Parties have entered into this Addendum effective the date written above.

TOWN OF APEX (CUSTOMER)

[SEAL]

By:_____
Andrew L. Havens, Town Manager

Attest:

_____
Donna B. Hosch, Town Clerk, CMC

RARESTEP, INC. D/B/A FLEETIO (COMPANY)

By: _____

Name: Will Yarbrough

Title: Sales Director

Date: _____

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: 12-17-2019

Item Details

Presenter(s): Russell H. Dalton, PE, Senior Transportation Engineer

Department(s): Public Works & Transportation, Police, and Fire

Requested Motion

Motion to approve an Ordinance amending Section 20-164 with the addition of subsection (36) to enforce a No Parking restriction along the south side of Olive Street from S Elm Street to S Hughes Street.

Approval Recommended?

Yes

Item Details

PW&T Transportation staff were contacted by Apex United Methodist Church concerning parking along Olive Street adjacent to the church office and across the street from the church. During peak times when vehicles are parked along both sides of the street it is difficult for one vehicle to pass between and not possible to maintain two way traffic. The church representative requested parking be allowed only along the north side of the street, in which case the Town would need an ordinance to post No Parking on the south side. Apex Police and Apex Fire are in favor of this request based on observations. The request and staff input is provided as part of this agenda item. Staff recommend the posting of three (3) signs as shown in the attached map in order to enforce the proposed ordinance.

Attachments

- Ordinance 20-164(36)
- Map of proposed "No Parking" zone and signs
- Request from Apex UMC with input from APD and AFD

ORDINANCE NO. 2019-1217-34

AN ORDINANCE TO AMEND SECTION 20-164 OF THE CODE OF ORDINANCES OF THE TOWN OF APEX

NOW, THEREFORE, BE IT ORDAINED by the Town Council of the Town of Apex as follows:

Section 1. Section 20-164 of the Code of Ordinances of the Town of Apex is hereby amended to add subsection (36) as follows:

Sec. 20-164. - No parking zones.

(36) Along the south side of Olive Street from S Elm Street to S Hughes Street.

Section 2. All ordinances or parts of ordinances in conflict with this ordinance are hereby repealed. If any part of this ordinance shall be adjudged invalid, such adjudication shall apply only to such part so adjudged and the remainder of the ordinance shall be deemed valid and effective.

Section 3. This ordinance shall be effective on the 17th day of December 2019.

Introduced by Council Member _____

Seconded by Council Member _____

Attest:

TOWN OF APEX, NORTH CAROLINA

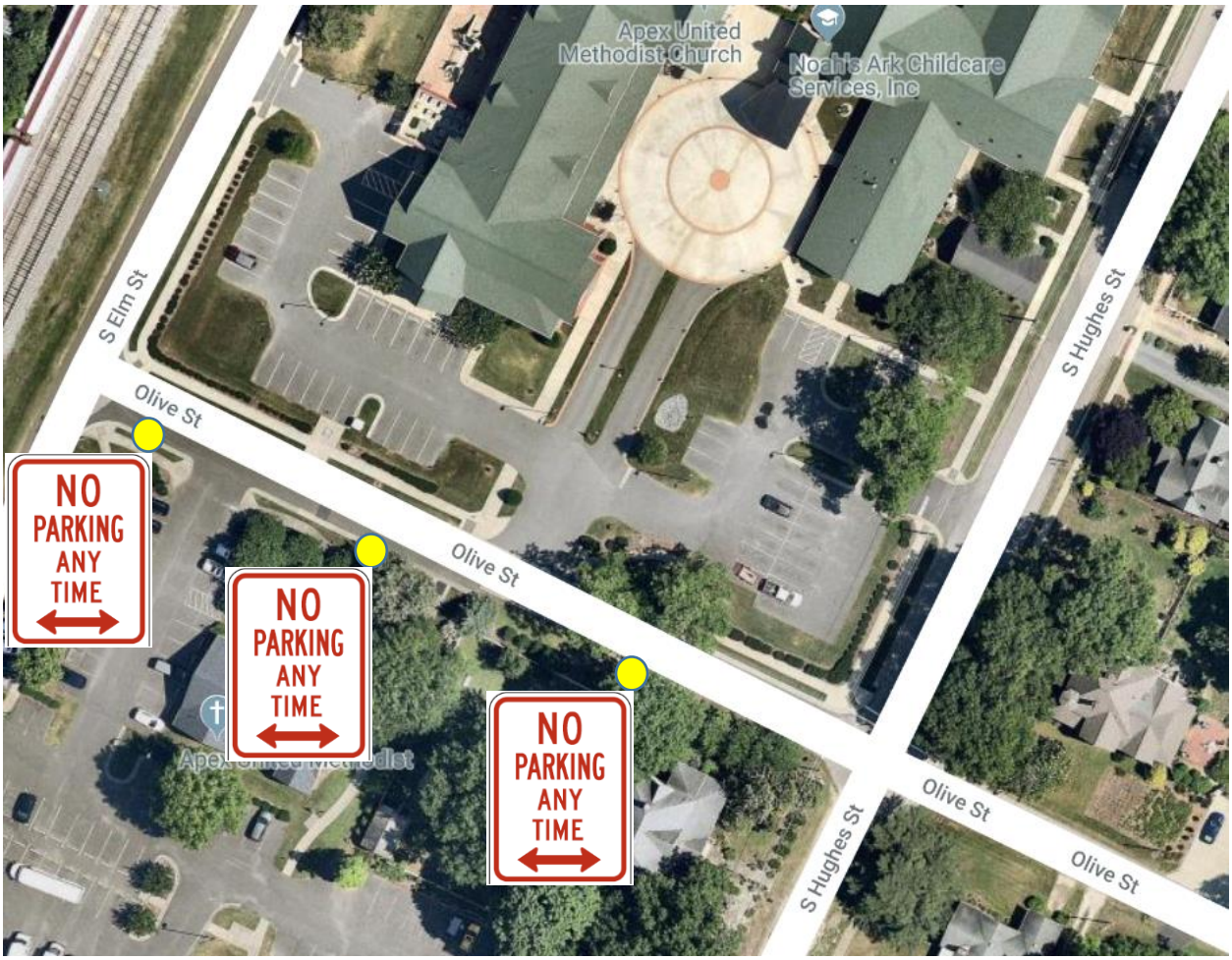
_____
Donna B. Hosch, MMC, NCCMC
Town Clerk

_____
Jacques K. Gilbert
Mayor

Approved As To Form:

_____
Laurie L. Hohe,
Town Attorney

Apex UMC “No Parking” Request for Olive Street – Dec 2019



South side of Olive St from the intersection at S Elm St to the intersection at S Hughes St, to be signed as “No Parking.”

Russell Dalton

From: David Dillon
Sent: Thursday, October 24, 2019 10:12 AM
To: Russell Dalton
Cc: Ann Stephens
Subject: RE: Apex UMC Request

Follow Up Flag: Follow up
Flag Status: Completed

Yes sir the south side close to the church office

David L Dillon FM, FO
Deputy Fire Marshal
Town of Apex
PO Box 250
Apex, NC 27502
Direct: 919.367.4062 | Main: 919.362.4001
www.apexnc.org

Smoke Alarms Save Lives - Change Your Batteries!

From: Russell Dalton
Sent: Thursday, October 24, 2019 10:01 AM
To: David Dillon
Cc: Ann Stephens
Subject: RE: Apex UMC Request

David,

Just confirming, you are asking that parking be prohibited on the south side of the street? Just making sure I understand your response before I respond to the church.

Ann,

You didn't indicate a preference so does it matter to you either way?

Thank you.

Russell H. Dalton, PE
Senior Transportation Engineer
Public Works & Transportation
Town of Apex
919-249-3358

From: Ann Stephens
Sent: Tuesday, October 22, 2019 2:16 PM
To: David Dillon <David.Dillon@apexnc.org>; Russell Dalton <Russell.Dalton@apexnc.org>
Subject: RE: Apex UMC Request

I have been through there and it is tight and vehicles are illegally parked at the intersection.

Captain Ann Stephens
Patrol Commander
(919)249-3456 – *Office*

(Pursuant to NC General Statutes Chapter 132, Public Records, this electronic mail message and any attachments hereto, as well as any electronic mail message(s) that may be sent in response to it may be considered public record and as such are subject to request and review by anyone at any time.)

From: David Dillon
Sent: Tuesday, October 22, 2019 2:06 PM
To: Russell Dalton <Russell.Dalton@apexnc.org>; Ann Stephens <Ann.Stephens@apexnc.org>
Subject: RE: Apex UMC Request

Yes response has been hampered on Sundays, an incident I can recall is when the heat was turned on the first time of the year causing a burning smell in the church during Sunday services, I agree no parking on the side of Olive closest to the church office would enhance our response capabilities.

Thanks
David

David L Dillon FM, FO
Deputy Fire Marshal
Town of Apex
PO Box 250
Apex, NC 27502
Direct: 919.367.4062 | Main: 919.362.4001
www.apexnc.org

Smoke Alarms Save Lives - Change Your Batteries!

From: Russell Dalton
Sent: Wednesday, September 25, 2019 1:49 PM
To: David Dillon; Ann Stephens
Subject: FW: Apex UMC Request

Have emergency vehicles had a history of problems in trying to access this block of Olive Street described below? Since it's in the grid and there are multiple parking lot access points and ways around that block I'm wondering if parking during peak church times significantly affects emergency response. It may be inconvenient during peak times, but I'd need more justification from PD and FD to pursue this. Please let me know what your departments have experienced out there and if there's good justification for limiting parking to one side based on emergency response. Most of this block is the typical minimum 27' b-b curb standard except the 25% of frontage on the southeast end where we still have grass shoulder

section.



Russell H. Dalton, PE
Senior Transportation Engineer
Public Works & Transportation
Town of Apex
919-249-3358

From: Kate Shoffner [mailto:kate.shoffner@apexumc.org]
Sent: Wednesday, September 25, 2019 11:23 AM
To: Russell Dalton <Russell.Dalton@apexnc.org>; Jessica Bolin <jessica.bolin@gmail.com>; Laura Johnson <laura.johnson@apexumc.org>
Subject: Apex UMC Request

Notice: This message is from an external sender.
Do not click links or open attachments unless you trust the sender, and can verify that the content is safe.

Hey Russ!

I am sending this email on behalf of Apex United Methodist Church to ask if there is a potential to add some no parking signage or line painting on our campus along Olive Street. Our goal is to stop street parking along Olive Street from Elm St to Hughes St on the side of the street that is not on the church side.

We have struggled to find a solution to stop parking on both sides of the street on Sunday mornings as it makes it a tight squeeze to pass and certainly would create a problem for emergency vehicles. Almost two years ago we purchased small no parking sandwich board signs that our team puts out on Sunday mornings. Over time they have been run over, worn out and stolen and we are making this request in the hope of finding a permanent solution with the town.

Our preference is to have the street painted along this whole block on that side of the street to designate no parking. Signs would be our second choice. We own half of the street frontage on this stretch of the block and the other half is a privately owned residence so the street painting would prevent signage installation on their property.

We can help with costs if needed. We are just trying to find a permanent solution to the problem. Let me know if you need additional information from me regarding this request.

Much thanks!
Kate Shoffner
Operations Director
Apex UMC
919-362-7807

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Marty Stone, Assistant Town Manager

Department(s): Administration

Requested Motion

Motion to adopt a Resolution to "*Abandon portions of Existing Public Utility Easements*" as shown on its attached plat

Approval Recommended?

The Planning Department recommends approval.

Item Details

The developer has determined that corrections to the Center Street Station Plat are necessary due to the actual construction not matching the recorded plat on certain lots. The additions for new easement areas are sufficiently dedicated through the recording of the new plat at the Wake County Register of Deeds. Abandonment of easement areas previously dedicated by plat require a resolution passed by Town Council to effectively abandon them.

Attachments

- Resolution to Abandon Portions of Existing Public Utility Easements
- Center Street Station Plat showing new and abandoned easements

Resolution No. 2019-1217-33

A Resolution to Abandon Portions of Existing Public Utility Easements

WHEREAS, as part of the Center Street Station development, the developer dedicated by plat public utility easement interests ("Easements") to the Town as shown on Book of Maps 2019, Pages 818-824; and

WHEREAS, in the course of construction it was determine that the location of certain Easements dedicated by plat were inaccurate; and

WHEREAS, the developer desires to correct the location of the Easements by the dedication of new public utility easements designated as "New TOAPUE" on the survey attached hereto as Exhibit A (Sheet 2 of 3); and

WHEREAS, the developer desires the Town to abandon those certain areas of land designated as "To Be Abandoned TOAPUE" on the attached Exhibit A (Sheet 3 of 3), which shows 15 areas of PUE to be abandoned (the "Abandoned Portions of Easements ") as follows:

1. A1: 42 sf to be abandoned between Lots #44 and #45.
2. B1: 66 sf to be abandoned between Lots #42 and #43;
3. C1: 49 sf to be abandoned on Lot #30;
4. D1: 37 sf to be abandoned on Lot #29;
5. E1: 88 sf to be abandoned on Lot #13;
6. F1: 3 sf to be abandoned on Lot #15;
7. G1:19 sf to be abandoned on Lot #16;
8. H1: 36 sf to be abandoned on Lot #19;
9. I1: 36 sf to be abandoned on Lot #20;
10. J1: 36 sf to be abandoned on Lot #21;
11. K1: 22 sf to be abandoned on Lot #28;
12. L1: 30 sf to be abandoned on Lot #27;
13. M1: 16 sf to be abandoned on the 10' Type 'A' Buffer adjacent to Lot #25;
14. N1: 68 sf to be abandoned on Lot #9;
15. O1: 512 sf to be abandoned across Lots #29 - #40.

WHEREAS, the Town no longer has any need of the Abandoned Portions of Easements and they have no market value;

WHEREAS, the Town Council considers it advisable to abandon the Abandoned Portions of Easements;

NOW, THEREFORE, BE IT RESOLVED by the Town Council that:

(1) The Abandoned Portions of Easements as shown on Exhibit A hereto are hereby abandoned in accordance with Paragraph (2) below.

(2) This abandonment shall be abandoned effective upon, and only upon, the recording of Exhibit A at the Wake County Register of Deeds which dedicates to the Town of Apex the areas described as "New TOAPUE" on Exhibit A.

(3) The easements described as "New TOAPUE" on Exhibit A are hereby accepted by the Town of Apex upon recording of the plat at the Wake County Register of Deeds in accordance with Paragraph (2) above.

Upon motion duly made by Council Member_____ , and duly seconded by Council Member _____, the above Resolution was duly adopted by the Apex Town Council at the meeting held on the 17th day of December, 2019, in the Apex Town Hall.

Upon call for a vote the following Council Members voted in the affirmative:

_____

_____

_____

and the following Council Members voted in the negative:

_____

_____

_____

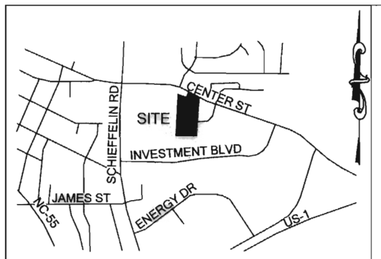
This the 17th day of December, 2019.

TOWN OF APEX

_____
Jacques K. Gilbert, Mayor

ATTEST:

_____
Donna B. Hosch, Town Clerk, MMC, NCCMC



VICINITY MAP NOT TO SCALE

SITE DATA:
LOT 40 AREA: 2,340 SF / 0.05 AC
TOTAL SITE MAXIMUM DENSITY: 74%
TOTAL SITE RCA PROVIDED: 2.29 AC / 30%
TOTAL SITE IMPERVIOUS: 37%
ALLOWABLE SITE IMPERVIOUS: 60%

REFERENCES
-BOOK MAP 2006 PAGE 981
-BOOK MAP 2019 PAGE 818-824
-DEED BOOK 16873 PAGE 2688
-DEED BOOK 17452 PAGE 1476

GENERAL NOTES
1. This survey was prepared by Bateman Civil Survey Company, under the supervision of Jeffrey W. Baker, pls.
2. This plan has been prepared for layout and permitting purposes only.
3. Field equipment used: Trimble total station.
4. All distances are horizontal ground distances unless otherwise noted.
5. No grid monuments found within 2000'.
6. This survey was prepared without the benefit of a title report and is subjected to any matters that a full title search would disclose.
7. The purpose of this plat is to move the utility easements on lots 9, 12-37 & lots 41-44 and open space to encompass existing water meter & sewer cleanouts.

NOTE:
"All future development or redevelopment activties on this property shall be consistent with this approved plan. No changes to this plan shall be permitted without the Town of Apex's prior written approval."

Required Base Information:

Project Information: Center Street Station
327 Old Grove Lane, Apex, NC 27502
Pin# 0741897922

Owner Information: Waterford Green Communities of NC , LLC
207 W Millbrook Road #205, Raleigh, NC, 27609
704-608-1968
talsop.wgc@gmail.com

Capital Properties of Raleigh II, LLC
3724 National Dr, #220, Raleigh, NC 27612
919-618-2060
david@shenadoahhomes.us

Surveyor Information: Jeffrey W. Baker
North Carolina L-4412

Date of Survey & Plat Preparation: 08/06/2019

Zoning District & Zoning Case #: HD MF-CZ Case# 16CZ28

Annexation #: 614

Building Setbacks: Front 15'
Side 0'
Building to Building 8'
Corner 15'
Rear 15'
Sign Setback: 10' from Right of Way

Township, County, State: White Oak, Wake, North Carolina

Primary or Secondary Watershed: Secondary - Middle Creek Basin

FEMA designated floodplain: 'X' per National Flood Insurance Program Flood Insurance Rate Map #3720074100J &, Rate Map #3720074200J dated May 2, 2006

"I, certify this plat was drawn (under my supervision) from an actual (survey made under my supervision); that the boundaries not surveyed are clearly indicated as drawn from information found in Deed Book 17452, Page 1476 and Book of Maps 2019, page 818 ; that the ratio of precision as calculated is 1:10000+; that this plat was prepared in accordance with G.S. 47-30 as amended. Witness my original signature, registration number and seal this day 28 of October, in the year 2019.

Jeffrey W. Baker, PLS L-4412 *10/28/19 date*

I, Jeffrey W. Baker, Professional Land Surveyor No. L-4412 certify D. That the survey is of another category, such as the recombination of existing parcels, a court-ordered survey, or other exceptions to the definition of subdivision.

Jeffrey W. Baker, PLS L-4412 *10/28/19 date*

"I hereby certify that I am the owner of the property shown and described herein, and all sheets related hereto, which is located in the subdivision jurisdiction of the Town of Apex, and that I hereby adopt this plan of subdivision with my free consent, certify that this plan complies with building setback lines established by the Town of Apex Unified Development Ordinance and dedicate all streets, alleys, walks, parks and other sites and easements to public or private use as noted and will maintain the same to the standards set forth by the Town of Apex Unified Development Ordinance until the Town or Homeowners Association takes over responsibility. Furthermore, I hereby dedicate all electrical systems which are located within the municipal electric service area, sewer and water lines to the Town of Apex."

Capital Properties of Raleigh II , LLC (Lot 9 & Open Space)
10-29-19 Owner
Date

I, Zachary Daugherty a Notary Public of the County of Onslow, State of North Carolina hereby certify that David Sitlings personally appeared before me this day and under oath acknowledged that the above form was executed by him/her.
Witness my hand and seal this 29th day of October, 2019.
Zachary Daugherty
NOTARY
5/22/2023
My Commission Expires

Zachary Daugherty Notary Public Onslow County North Carolina My Commission Expires 5/22/2023

"I hereby certify that I am the owner of the property shown and described herein, and all sheets related hereto, which is located in the subdivision jurisdiction of the Town of Apex, and that I hereby adopt this plan of subdivision with my free consent, certify that this plan complies with building setback lines established by the Town of Apex Unified Development Ordinance and dedicate all streets, alleys, walks, parks and other sites and easements to public or private use as noted and will maintain the same to the standards set forth by the Town of Apex Unified Development Ordinance until the Town or Homeowners Association takes over responsibility. Furthermore, I hereby dedicate all electrical systems which are located within the municipal electric service area, sewer and water lines to the Town of Apex."

Waterford Green Communities of NC , LLC (Lots 10-45)
10-29-19 Owner
Date

I, Zachary Daugherty a Notary Public of the County of Onslow, State of North Carolina hereby certify that Todd Alsop personally appeared before me this day and under oath acknowledged that the above form was executed by him/her.
Witness my hand and seal this 29th day of October, 2019.
Zachary Daugherty
NOTARY
5/22/2023
My Commission Expires

Zachary Daugherty Notary Public Onslow County North Carolina Expires 5/22/2023

NOTE: 1) Waterford Green Communities of NC, LLC is the sole owner of lots 10-45.
2) Capital Properties of Raleigh II, LLC is the sole owner of lot 9 & all open space.
3) All public access Easements are maintained by the HOA.
4) See sheet 3 for abandoned easements.
5) All existing easements, property lines, ROW, etc. are from BM 2019, Pgs 818-824.

SITE DATA:
Capital Properties of Raleigh II, LLC
Pin:0741898083
Reid:0468137
Easement Area: 10 sf
Pin:0742808096
Reid:0468175
Easement Area: 40 sf
Pin:0741897925
Reid:0468177
Easement Area: 10 sf

SITE DATA:
Waterford Green Communities of NC, LLC

Pin:0741898967	Pin:0741898789	Pin:0741897756
Reid:0468140	Reid:0468148	Reid:0468160
Easement Area: 16 sf	Easement Area: 17 sf	Easement Area: 22 sf
Pin:0741898973	Pin:0741898787	Pin:0741897757
Reid:0468141	Reid:0468149	Reid:0468161
Easement Area: 75 sf	Easement Area: 17 sf	Easement Area: 22 sf
Pin:0741898971	Pin:0741898785	Pin:0741897850
Reid:0468142	Reid:0468150	Reid:0468162
Easement Area: 43 sf	Easement Area: 14 sf	Easement Area: 22 sf
Pin:0741898889	Pin:0741898783	Pin:0741897852
Reid:0468143	Reid:0468151	Reid:0468163
Easement Area: 19 sf	Easement Area: 22 sf	Easement Area: 22 sf
Pin:0741898887	Pin:0741898780	Pin:0741897845
Reid:0468144	Reid:0468152	Reid:0468164
Easement Area: 23 sf	Easement Area: 22 sf	Easement Area: 22 sf
Pin:0741898885	Pin:0741899528	Pin:0741897846
Reid:0468145	Reid:0468153	Reid:0468165
Easement Area: 18 sf	Easement Area: 136 sf	Easement Area: 11 sf
Pin:0741898883	Pin:0741899508	Pin:0741896986
Reid:0468146	Reid:0468154	Reid:0468169
Easement Area: 22 sf	Easement Area: 19 sf	Easement Area: 11 sf
Pin:0741898881	Pin:0741898588	Pin:0741896977
Reid:0468147	Reid:0468155	Reid:0468170
Easement Area: 22 sf	Easement Area: 20 sf	Easement Area: 46 sf
	Pin:0741898568	Pin:0741896939
	Reid:0468156	Reid:0468172
	Easement Area: 16 sf	Easement Area: 26 sf
	Pin:0741897754	
	Reid:0468159	
	Easement Area: 16 sf	

NOTES:
1. Where Town of Apex Public Utilities are installed within easements crossing private property, the Town's Water Resources Department, Public Works and Transportation Department, and Electric Utilities Department shall have the right to enter upon the easement for purposes of inspecting, repairing, or replacing the sewer main and appurtenances. Where paved private streets, driveways, parking lots, etc. have been installed over public sewer mains, the Town of Apex shall not be responsible for the repair or replacement of pavement, curbing, etc. which must be removed to facilitate repairs. The Water Resources Department, Public Works and Transportation Department, and Electric Utilities Department shall excavate as necessary to make the repair, and shall backfill the disturbed area to approximately the original grade. Replacement of privately owned pavement, curbing, walkways, etc. shall be the responsibility of the property owner and/or Homeowner's Association.
2. All off-site easements shall be acquired by the developer and these off-site easements shall be recorded by a deed of easement prior to utility infrastructure construction approval. These easements shall be dedicated to the Town of Apex and labeled "Town of Apex Public Utility Easement".
3. No person shall place any part of a structure, any permanent equipment, or impoundment upon the Town of Apex Public Utility Easements. Prohibited structures include, but are not limited to: buildings, houses, air conditioning units, heat pump units, storage/tool sheds, swimming pools, walls, retaining wall mechanisms/appurtenances, decks, garages, and fences. Upon prior written approval by the Water Resources Department, Public Works and Transportation Department, or Electric Utilities Department, as appropriate, fences may be permitted across easements provided that an access gate is installed for the full width of the easement.
4. No person shall plant trees, shrubs, or other plants within a Town of Apex Public Utility Easement without prior written approval from the Water Resources Department, Public Works and Transportation Department, or Electric Utilities Department, as appropriate.
5. Contact the Planning Department to get a copy of the zoning conditions.

I hereby certify that all streets, utilities and other required improvements have been installed in an acceptable manner and according to Town specification and standards or that guarantees of the installation of the required improvements in an amount and manner satisfactory to the Town of Apex has been received.

Date Subdivision Administrator

Date Water Resources Director

I, _____ Review Officer of Wake County, certify that this Plat meets all statutory requirements for recording.

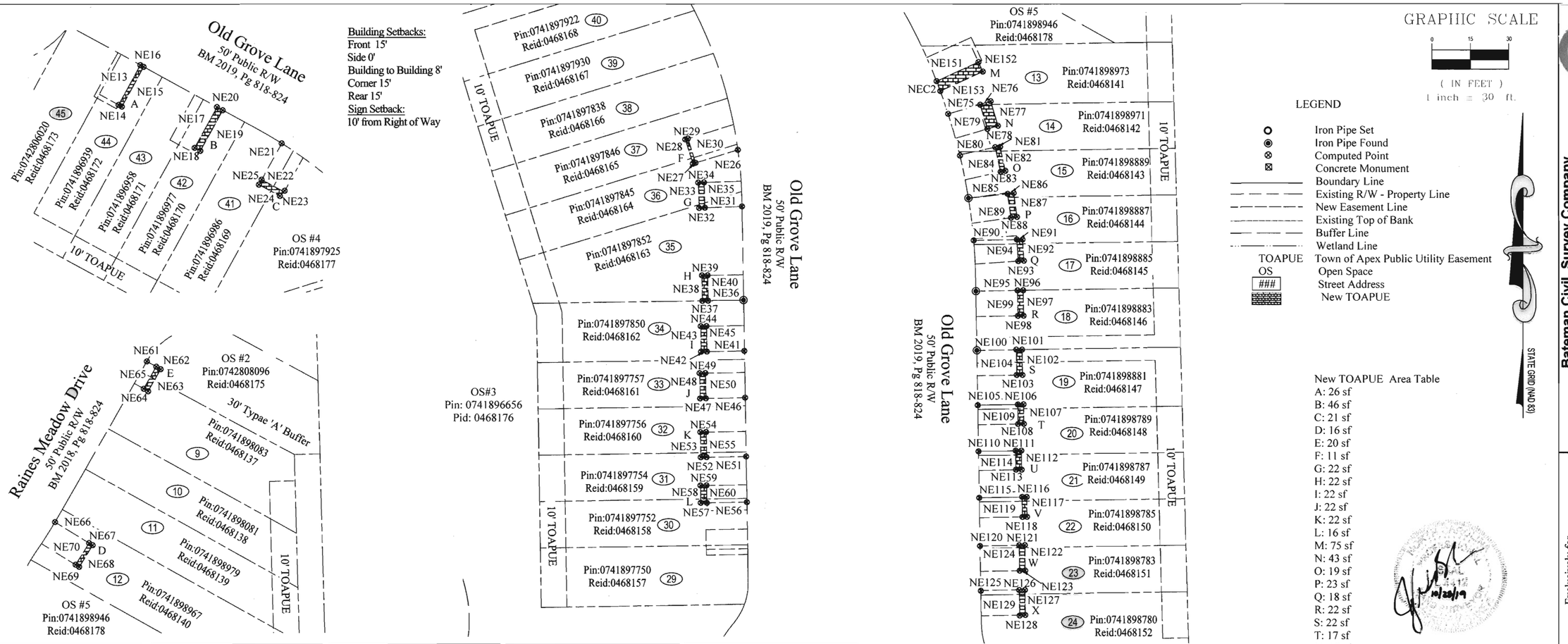
Date Review Officer
Approval expires if not recorded on or before: _____

Bateman Civil Survey Company
Engineers ● Surveyors ● Planners
2524 Reliance Ave., Apex, NC 27539
Phone: 919.577.1080 Fax: 919.577.1081
NCBELS FIRM No. C-2378

Exclusively for
Waterford Green Communities of NC, LLC
207 W Millbrook Road #205, Raleigh, NC, 27609
Capital Properties of Raleigh II, LLC
3724 National Dr, Suite 220 Raleigh, NC 27612

10' TOWN of APEX PUBLIC UTILITY EASEMENT PLAT
LOTS 9, 10-28, 30-37, 41-42 & 44 CENTER STREET STATION
APEX, NC, WAKE COUNTY, WHITE OAK TOWNSHIP

Designed By: N/A
Drawn By: JCH
Checked By: JWB
Scale:N/A
Date: 10/19/2019
Project #:190428



New Easement Line Table		
Line #	Length	Direction
NE13	17.72	S28°44'06"W
NE14	1.47	S61°15'54"E
NE15	17.72	N28°44'06"E
NE16	1.47	N61°15'54"W
NE17	18.21	S28°44'06"W
NE18	2.54	S61°15'54"E
NE19	18.21	N28°44'06"E
NE20	2.54	N61°15'54"W
NE21	16.29	S28°44'06"W
NE22	9.88	S61°15'54"E
NE23	2.28	S41°54'30"W
NE24	9.36	N61°15'54"W
NE25	2.22	N28°44'06"E
NE26	17.32	S72°44'33"W
NE27	1.07	S72°44'33"W
NE28	10.00	N17°15'27"W
NE29	1.07	N72°44'33"E
NE30	10.00	S17°15'27"E
NE31	14.54	S88°00'03"W
NE32	2.23	S88°00'03"W
NE33	10.00	N01°59'57"W
NE34	2.23	N88°00'03"E
NE35	10.00	S01°59'57"E
NE36	13.87	S89°04'48"W

New Easement Line Table		
Line #	Length	Direction
NE37	2.24	S89°04'48"W
NE38	10.00	N00°55'12"W
NE39	2.24	N89°04'48"E
NE40	10.00	S00°55'12"E
NE41	14.67	S89°04'48"W
NE42	2.23	S89°04'48"W
NE43	10.00	N00°55'12"W
NE44	2.23	N89°04'48"E
NE45	10.00	S00°55'12"E
NE46	15.39	S89°04'48"W
NE47	2.25	S89°04'48"W
NE48	10.00	N00°55'12"W
NE49	2.25	N89°04'48"E
NE50	10.00	S00°55'12"E
NE51	15.48	S89°04'48"W
NE52	2.25	S89°04'48"W
NE53	10.00	N00°55'12"W
NE54	2.25	N89°04'48"E
NE55	10.00	S00°55'12"E
NE56	15.65	S89°04'48"W
NE57	2.37	S89°04'48"W
NE58	6.89	N00°55'12"W
NE59	2.37	N89°04'48"E
NE60	6.89	S00°55'12"E

New Easement Line Table		
Line #	Length	Direction
NE61	4.22	S60°30'50"E
NE62	2.00	S60°30'50"E
NE63	10.00	S29°29'10"W
NE64	2.00	N60°30'50"W
NE65	10.00	N29°29'10"E
NE66	15.67	S58°11'50"E
NE67	1.63	S58°11'50"E
NE68	10.00	S31°48'10"W
NE69	1.63	N58°11'50"W
NE70	10.00	N31°48'10"E
NE75	13.02	N73°29'28"E
NE76	4.31	N73°29'28"E
NE77	10.00	S16°30'32"E
NE78	4.31	S73°29'28"W
NE79	10.00	N16°30'32"W
NE80	14.18	N77°44'57"E
NE81	1.89	N77°44'57"E
NE82	10.00	S12°15'03"E
NE83	1.89	S77°44'57"W
NE84	10.00	N12°15'03"W
NE85	15.40	N83°41'58"E
NE86	2.38	N83°41'58"E
NE87	9.50	S07°54'44"E
NE88	2.38	S82°05'16"W

New Easement Line Table		
Line #	Length	Direction
NE89	9.57	N07°54'44"W
NE90	16.90	N89°04'48"E
NE91	2.19	N89°04'48"E
NE92	8.37	S03°43'43"E
NE93	2.19	S86°16'17"W
NE94	8.48	N03°43'43"W
NE95	16.31	N89°04'48"E
NE96	2.22	N89°04'48"E
NE97	10.00	S00°55'12"E
NE98	2.22	S89°04'48"W
NE99	10.00	N00°55'12"W
NE100	15.44	N89°04'48"E
NE101	2.23	N89°04'48"E
NE102	10.00	S00°55'12"E
NE103	2.23	S89°04'48"W
NE104	10.00	N00°55'12"W
NE105	15.67	N89°04'48"E
NE106	2.22	N89°04'48"E
NE107	7.72	S00°55'12"E
NE108	2.22	S89°04'48"W
NE109	7.72	N00°55'12"W
NE110	14.53	N89°04'48"E
NE111	2.23	N89°04'48"E
NE112	7.49	S00°55'12"E

New Easement Line Table		
Line #	Length	Direction
NE113	2.23	S89°04'48"W
NE114	7.49	N00°55'12"W
NE115	16.78	N89°04'48"E
NE116	1.78	N89°04'48"E
NE117	7.87	S00°55'12"E
NE118	1.78	S89°04'48"W
NE119	7.87	N00°55'12"W
NE120	15.32	N89°04'48"E
NE121	2.21	N89°04'48"E
NE122	10.00	S00°55'12"E
NE123	2.21	S89°04'48"W
NE124	10.00	N00°55'12"W
NE125	15.06	N89°04'48"E
NE126	2.19	N89°04'48"E
NE127	10.00	S00°55'12"E
NE128	2.19	S89°04'48"W
NE129	10.00	N00°55'12"W
NE130	4.16	S00°55'12"E
NE131	10.00	N89°04'48"E
NE133	10.00	S89°04'48"W
NE134	1.65	N00°55'12"W
NE135	16.01	S00°55'12"E
NE136	8.59	N89°04'48"E
NE138	8.59	S89°04'48"W

New Easement Line Table		
Line #	Length	Direction
NE140	15.96	S00°55'12"E
NE141	8.13	N89°04'48"E
NE143	8.13	S89°04'48"W
NE144	2.36	N00°55'12"W
NE145	18.49	S00°55'12"E
NE146	10.00	N89°04'48"E
NE147	15.04	N00°55'12"W
NE148	5.46	S89°04'48"W
NE149	3.45	N00°55'12"W
NE150	4.54	S89°04'48"W
NE151	18.00	N65°31'57"E
NE152	4.12	S24°28'03"E
NE153	18.27	S65°31'57"W

New Easement Curve Table						
Curve #	Length	Radius	Delta	Direction	Chord	Tangent
NEC2	4.13	225.00	001°03'06"	N20°43'03"W	4.13	2.06

NOTE: 1) Waterford Green Communities of NC, LLC is the sole owner of lots 10-45.
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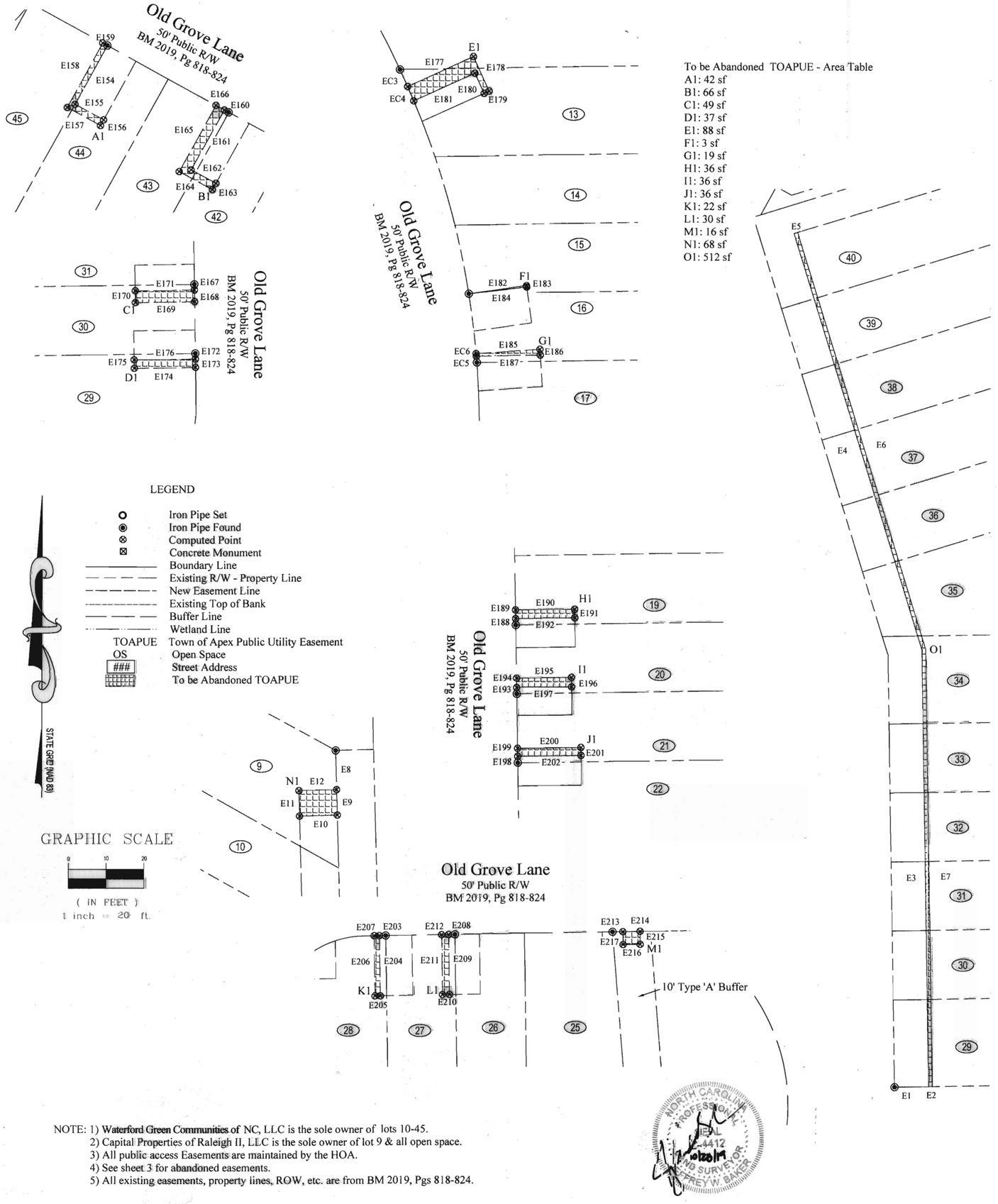
Bateman Civil Survey Company
Engineers ● Surveyors ● Planners
2524 Reliance Ave., Apex, NC 27539
Phone: 919.577.1080 Fax: 919.577.1081
NCBELS FIRM No. C-2378

Exclusively for
Waterford Green Communities of NC, LLC
207 W Millbrook Road #205, Raleigh, NC, 27609
Capital Properties of Raleigh II, LLC
3724 National Dr, Suite 220 Raleigh, NC 27612

10' TOWN of APEX PUBLIC UTILITY EASEMENT PLAT
LOTS 9, 10-28, 31-37, 41-42 & 44 CENTER STREET STATION
APEX, NC, WAKE COUNTY, WHITE OAK TOWNSHIP

Designed By: N/A
Drawn By: JCH
Checked By: JWB
Scale: 1"=30'
Date: 10/19/2019
Project #:190428

SHEET
2 OF 3



Abandoned Easement Curve Table						
Curve #	Length	Radius	Delta	Direction	Chord	Tangent
EC3	4.95	225.00	001°15'35"	S24°25'17"E	4.95	2.47
EC4	4.12	225.00	001°02'58"	N23°16'00"W	4.12	2.06
EC5	1.68	225.00	000°25'38"	N04°36'46"W	1.68	0.84
EC6	0.69	225.16	000°10'32"	N04°54'51"W	0.69	0.34

Abandoned Easement Line Table		
Line #	Length	Direction
E1	10.00	N89°04'48"E
E2	1.00	S89°04'48"W
E3	116.27	N00°55'12"W
E4	115.88	N17°05'38"W
E5	1.00	N72°44'33"E
E6	116.02	S17°05'38"E
E7	116.42	S00°55'12"E
E8	10.39	S01°30'52"E
E9	6.79	S01°30'52"E
E10	10.00	S88°29'08"W
E11	6.79	N01°30'52"W
E12	10.00	N88°29'08"E
E154	17.72	S28°44'06"W
E155	8.61	S61°15'54"E
E156	1.73	S28°44'06"W
E157	10.00	N61°15'54"W
E158	19.45	N28°44'06"E
E159	1.39	S61°15'54"E
E160	1.34	N61°15'54"W
E161	18.21	S28°44'06"W
E162	7.46	S61°15'54"E
E163	1.94	S28°44'06"W
E164	10.00	N61°15'54"W
E165	20.15	N28°44'06"E
E166	2.54	S61°15'54"E
E167	1.50	S00°55'12"E
E168	3.11	S00°55'12"E
E169	15.65	S89°04'48"W
E170	3.11	N00°55'12"W
E171	15.65	N89°04'48"E
E172	1.50	S00°55'12"E
E173	2.26	S00°55'12"E
E174	16.20	S89°04'48"W
E175	2.26	N00°55'12"W
E176	16.20	N89°04'48"E
E177	19.12	N65°31'57"E
E178	10.00	S24°28'03"E
E179	1.46	S65°31'57"W

Abandoned Easement Line Table		
Line #	Length	Direction
E180	5.88	N24°28'03"W
E181	17.75	S65°31'57"W
E182	15.39	N82°05'16"E
E183	0.43	S07°54'44"E
E184	15.40	S83°41'58"W
E185	16.89	N86°16'17"E
E186	1.52	S03°43'43"E
E187	16.90	S89°04'48"W
E188	1.67	N00°55'12"W
E189	2.28	N00°55'12"W
E190	15.67	N89°04'48"E
E191	2.28	S00°55'12"E
E192	15.67	S89°04'48"W
E193	1.67	N00°55'12"W
E194	2.51	N00°55'12"W
E195	14.53	N89°04'48"E
E196	2.51	S00°55'12"E
E197	14.53	S89°04'48"W
E198	1.67	N00°55'12"W
E199	2.13	N00°55'12"W
E200	16.78	N89°04'48"E
E201	2.13	S00°55'12"E
E202	16.78	S89°04'48"W
E203	1.66	S89°04'48"W
E204	16.01	S00°55'12"E
E205	1.41	S89°04'48"W
E206	16.01	N00°55'12"W
E207	1.41	N89°04'48"E
E208	1.66	S89°04'48"W
E209	15.96	S00°55'12"E
E210	1.87	S89°04'48"W
E211	15.96	N00°55'12"W
E212	1.87	N89°04'48"E
E213	2.76	N89°04'48"E
E214	4.54	N89°04'48"E
E215	3.45	S00°55'12"E
E216	4.54	S89°04'48"W
E217	3.45	N00°55'12"W

NOTE: 1) Waterford Green Communities of NC, LLC is the sole owner of lots 10-45.
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NORTH CAROLINA PROFESSIONAL SEAL L-4412 LAND SURVEYOR JEFFREY W. BAKER

Bateman Civil Survey Company
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Designed By: N/A
Drawn By: JCH
Checked By: JWB
Scale:N/A
Date: 10/19/2019
Project #:190428

SHEET
3 OF 3

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Marty Stone, Assistant Town Manager

Department(s): Water Resources Department

Requested Motion

Motion to adopt a Resolution authorizing the *"Contract Between the State of North Carolina and the Towns of Apex and Cary for Water Supply storage in B. Everett Jordan Lake"* and authorizing the Town Manager to execute an agreement substantially like the Contract and to provide such notices and take such actions as Contract contemplates.

Approval Recommended?

The Water Resources Department recommends approval.

Item Details

Jordan Lake water supply storage pool is sufficient to supply 100 mgd of water. To date, the State has administered four rounds of water supply allocations to various municipalities, awarded in 1988, 2000, 2002, and 2017. The Environmental Management Commission approved the Apex/Cary request for an increase in Jordan Lake Allocation 4, and the State contract for the increased allocation is submitted for Council consideration. As of Round 4, 91.2 percent of Jordan Lake Water storage pool has been allocated, and the Towns of Apex and Cary are allocated 46.2 million gallons per day. This contract covers the rights and costs of this allocation. The 2017 Cary/Apex Water Treatment Facility Agreement specifies how the capital cost, operational cost, and allocation will be split between Apex and Cary. After approval by Apex and Cary, the contract will be returned to the NC Division of Water Resources for execution by the State. The Contract has no defined term and will remain in effect indefinitely.

Attachments

- Contract between the State of North Carolina and the Towns of Apex and Cary for Water Supply storage in B. Everett Jordan Lake
- 2017 Cary/Apex Water Treatment Facility Agreement
- Resolution authorizing the Interlocal Agreement No. 3



RESOLUTION NO. 19-1217-34

RESOLUTION AUTHORIZING THE "CONTRACT BETWEEN THE STATE OF NORTH CAROLINA AND THE TOWNS OF CARY AND APEX FOR WATER SUPPLY STORAGE IN B. EVERETT JORDAN LAKE"

Council Member_____ moved, seconded by Council Member _____, and the Town of Apex Town Council (the "Council") approved by a vote of _____ to _____, that the following Resolution be adopted by the Council:

WHEREAS, the Council has determined that authorizing the *Contract between the State of North Carolina and the Towns of Cary and Apex for Water Supply Storage in B. Everett Jordan Lake* is in the best interests of the Town of Apex;

NOW, THEREFORE, BE IT RESOLVED that the Town of Apex Town Council hereby authorizes and approves the *Contract between the State of North Carolina and the Towns of Cary and Apex for Water Supply Storage in B. Everett Jordan Lake*.

This the 17th day of December 2019.

By:

_____

Jacques K. Gilbert, Mayor

ATTEST:

_____

Donna B. Hosch, Town Clerk, MMC, NCCMC

CONTRACT BETWEEN THE STATE OF NORTH CAROLINA

AND

THE TOWNS OF CARY AND APEX

FOR

WATER SUPPLY STORAGE IN B. EVERETT JORDAN LAKE

This contract ("Contract"), entered into by and between the STATE OF NORTH CAROLINA ("State") and THE TOWNS OF CARY AND APEX ("Allocation Holders");

WITNESSETH THAT:

WHEREAS, the Flood Control Act of 1963 (Public Law 88-253, 88th Congress) authorized the construction, operation and maintenance of the B. Everett Jordan Dam and Lake Project on Haw River and New Hope River, North Carolina ("Project"); and

WHEREAS, the State contracted with the United States of America ("Government") for the use of storage included in the Project for municipal and industrial water supply ("Jordan Water Supply Storage"), and for payment of the cost thereof in accordance with the provisions of the Water Supply Act of 1958, as amended; and

WHEREAS, the State through the Environmental Management Commission ("Commission") is authorized by N.C. Gen. Stat. §143-354(11) to assign to any county or municipality or any other local government having a need for water supply storage in federal projects any interest held by the State in such storage, upon assumption of repayment obligation therefore or compensation to the State by such local government; and

WHEREAS, on March 9, 2017, the Commission allocated a total of forty-two and seven tenths (42.7) percent of the water supply storage held by the State to the Allocation Holders for the use of Cary, Apex and the Wake County Portion of Research Triangle Park (also known as "Wake Co-RTP" and "RTP-South"); and

WHEREAS, by separate agreement, the Town of Cary will administer the three and five tenths (3.5) percent Level I allocation granted to Wake County and has assumed the contractual obligations related to the allocation; and

WHEREAS, the allocation became effective on the date it was approved (i.e. March 9, 2017) and, by and through its terms and conditions, this Contract implements the allocation.

NOW, THEREFORE, the State and the Allocation Holders (hereinafter jointly referred to as the "Parties") agree as follows:

ARTICLE I – DEFINITIONS.

(A) Annual Operation and Maintenance (O&M) Expense – The daily Project O&M costs over the Calendar Year.

(B) Calendar Year – A one-year period beginning January 1 and ending December 31.

(C) Capital Costs – The amount of principal paid by the State to the Government as part of the construction of the Project, i.e. $4,317,884.28.

(D) Division – The Division of Water Resources within the North Carolina Department of Environmental Quality.

(E) Interest Costs – The amount of interest paid by the State to the Government as part of the construction of the Project, i.e. $ 2,363,375.66.

(F) Jordan Water Supply Storage – The portion of the water supply included in the Project for municipal and industrial water supply.

(G) Level I Allocation – An assignment of Jordan Water Supply Storage that is made to an applicant that has an immediate need for water and plans to commence withdrawals within five years.

(H) Level II Allocation – An assignment of Jordan Water Supply Storage that is made to an applicant that has a long-range need for water five to thirty years into the future.

(I) Life of the Project – The physical life of the Project.

(J) Major Replacement Costs – Infrequent costs to replace major structures, facilities and associated equipment at the Project.

(K) Major Rehabilitation Costs – Infrequent significant costs to rehabilitate structures, facilities and equipment at the Project.

(L) Net Inflow – The change (positive or negative) in the amount of water stored in Jordan Lake, as measured by the difference in elevation from one day to the next (i.e., a 24-hour period), plus the amount of water withdrawn from Jordan Lake during that same one-day period, plus the amount of water released from the dam or spillway during that same one-day period.

(M) Project – The B. Everett Jordan Dam and Lake Project on Haw River and New Hope River, North Carolina.

(N) Total Capital and Interest Cost – the total amount paid by the State to the Government as part of the construction of the Jordan Water Supply Storage, i.e. $6,681,259.94.

ARTICLE II – RELATIONSHIP TO OTHER AGREEMENTS.

This Contract is predicated on the State's right to utilize the Jordan Water Supply Storage as provided in the contract between the State and the Government, dated April 10, 1988, which is attached hereto as Attachment A. Upon execution of this Contract any and all previous contracts between the State and the Allocation Holders regarding water supply in Jordan Lake are merged into this Contract and all outstanding rights and duties under previous contracts are continued and governed by this Contract. If there is a conflict between prior contracts and this Contract, the provisions in this Contract shall prevail.

ARTICLE III – JORDAN WATER SUPPLY STORAGE.

(A) Total Water Supply Storage Available. As provided in Attachment A, the State has the right to utilize an undivided 32.62 percent of the storage space at the Project between elevation 202 feet above mean sea level and 216 feet above mean sea level. The storage space held by the State is estimated to equal 45,800 acre-feet before adjustment for sediment deposits.

(B) Jordan Water Supply Storage Amounts. The Division will maintain records on the amount of water supply available in the water supply storage pool and will inform each Allocation Holder of the amount of water available in its portion of that pool.

(C) Sediment Adjustments. From time to time, the Government will survey the amount of sediment accumulated in Jordan Lake. When necessary, the Government will re-allocate the storage remaining in the lake among the Project purposes, maintaining the same proportional storage space for each purpose. This adjustment of storage may reduce the amount of space available to each Allocation Holder. Note, because a sediment storage pool designed to last over 100 years is included in Jordan Lake, such reductions in water supply storage are not expected to occur until after the year 2082.

ARTICLE IV – RIGHTS OF THE ALLOCATION HOLDERS.

(A) Right to Withdraw Level I Allocation: The Allocation Holders have a forty-two and seven tenths (42.7) percent Level I Allocation. Subject to the limitations set forth in this Contract and any other requirements provided by law, the Allocation Holders have the right to withdraw up to forty-two and seven tenths (42.7) percent of the Jordan Water Supply Storage. The Allocation Holders' water withdrawals will be restricted during water shortage conditions according to the Allocation Holders' approved drought and water shortage response plan under Article V, and in accordance with other laws. If the Allocation Holders' storage space becomes depleted, the Allocation Holders' right of withdrawal will be limited to a maximum withdrawal of forty-two and seven tenths (42.7) percent of the portion of Net Inflow allocated to water supply (forty-two and seven tenths

(42.7) percent of 32.62 percent, which equals 13.9287 percent of the Net Inflow), for as long as the Allocation Holders' water supply storage space is depleted.

(B) The Allocation Holders' right to withdraw is contingent upon compliance with this Contract. The Allocation Holders allocation may be revised or rescinded as set forth in 15A NCAC 02G .0507.

(C) The Allocation Holders shall have the right to construct all such works, plants, pipelines and appurtenances as may be necessary and convenient for the purpose of diversion or withdrawals, subject to the approval of the Government and of the State as to design and location. Notwithstanding such approval, the Allocation Holders shall comply with all applicable laws, including all permitting requirements. The grant of an easement for right-of-way across, in and upon land of the Government at the Project shall be by a separate instrument in a form satisfactory to the Secretary of the Army, without additional cost to the Allocation Holders under the authority of and in accordance with the provisions of 10 USC 2668 and as may be necessary. Subject to the conditions of such easement, the Allocation Holders shall have the right to use as much of the Project land as may reasonably be required in the exercise of the rights and privileges granted under this Contract.

(D) During any construction, operation and maintenance by the Allocation Holders of any facilities, the Allocation Holders will take specific actions to control environmental pollution that could result from such activity and to comply with applicable Federal, State, and local laws and regulations concerning environmental pollution.

(E) The Allocation Holders shall be responsible for operation and maintenance of all installations and facilities that it may construct for the diversion or withdrawal of water, and shall bear all costs of construction, operation and maintenance of such installations and facilities. The responsibility for operating and maintaining any facilities constructed under this Article shall be separate from, and in addition to, the Allocation Holders' responsibility to pay Annual O&M Expenses as described in Article VIII.

ARTICLE V – DROUGHT AND WATER SHORTAGE RESPONSE PLAN.

The Allocation Holders shall develop Drought and Water Shortage Response Plans that are acceptable to both the Division and the Government prior to withdrawing any water. The Allocation Holders shall implement this Plan during droughts and other water shortages.

ARTICLE VI – MEASUREMENT OF WITHDRAWALS AND RELEASES.

The Allocation Holders agree to furnish and install, without cost to the State, suitable meters or measuring devices satisfactory to the Government and to the Division for the measurement

of water that is withdrawn by the Allocation Holders from the Project by any means other than through the Project outlet works. Such devices shall be available for inspection by Government and Division representatives at all reasonable times. The Allocation Holders shall furnish to the Division monthly statements of all such withdrawals, showing the total amount withdrawn each month. The Allocation Holders shall also furnish to the Division monthly statements showing the amount withdrawn through their intake each day. Water supply releases through the Project outlet works shall be made in accordance with written schedules furnished by the Allocation Holders and approved by the Government. The measure of all such releases shall be by means of a rating curve of the outlet works, or by such other suitable means as may be agreed upon prior to use of Jordan Water Supply Storage.

ARTICLE VII – PROVIDING ACCESS.

The Allocation Holders shall provide access at their existing intake site to any other Jordan Lake water allocation holders that request access to utilize their allocations if:

(A) the Division determines that access is technically feasible and would not materially reduce the ability of the Allocation Holders to withdraw their entire allocation under normal conditions;

(B) the Allocation Holders are not liable, without their consent, for any costs associated with obtaining any necessary permits, engineering design or construction associated with access; and

(C) the Allocation Holders are not liable, without their consent, for any increased operation and maintenance costs resulting from provision of access.

ARTICLE VIII – PAYMENTS.

In consideration of the right to utilize the aforesaid allocation of water supply from the Jordan Water Supply Storage for municipal and industrial water supply purposes, and for other contractual rights specified in this Contract, the Allocation Holders shall pay the following sums to the State.

(A) Construction and Interest Costs:

(1) Level I Allocation Costs Amount: Level I Allocation Holders are responsible for a proportional share of the State's Total Capital and Interest Costs. The Commission allocated to the Allocation Holders a forty-two and seven tenths (42.7) percent allocation on March 9, 2017, which represents a seven and two tenths (7.2) percent increase in the Allocation Holders' previous Level I Allocation. Based on the increase in Level I Allocation, the Allocation Holders

are responsible for seven and two tenths (7.2) percent of the Total Capital and Interest Costs, totaling $481,050.72 (i.e. 7.2% x $6,681,259.94).

(2) Payment: The Allocation Holders shall pay the total amount for Level I Allocation Costs (i.e. $481,050.72) within 30 days of receipt of the invoice from the Division.

(B) Annual Operation and Maintenance (O&M) Expenses: The Allocation Holders are responsible for and shall pay forty-two and seven tenths (42.7) percent of the State's share of annual O&M expenses for each Calendar yYar the allocation is effective. The amount of each annual payment will be based on the actual O&M expense for the preceding Calendar Year. Payment of annual O&M costs shall be made within 30 days of invoice from the Division.

(C) Administrative Costs: The Allocation Holders shall pay the State $500 per year to cover the State's administrative costs. Payment shall be made within 30 days of receipt of invoice from the Division.

(D) Major Replacement Costs: The Allocation Holders shall pay forty-two and seven tenths (42.7) percent of the State's share of Major Replacement Costs. Payment of major replacement costs shall be made in a lump sum. The State will send an invoice to the Allocation Holders upon substantial completion of construction. This payment shall be due within 30 days of receipt of invoice from the Division.

(E) Major Rehabilitation Costs. The Allocation Holders shall pay forty-two and seven tenths (42.7) percent of the State's share of annual Major Rehabilitation Costs. This rate of payment shall apply to all invoices received from the Government following the effective date of this Contract regardless of the date on which such Major Rehabilitation Costs were incurred by the Government or any other entity. The amount of each annual payment will be based on the actual Major Rehabilitation Costs for the preceding Calendar Year. The annual payment of these Major Rehabilitation Costs shall be made within 30 days of receipt of invoice from the Division.

ARTICLE IX – EFFECTIVE DATE OF ALLOCATION AND DURATION OF CONTRACT.

Pursuant to 15 NCAC 02G .0502(5), the effective date of the allocation is the date that the Commission approved the allocation (i.e. March 9, 2017). This Contract is predicated on the Commission's allocation decision and shall remain in full force and effect unless and until the Commission acts to revise or rescind the Allocation Holders' allocation. This Contract may be modified by the Parties by mutual agreement.

ARTICLE X – RELEASE OF CLAIMS AND PRESERVATION OF AUTHORITY.

To the extent permitted by law, the Allocation Holders shall hold and save the Government and the State, including its officers, agents and employees, harmless from liability of any nature or kind for or on account of any claim for damages which may be filed or asserted as a result of the storage in the Project or withdrawal or release of water from the Project made or requested by the Allocation Holders, or as a result of the construction, operation or maintenance of the water supply facilities and appurtenances thereto owned and operated by the Allocation Holders, except for damages due to the sole fault or negligence of the State of North Carolina, the Government, or its contractors. Nothing in this Contract shall restrict the State in the exercise of any right or duty of the State, including rights or duties related to the conduct of investigations, collection of information and issuance of permits.

ARTICLE XI – NO TRANSFER OR ASSIGNMENT.

The Allocation Holders shall not transfer or assign this Contract or any rights acquired thereunder, nor suballot Jordan Water Supply Storage or any part thereof, nor grant any interest, privilege or license whatsoever in connection with this Contract. The Allocation Holders shall not infringe on the authority of the Commission to allocate Jordan Water Supply Storage. This Article shall not be construed so as to limit the Allocation Holders' ability to receive water withdrawn from Jordan Water Supply Storage through an intake operated and/or maintained by another allocation holder.

ARTICLE XII – CONTRACT ADMINISTRATORS.

The contract administrator for the Allocation Holders shall make the payments specified in this Contract to the contract administrator for the State. The administrator for the Allocation Holder shall be the following person:

Jamie Revels
Utilities Director
Town of Cary Utilities Department
PO Box 8005
Cary, NC 27512

with copies of notices provided to:

Water Resources Director
Town of Apex
Water Resources Department
P.O. Box 250
Apex, North Carolina 27502

The Allocation Holders shall be responsible for providing written notification to the State in the event the name and/or address for the Allocation Holders' designated contract administrator changes.

The contract administrator for the State and Department shall be the following person:

Kim Nimmer, Water Supply Planning
Division of Water Resources
Department of Environmental Quality
1611 Mail Service Center
Raleigh, North Carolina 27699-1611

[signatures on following pages]

IN WITNESS WHEREOF:

TOWN OF CARY

BY_____ DATE: _____

Harold Weinbrecht
Mayor

ATTEST:

BY_____ (SEAL)

Virginia Johnson
Town Clerk

TOWN OF APEX

BY_____ DATE: _____

Jacques Gilbert
Mayor

ATTEST:

BY_____ (SEAL)

Donna B. Hosch, MMC, NCCMC
Town Clerk

STATE OF NORTH CAROLINA

BY_____ DATE: _____

Dr. A. Stanley Meiburg
Chairman, NC Environmental
Management Commission

ATTEST:

BY_____ (SEAL)

STATE OF NORTH CAROLINA
COUNTY OF WAKE

2017 CARY/APEX WATER TREATMENT FACILITY AGREEMENT

This **2017 CARY/APEX WATER TREATMENT FACILITY AGREEMENT** (this "Agreement"), made and entered into the date of the last Party to sign and effective July 1, 2017 ('Commencement Date'), by and between the Town of Apex, a municipal corporation organized and existing under the laws of the State of North Carolina ("Apex") and the Town of Cary, a municipal corporation organized and existing under the laws of the State of North Carolina ("Cary"). Apex and Cary are sometimes referred to as "Party" or jointly as the "Parties."

WITNESSETH

THAT WHEREAS, Apex and Cary are the owners and operators of certain public enterprises within their respective service areas; and

WHEREAS, Cary and Apex have, since 1980, jointly conducted a wide range of planning, permitting and construction activities to meet the water supply needs of their respective service areas; and

WHEREAS, Apex and Cary together hold a water supply allocation from the State of North Carolina for 32 percent of the water supply storage in B. Everett Jordan Lake ("Jordan Lake"), of which 23.5 percent is assigned to Cary and 8.5 percent is assigned to Apex; and

WHEREAS, Apex and Cary were jointly granted on March 12, 2015 a modified Interbasin Transfer Certificate from the State of North Carolina ("2015 IBT Certificate"), which replaced the Interbasin Transfer Certificate issued jointly to Cary, Apex, Morrisville and Wake County in 2001; and

WHEREAS, Apex and Cary jointly own and operate the Cary/Apex Water Treatment Facility ("CAWTF") in accordance with an Agreement dated April 26, 1988 as amended January 26, 1989; August 1, 1995; August 3, 1999; April 5, 2000; and December 20, 2011 ("Original Agreement"); and

WHEREAS, Apex's ownership in the CAWTF is 23% and Cary's ownership in the CAWTF is 77%; and

WHEREAS, the CAWTF has a current maximum day capacity of 40 million gallons per day (mgd), of which 77 percent (30.8 mgd) is owned by Cary and 23 percent (9.2 mgd) is owned by Apex; and

WHEREAS, Apex and Cary jointly own related raw water intake and transmission facilities that deliver water from Jordan Lake to the CAWTF, finished water transmission facilities that deliver water from the CAWTF to the Delivery Points (as such term is defined in this Agreement), and related ancillary facilities, some of which are located off the CAWTF site, (collectively "Other Components of the CAWTF" or "Other Components"), all of which Other Components are owned 77 percent by Cary and 23 percent by Apex; and

WHEREAS, Apex and Cary have planned and designed for the expansion of the CAWTF to a maximum day capacity of 56 mgd and desire to proceed with construction of such expansion and with the addition and expansion of certain Other Components, all of which will be owned 77 percent by Cary and 23 percent by Apex; and

WHEREAS, Apex and Cary desire to provide the terms pursuant to which they may, jointly and/or separately, enter into agreements to provide untreated or treated water to other jurisdictions provided such provision of water to others does not infringe on the other Party's ownership interest or ability to use its share of the capacity of the CAWTF and Other Components; and

WHEREAS, Apex and Cary desire to enter into this Agreement to, among other things, address the planned expansion of the CAWTF and Other Components and provide a process for the sale of water to other jurisdictions.

NOW, THEREFORE, in accordance with authority granted under Articles 16 and 20 of Chapter 160A of the North Carolina General Statutes, and in consideration of the respective rights, powers, duties and obligations hereafter set forth to be performed, Apex and Cary agree as follows:

ARTICLE 1
PURPOSE, DEFINITIONS AND RULES OF CONSTRUCTION

Section 1.1. Purpose. The Recitals are incorporated into this Agreement. The purpose of this Agreement is to update and replace the Original Agreement and define the terms and conditions pursuant to which Apex and Cary will expand and continue to own and operate the CAWTF and Other Components and:

a. Allocate and share the rights and responsibilities associated with their joint ownership of the CAWTF and Other Components, as such terms are defined herein, and for the operation of the CAWTF and Other Components;
b. Allocate the entitlement to the Capacity of the CAWTF and Other Components;
c. Address the joint holding of a Jordan Lake water supply Allocation;
d. Address the joint holding of the 2015 IBT certificate;
e. Address the sale of water and Capacity to others; and
f. Provide mutual aid water supply to each other.

Section 1.2. Definitions. In addition to the capitalized terms defined elsewhere in this Agreement, the following capitalized terms shall have the following meanings unless some other meaning is plainly intended:

a. Allocation – A percentage of the water supply storage pool in B. Everett Jordan Lake, as granted by the North Carolina Environmental Management Commission to a unit of local government under the authority of G.S. 143-354(a)(11). At the Commencement Date, Apex and Cary's joint Allocation is as provided in Section 8.1.
b. Annual Budget – The budget for Current Expenses of the CATWF and Other Components prepared for each Fiscal Year by Cary as the Lead Agency.

c. Apex Delivery Point – Each point where potable water from the CAWTF is delivered to the Apex Distribution System.
d. Apex Distribution System – The system of potable water pumps and distribution lines and all appurtenances thereto owned and operated by Apex in order to provide potable water utility services to its customers, as the same may be extended or modified from time to time.
e. Capacity – The maximum amount of water the CAWTF or a specific Other Component can deliver on a daily basis, unless otherwise specified.
f. Capital Costs – All costs properly allocable to the capital account for the CATWF and Other Components, including future expansion or upgrade, in accordance with generally accepted accounting principles, including the following:
    i. Obligations incurred for labor, materials, and services provided by contractors, builders and materialmen in connection with the construction, acquisition, and equipping of the CATWF and Other Components, machinery and equipment, for the restoration of property damaged or destroyed in connection with such construction and acquisition, for the demolition, removal or relocation of any structures or equipment and for the clearing of lands;
    ii. The cost of acquiring by purchase or by eminent domain, including the amount of any award or final judgment in any proceeding to acquire by eminent domain, such land, structures and improvements, property, property rights, rights-of-way, franchises, easements and other interests in lands as may be deemed necessary or convenient in connection with such construction or operation of the CATWF or Other Components;
    iii. Expenses of administration properly chargeable to such construction or acquisition; legal, architectural and engineering expenses and fees; fees and expenses of consultants; premiums of insurance in connection with construction; and all other items of expense not elsewhere in this Section specified that are incident to the financing, construction or acquisition of the CATWF or Other Components and the placing of the same in operation;
    iv. Design costs for the CATWF or Other Components; and
    v. Expenses of obtaining permits for construction and operation of the CATWF or Other Components, including permits from the required State and federal agencies necessary to withdraw, treat and convey water to the Delivery Points.
    vi. Expenses described in this subsection do not include compensation or benefits for full time employees of Apex or Cary.
g. CAWTF – Cary/Apex Water Treatment Facility, including the real property on which it is located.
h. Cary Delivery Point – Each point where potable water from the Facilities is delivered to the Cary Distribution System.
i. Cary Distribution System – The system of potable water pumps and distribution lines and all appurtenances thereto owned and operated by Cary in order to provide potable water utility services to its customers, as the same may be extended or modified from time to time.

j. Credits – Financial credits for surplus materials, sales taxes, court awards, payments for water supplied to others, or any other financial credits arising related to the operation or construction of the Facilities.

k. Current Expenses – Expenses incurred by the Lead Agency for the administration, management, operation, maintenance and repair of Facilities, as determined in accordance with generally accepted accounting principles, except as expressly modified by this definition, including, but not limited to:
    i. all ordinary and usual expenses of operation, maintenance and repair, which may include expenses not annually recurring,
    ii. direct administrative expenses,
    iii. salaries and other compensation,
    iv. operating lease payments,
    v. payments to any pension or retirement plan or plans properly chargeable to the Facilities,
    vi. insurance premiums and expenses,
    vii. legal, engineering and architectural expenses relating to the operation, maintenance or repair of the CATWF or Other Components,
    viii. costs for contracts with service providers such as engineers or attorneys for the development or updates of this Agreement or other agreements relating to the CATWF and Other Components, and
    ix. any other similar-type current expenses required to be paid with respect to the CATWF or Other Components;

    Current Expenses shall not include:
    i. any reserves for extraordinary replacements or repairs, and
    ii. any allowance for depreciation.
    iii. Expenses described in this subsection do not include compensation or benefits for full time employees of Apex or Cary.

l. Delivery Points – The Apex Delivery Points and the Cary Delivery Points.

m. Facilities – The jointly owned CATWF and Other Components (including all other related ancillary facilities needed to deliver treated drinking water to the Delivery Points). The Facilities and their general locations are identified in Exhibit A.

n. Fixed Current Expenses – That portion of the Current Expenses of the Facilities for a given period of time that would remain constant regardless of the quantity, quality or characteristics of the water supplied or conveyed during that period. Examples of Fixed Current Expenses include, but are not limited to, administrative expenses, salaries and other compensation, operating lease payments, insurance premiums and expenses and fees, Jordan Lake water supply storage Allocation payments, and expenses incurred in maintaining and submitting reports for permits after their initial issuance for the operation of the Facilities.

o. IBT – Interbasin Transfer as defined by G.S. 143-215.22G and G.S. 143-215.22L.

p. Interconnection Points – Points at which the Apex and Cary Distribution Systems are connected (Exhibit B).

q. Lead Agency – The Town of Cary acting in its capacity as the lead agent for purposes of managing the planning, design, permitting, construction, operation and maintenance of the Facilities.

r. Original Agreement – The Agreement dated April 26, 1988, regarding the ownership and operation of the CAWTF, and defining Utility Service Areas, as amended January 26, 1989; August 1, 1995; August 3, 1999; April 5, 2000; and December 20, 2011.
s. Other Components – The jointly owned raw water intake and transmission facilities that deliver water from Jordan Lake to CATWF, and all other jointly owned ancillary facilities, appurtenances, land, and interests in land that are necessary to deliver water to the Delivery Points, but are not the CAWTF.
t. Ownership Share – The portion, expressed as a percentage, of the CATWF or an Other Component owned by a Party to this Agreement, generally applicable to land or an interest in land, facilities built on that land or interest in land, and hydraulic capacity of that CATWF or Other Component, unless otherwise stated herein.
u. Permits – Permits, certificates or other regulatory instruments required to use, modify or expand the Facilities including, but not limited to, Public Water Supply Operating Permit, Laboratory Certification, Jordan Lake Allocation contract, and IBT requirements and certificates.
v. Service Area – Area in which water is supplied or planned to be supplied by either Cary or Apex and as defined pursuant to Apex Ordinance No. 2004-1207-07 and Cary Ordinance No. O-2005-01, An Ordinance Revising A Utility Service And Annexation Agreement Between The Town of Apex, North Carolina and The Town of Cary, North Carolina For the Boundary Line Between These Two Municipalities, as may be amended from time to time.
w. Variable Current Expenses – That portion of the Current Expenses of the Facilities for a given period of time that varies based upon the quantity, quality or characteristics of the water withdrawn, treated or conveyed during that period. Examples of Variable Current Expenses include, but are not limited to, electricity costs and chemical costs.
x. Water Shortage Response Plan – As required of each of Cary and Apex by the state of North Carolina.

Section 1.3. Rules of Interpretation.

a. Words of the masculine gender shall be deemed and construed to include correlative words of the feminine and neuter genders. Unless the context shall otherwise indicate, words used herein shall include the plural as well as the singular number.
b. References to particular articles or sections are references to articles or sections of this Agreement unless some other reference is indicated.
c. References to specific sections or chapters of the General Statutes of North Carolina or to specific legislative acts are intended to be references to these sections, chapters or acts as amended and as they may be amended from time to time by the General Assembly of North Carolina, or any successor statute.

Section 1.4. Previous Agreements. On the Commencement Date, this Agreement will supersede and terminate the Original Agreement.

Section 1.5 Utility Service Area. An Ordinance Revising A Utility Service And Annexation Agreement Between The Town of Apex, North Carolina and The Town of Cary, North Carolina For the Boundary Line Between These Two Municipalities (Apex Ordinance

No. 2004-1207-07 and Cary Ordinance No. O-2005-01), by its terms superseded and replaced Utility Service Areas defined in Original Agreement, and the following Resolutions:

a. Joint Resolution of the Towns of Apex and Cary Establishing Jurisdictional Boundaries, dated January 26, 1989;
b. Joint Resolution of the Towns of Cary and Apex Establishing Jurisdictional Boundaries, dated August 3, 1999; and
c. Joint Resolution of the Towns of Cary and Apex Establishing Jurisdictional Boundaries, dated April 5, 2000;

and such Resolutions are superseded and terminated.

ARTICLE 2
ALLOCATION OF COSTS AND PAYMENTS

Section 2.1. Allocation of Costs in General.

a. It is the intent of the Parties to allocate the Capital Costs, Credits, and Current Expenses of the Facilities based on the Parties' respective Ownership Share of Facilities, except where described otherwise.
b. Cary, as the Lead Agency, will establish such record keeping and accounting systems as shall be necessary to enable it, as near as shall be practicable, to account properly for all Capital Costs, Credits, and Current Expenses of the Facilities, and, as near as shall be practicable, to properly identify and categorize the Current Expenses of the Facilities as Fixed Current Expenses and Variable Current Expenses.
c. Apex may conduct such reasonable inspections and reviews as Apex deems necessary to assure that all Capital Costs, Credits, and Current Expenses are properly allocated as provided in this Agreement.

Section 2.2. Capital Costs, Credits, and Fixed Current Expenses. Capital Costs, Credits, and Fixed Current Expenses shall be allocated to and borne by Cary and Apex in accordance with their respective Ownership Shares at the time the Capital Cost, the Credit, or the Fixed Current Expense is incurred by the Lead Agency.

Section 2.3. Variable Current Expenses. The Variable Current Expenses shall be allocated to and borne by Cary and Apex in accordance with their proportionate use of the Facilities' Capacity that results in the incurrence of the Variable Current Expense. The proportionate use of Facilities' Capacity will be measured by the Lead Agency as the percentage of the total volume of water produced delivered to each Party at the Delivery Points.

Section 2.4. Billing. Cary, as the Lead Agency, will invoice Apex monthly for its share of Capital Costs, Current Expenses, and any special assessments as provided in Section 3.3.

Section 2.5. Payment. Within 30 days of receipt of the invoice, Apex shall make payment in the amount of the invoice to the Lead Agency. If Apex disagrees with any expense allocated to it, it may notify the Lead Agency of the disagreement and request a review and that an adjustment be made, but shall make the required payment to the Lead Agency pending the resolution of the disagreement.

Section 2.6. Interest. Interest shall be charged on any unpaid balance at the rate of 0.5% per month beginning with the second monthly invoice following (that is, approximately 60 days after) the month in which the unpaid amount was billed. Adjustments will not be made on interest amounts.

Section 2.7. Annual Audit. The Lead Agency will arrange for an independent accounting firm, which may be the independent accounting firm that audits the books and records of the Lead Agency, to review the books and records for the Facilities and provide a report that shall indicate whether the Capital Costs and Current Expenses allocated to each Party during the prior fiscal year are in accordance with generally accepted accounting

principles. Such report may be included in the Comprehensive Annual Financial Report of the Lead Agency, so long as the Comprehensive Annual Financial Report includes sufficient detail to provide the information required by this section.

Section 2.8. No Obligation to Levy Taxes. No provision of this Agreement shall obligate Cary or Apex, whether expressly or by implication, to levy taxes either to make payments falling due hereunder or to pay any judgment entered against it as a result of its breach of this Agreement. Cary covenants with Apex that it will operate the Cary Distribution System, and Apex covenants with Cary that it will operate the Apex Distribution System, so that in each case the respective system will generate revenues sufficient to meets its obligations under this Agreement (in addition to any other obligations payable from such revenues) to the extent funds are not otherwise available for such purpose.

ARTICLE 3
ENTITLEMENTS TO CAPACITY

Section 3.1. Facilities Water Supply Capacity.

a. Generally, each Party is entitled to a percentage of the water producing Capacity of the Facilities that is equal to its Ownership Share.
b. Exhibit A shows the general location of the Facilities. Facilities include the components listed in Table 1 and all ancillary facilities and appurtenances, some of which are located on real property owned jointly by the Parties and some on jointly owned easements in real property.
c. Each Party's Ownership Share is as follows.
   i. Cary – 77%
   ii. Apex – 23%

Section 3.2. Facilities Capacities. Table 1 lists 2014 Capacities, as well as the Capacities resulting from the CAWTF expansion (referred to as "Phase III Expansion"), which is under construction by the Lead Agency with expected completion in 2017. While components of the Facilities have specific design Capacities as shown in Table 1, if Lead Agency ever determines that actual Capacity is different from the Capacity shown in Table 1, then the actual Capacity will control and Ownership Shares will be applied to the actual Capacity.

Table 1. Facilities 2014 and Phase III Expansion Capacities

	2014 Capacity or Size	Phase III Expanded Capacity or Size
Aeration Facility	None	2 ResMix units
Raw Water Intake Structure (maximum day)	47 mgd	82 mgd
Raw Water Pump Station (maximum day)	41.5 mgd	63 mgd
Raw Water Pipeline(s)	• Parallel 30-inch/42-inch lines (32,000 ft) • 54-inch line (1,800 ft)	• Parallel 54-inch/42-inch lines (1,200 ft) • Parallel 30-inch & (2) 42-inch lines (26,300 ft) • Diverging sets of lines meet at plant entry o Parallel 30-inch/42-inch lines (4,300 ft), 54-inch line (1,800 ft) o 48-inch line (5,500 ft)
Cary/Apex Water Treatment Facility/ High Service Pump Station (maximum day)	40 mgd	56 mgd
Finished Water Pipeline(s)	Parallel 30-inch/42-inch lines (14,000 ft)	Parallel 30-inch/42-inch lines (14,000 ft)

Section 3.3. Future Modification or Expansion. Following the Phase III Expansion, the Capacity of Facilities may be further modified or expanded as follows:

a. Modifications that are deemed necessary by the Lead Agency in order to maintain or improve regulatory compliance, operational functions, or design Capacity may be undertaken by the Lead Agency with costs shared according to Section 2.2. Any resulting increase in Capacity of Facilities shall be allocated in accordance with each Party's Ownership Share.
b. Major modifications or expansions, such as increasing the CAWTF Capacity up to 72 mgd with associated expansion of Other Components, will be undertaken by the Lead Agency upon approval by the Advisory Committee. Any costs and expenses and any resulting increase in Capacity shall be allocated in accordance with each Party's Ownership Share.
c. Either Apex or Cary may modify or expand the Capacity of Facilities without amendment to this Agreement, as follows:
    i. If Apex desires a modification or expansion, Apex shall notify Cary in a duly authorized writing of its request. Upon receipt of such request, Cary will develop, as promptly as reasonably possible, the plans and specifications required for the modification or expansion and will notify Apex of the expected cost and the basis therefore. If Apex desires to proceed with implementation of the modification or expansion, Apex shall notify Cary in a duly authorized writing of its intent to proceed. Upon receipt of such request, Cary will proceed to implement the modification or expansion.
    ii. If Cary desires a modification or expansion, Cary will notify Apex in a duly authorized writing of its request and proceed to develop the plans and specifications required for the modification or expansion. If Cary desires to proceed with implementation of the modification or expansion, Cary shall notify Apex in a duly authorized writing and proceed to implement the modification or expansion.
    iii. The Party requesting the modification or expansion shall be responsible for all costs incurred by Cary in developing plans and specifications, regardless of whether the proposed modification or expansion proceeds and the other Party will have no liability therefore. If the modification or expansion proceeds, the Party requesting the modification or expansion shall pay all the Capital Costs of the modification or expansion to the Facilities and the other Party will have no liability therefore.
    iv. Upon completion of such modification or expansion, the Party that requested and paid for the modification or expansion shall be solely entitled to the increased Capacity resulting therefrom, and any change in the Ownership Shares shall be determined and documented in a Letter of Agreement signed by the Town Manager of Cary and the Town Manager of Apex. Thereafter, except as hereinafter provided, the Current Expenses for the operation of the Facilities shall be allocated based upon the new Ownership Shares. If the expansion of the Facilities' Capacity results in an increase in the overall Current Expenses such that an allocation based solely upon the Ownership Shares does not result in a fair sharing of the Current Expenses following the expansion (e.g., the increase in Capacity results in a higher per unit Current Expense charge than would have been the case without the increase), Cary shall impose a special assessment on the Party requiring the increase in Capacity in order to allocate the Current

Expenses following the increase in Capacity more fairly in accordance with generally accepted accounting principles.

v. Notwithstanding the foregoing, in the event that a modification or expansion of the Capacity of any of the Facilities is undertaken pursuant to this Section 3.3(c), and in connection therewith Cary as the Lead Agency determines that other non-expansion modifications to the existing Facilities should be installed at the same time, then Cary may cause the installation at that time and the costs of the additions and modifications shall be allocated as provided in Section 3.1 (based upon Ownership Shares prior to the increase in Capacity). In such case, Cary shall allocate the costs of the expansion and modification project so that the Party requesting the expansion bears the Capital Costs of the expansion, and Cary and Apex bear the cost of the improvements and modifications to the existing Facilities in accordance with their Ownership Shares.

d. Any other modifications or expansions, including expansions other than as provided in Section 3.3(c), that would result in any change in Ownership Shares, will require prior written amendment to this Agreement. In such event, the Capital Costs of the improvements and the Current Expenses from operations after the installation of the improvements shall be allocated as set forth in the amendment hereto.

e. In all events, Cary will be responsible for the supervision of all design, construction, acquisition and installation of the modification or expansion, and will endeavor to minimize disruptions in the operation of the Facilities.

Section 3.4. Use of Capacity of the Other Party.

a. To the extent that a Party has surplus Capacity resulting from its Ownership Share in Facilities available to it ("Owning Party"), the other Party ("Using Party") may pay for, use and sell water from the Owning Party's Capacity provided such use of or sale of water does not infringe upon the Owning Party's ability to meet the water demands of its customers. Such use will be by Letter of Agreement, signed by the Town Manager of each Party, specifying the surplus Capacity, the amount to be paid, and the duration of use of such Capacity of the Owning Party.

b. In the event Using Party is using Owning Party's Capacity and the Owning Party reasonably and in good faith determines that it is not able to meet the water demands of its customers, Owning Party shall provide written notice to the Using Party that its ability to meet the demands of its customers has been infringed upon ("Infringement Notice"). Such Infringement Notice may be sent whenever the Owning Party experiences such occurrences as water quality concerns, undesirable hydraulic conditions, unsatisfactory pressure, pressure fluctuation, and other conditions or occurrences that affect or may affect its ability to meet the demands of its customers. Upon receipt of such Infringement Notice, Using Party will discontinue use of Owning Party's Capacity within 24 hours or as soon as is otherwise practical and is agreed to in writing by Owning Party.

c. Notwithstanding the terms for cost sharing in Article 2, during any month when one Party uses part of the other Party's Capacity, all expenses related to salaries and other personnel expenses will be billed to the Using Party as Variable Current Expenses.

Section 3.5 Sale of Capacity.

a. Cary and Apex agree that both have the right to benefit from any sale of Capacity (which may also refer to any sale of the right to use Capacity without transferring ownership of Capacity) of the CAWTF or Other Components to a third party to the extent they determine to participate in the sale. In the event that Cary or Apex are offered the opportunity by another entity to sell to such entity some portion of the Capacity to which it is entitled by Ownership Share, the Party receiving the offer of such opportunity shall notify the other Party.
b. If both Apex and Cary wish to participate in the sale of Capacity of the CAWTF and/or some Other Component (which may also refer to any sale of the right to use Capacity without transferring ownership of Capacity), then an agreement will be prepared between and among the third party buying Capacity, Apex and Cary. In addition to such provisions as the Parties shall agree upon, such agreement shall contain provisions to the effect that:
    i. The sale of Capacity will be shared by Cary and Apex;
    ii. Revenues from the sale of the Capacity will be equitably allocated to the components of the Facility utilized to deliver the Capacity and shared between Apex and Cary in accordance with their Ownership Shares of the components of the Facility utilized;
    iii. Arrangements for the use of the Capacity shall be managed by Cary as the Lead Agency;
    iv. Costs incurred in implementing the use of the Capacity will be equitably allocated to the component of the Facility utilized to deliver the Capacity and shared between Apex and Cary in accordance with their Ownership Shares;
    v. Operational details of providing water will be dependent on connection points and will be specified in the agreement; and
    vi. Such other operational details as necessary.
c. If a third party that is a governmental entity or a non-profit corporation that has a public water operation located in Chatham, Durham Orange, or Wake Counties ("Third Party") proposes to purchase Capacity from Cary or Apex ("Proposed Seller") and the other Party to this Agreement does not choose to participate in the sale as contemplated by subsections a. and b., then the Party desiring to make such a sale ("Proposed Seller") shall first offer to sell the capacity to the other Party ("Proposed Buyer") at a price that is the lesser of (1) the proposed sale price of the Capacity to the Third Party or (2) an amount sufficient for the Proposed Seller to recover its Capital Cost investment in the component of the Facility for which the Capacity is being sold for the period that the Capacity is being sold. If the Proposed Buyer elects to purchase the Capacity, then the Capacity shall be so sold for the purchase price described above. During the time the Capacity is sold to the Proposed Buyer, the Proposed Buyer shall be responsible for the Current Expenses allocable to the Capacity of the component of the Facilities so sold.
d. If the other Party does not purchase the Capacity as described in c. above, then the Proposed Seller may sell such Capacity to the Third Party (as defined in c. above) at the price described above. If such a sale to Third Party occurs:
    i. The Capacity so sold will be solely from the Ownership Share of the Proposed Seller;

ii. The sale may only be made if the sale will not infringe on the ability of the other Party to use its full Ownership Share in the Facilities or otherwise meet the demands of its customers; and
iii. The Proposed Seller shall be responsible for the performance of its payment and other obligations hereunder as if such sale had not occurred (although it may have such rights and actions against the Third Party as shall be negotiated between the Proposed Seller and the Third Party).

ARTICLE 4
REGULAR SALE OF WATER TO OTHERS

Section 4.1. Sale of Water to Others. The Parties may sell water to another person or entity ("Third Party") on a regular basis (Mutual Aid water supply is described in Article 10).

Section 4.2. Sale of Water by Both Cary and Apex. Cary and Apex both have the right to benefit from any sale of water to Third Parties to the extent they determine to participate in the sale. In the event that Cary or Apex are offered the opportunity by a Third Party to sell to that Third Party some portion of the water to which Cary or Apex is entitled, the Party receiving the offer shall notify the other Party. If both Apex and Cary wish to participate in the sale of water, then an agreement will be prepared among the Third Party, Apex and Cary. In addition to such provisions as the Parties shall agree upon, such agreement shall contain provisions to the effect that:

a. Allocation (if needed) and Facilities Capacity needed to provide the Third Party with water will be jointly provided by Cary and Apex according to their Ownership Shares.
b. Costs and revenues related to such Third Party sale will be managed by the Lead Agency and shared between Cary and Apex; any fixed regular payments shall be credited according to the Facilities Ownership Shares and any payments based on variable volume provided will offset Variable Current Expenses.
c. Operational details of providing water will be dependent on connection points and will be specified in the agreement with the Third Party.

Section 4.3. Sale of Water by Either Cary or Apex. If either Party does not wish to participate in the sale of water and the other Party (for purposes of this Section 4.3 "Selling Party") can provide water to the Third Party directly or indirectly from Selling Party's Water Distribution System:

a. Allocation (if needed) and Facilities Capacity necessary for the water provided to Third Party will be solely from Selling Party.
b. Any water use by Third Party will be deemed to be water used by Selling Party.
c. Any Variable Current Expenses incurred by the Lead Agency related to provision of water by the Selling Party to a Third Party will be tracked monthly, subtracted from the Variable Current Expenses before costs are split according to Article 2, and allocated solely to the Selling Party.
d. Selling Party shall not sell water to a Third Party at any time if such sale would infringe on the ability of the other non-selling Party to use its full Ownership Share in the Facilities or otherwise meet the demands of its customers (e.g., unsatisfactory pressure). Any agreement between Selling Party and a Third Party shall have a condition to this effect and a provision permitting termination of the sale of water upon 24 hours notice.

Section 4.4. Sale of Water by Separate Agreement. None of the provisions in this Article shall prevent Cary and Apex from jointly entering into a separate agreement or amending this Agreement to allow for sale of water to any person or entity under different terms and conditions than those in this Article.

ARTICLE 5
OPERATION OF THE FACILITIES

Section 5.1. Day-to-Day Operation. Cary as the Lead Agency shall be solely responsible for and entitled to manage and implement the day-to-day operations of the Facilities. Cary will operate the Facilities in an efficient and economical manner, maintain the properties constituting the Facilities in good repair and in sound operating condition for so long as the same are necessary for the operation of the Facilities, and comply with all valid acts, rules, regulations, orders and directions of any legislative, executive, administrative or judicial body that are applicable to the Facilities. In carrying out this obligation, the standards for quality and costs that Cary applies will be comparable to the standards for quality and costs Cary applies to its other utility assets that are not jointly owned, and Cary will use due diligence in carrying out the operation of the Facilities. No other warranties, whether express or implied, are made with regards to Cary's operations of the Facilities.

Section 5.2. Potable Water Delivery. As Lead Agency, Cary will operate the Facilities so that the Facilities will deliver potable water meeting the requirements of this Agreement to the Delivery Points. In carrying out such operations, Cary will not interrupt or suspend water treatment service except in cases of crisis, extreme emergency, *force majeure*, or court order. In the event of a crisis, extreme emergency or *force majeure*, Cary may operate the Facilities in the manner it determines is best for the protection of the public health, safety and welfare, and for the protection of the environment. Cary will immediately inform Apex regarding any situations or actions that could affect the flow of potable water to the Apex Distribution System. Apex will immediately inform Cary regarding any situations or actions that could affect the flow of potable water to the Cary Distribution System.

Section 5.3. Retaining Consultants. Except as provided in Article 6, Cary as the Lead Agency shall have sole responsibility for determining whether outside consultants and advisors or legal representatives will be retained to render services with respect to the Facilities and in determining which consultants, advisors or legal representatives will be retained. Nothing in this Agreement shall prevent Apex from retaining any consultant, advisors or legal representatives at its sole expense to advise it as to matters related to the Facilities. Additionally, Apex will be entitled to full access, at reasonable times and in a reasonable manner, to the Facilities, and documents related thereto, to review, observe or investigate any aspect of the operation of such Facilities. Apex will be entitled to access, at reasonable times and in a reasonable manner, to the consultants, advisors and legal representatives retained by Cary.

Section 5.4. Permits. Cary represents that it has received or will receive all permits, licenses, and authorizations necessary from the United States of America, the State of North Carolina, and any department or agency of either, to operate the Facilities and to deliver potable water. Cary is authorized to take all actions as are in its control to maintain all such permits necessary for the lawful operation of the Facilities in full force and effect for the term hereof. Apex shall cooperate with Cary in taking any actions required to maintain such permits. Apex and Cary both represent that they have received or will receive all permits, licenses, and authorizations necessary to operate their respective Distribution Systems.

ARTICLE 6
DUTIES OF CARY AND APEX; ADVISORY COMMITTEE

Section 6.1. Duties of Cary as Lead Agency. In addition to the other provisions of this Agreement, Cary, in its role as Lead Agency, agrees with respect to the Facilities that it will, in accordance with this Agreement:

a. Manage, operate and maintain the Facilities.
b. Provide all administrative and executive management of Facilities.
c. Manage planning, designing, permitting and constructing improvements, modifications, and expansions of Facilities.
d. Account for revenue and expenditures, track costs for the planning, permitting, design, construction, maintenance and operation of the Facilities, allocate such revenues and expenditures between Cary and Apex in accordance with this Agreement, report such allocations to Apex, and invoice Apex for its share of the costs.
e. Determine the scope for, solicit proposals from, and contract with and pay service providers to perform work for the planning, permitting, design, construction, maintenance, and operation of the Facilities.
f. Obtain permits for Facilities and manage compliance with regulatory requirements.
g. Keep Apex informed of the status of construction, management, maintenance and operations, and provide opportunities for input from the town staff of Apex as determined by Cary or upon request of Apex.

Section 6.2. Mutual Interests. In carrying out its role as Lead Agency, Cary will endeavor to act in the best mutual interests of Apex and Cary as partners in the undertaking that is the subject of this Agreement.

Section 6.3. Duties of Apex. Apex shall cooperate with Cary in carrying out its duties as Lead Agency and will endeavor to act in the best mutual interests of Apex and Cary as partners in the undertaking that is the subject of this Agreement.

Section 6.4. Water Distribution Systems. Each Party is solely responsible for management of its own Distribution System once water passes from the Delivery Points into the Apex or Cary Distribution System, respectively, including but not limited to, management of water quality, permit compliance, and billing customers for water use.

Section 6.5. Advisory Committee. An Advisory Committee, consisting of the Mayor of Cary, Mayor of Apex, Town Manager of Cary and Town Manager of Apex, or their designees, will meet at least annually, or upon request of either Party, to:

a. Recommend an annual budget for each upcoming fiscal year.
b. Advise the Lead Agency on policy matters, which may include moving forward with major Facilities modification or expansion as described in Article 3.
c. Based on recommendations by the Lead Agency, recommend selection of independent consultants and contractors for contracts exceeding $430,000 for study, design or other consultants, or exceeding $4,300,000 for construction or equipment. Upon approval of such selection recommendations by the Advisory Committee, the Lead Agency will proceed with its own contract approval process for the selected consultant or contractor.

d. Any recommendations made by the Advisory Committee shall be based on a vote of the Mayors and will be made on the basis of one vote per Town. In the absence of a Mayor, the Town Manager may vote. Apex and Cary shall be entitled to vote with respect to any matters regarding the Facilities.

Section 6.6. Water Resources Planning and Management. Cary and Apex will continue to work together to plan for future water supply needs and participate in regional planning activities, such as the Jordan Lake Partnership (or a similar group if re-formed to be broader in membership, as is anticipated). Both parties acknowledge the need to encourage customers to use water wisely and recognize the value of having consistent water use messages and Water Shortage Response Plans so that customers in adjacent water supply service areas receive consistent information.

Section 6.7. Participation in Regional Water Resources Organizations. As the Lead Agency Cary will, at its discretion, participate in and/or join regional organizations that conduct activities related to water resources affecting Jordan Lake or any of the water sources that may provide water to Cary and Apex under mutual aid agreements. At Cary's request, to best represent the Towns' mutual water resources interests, Apex will consider participating in and/or joining such organizations. If Cary joins on behalf of both towns, then any costs will be shared accordingly as Current Expenses. If both towns join, costs to each town will be borne independently. Such organizations may include, but not be limited to, the Jordan Lake Partnership, the Upper Cape Fear River Basin Association, and the Triangle Area Water Supply Monitoring Project.

ARTICLE 7
FINANCING; OWNERSHIP OF FACILITIES

Section 7.1. Financing. Each of Cary and Apex shall be responsible for obtaining its own financing of its respective share of the Capital Costs and Current Expenses of the Facilities. Each Party shall be responsible for determining the method of financing it will pursue, whether by expenditure of legally available funds, general obligation bonds, revenue bonds, installment contract financing, special obligation bonds or otherwise. Cary and Apex will cooperate generally in assisting the other in arranging their financings.

Cary and Apex acknowledge that each of them intends to finance a portion of its share of the costs of the Facilities with obligations the interest on which is not included in the gross income of the owners thereof for purposes of federal income taxation. Each of Cary and Apex covenants with the other that it will not take any action with respect to its ownership interest in the Facilities and its use of the Capacity thereof that would jeopardize the federal income tax treatment of interest on obligations the other issues to finance its share of costs of the Facilities. Each of Cary and Apex agree to provide to the other such certifications and other instruments as may be reasonably requested to evidence compliance with this covenant in connection with the issuance by the other of debt or similar obligations for such costs.

Section 7.2 Ownership of Property.

a. Ownership of the Facilities shall be held jointly by Apex and Cary based upon their respective Ownership Shares as provided in Article 3. In each case, such ownership shall include ownership of all real property and interests therein (including easements in real property) and personal property. All ownership shall be as Tenants-in-Common. Initially, the percentage of ownership of Cary and Apex in the respective Facilities shall be based upon the Ownership Shares set forth in Section 3.1.
b. Cary and Apex each waives any and all rights to partition the jointly owned real property for a period ending June 30, 2065. This provision shall survive the termination of this Agreement should the Agreement terminate for any reason before June 30, 2065.
c. In the event that the Ownership Shares of Cary or Apex set forth in Section 3.1 change in accordance with Sections 3.2, 3.3 or 3.5 the Parties agree to convey among each other such percentage of their ownership interest such that the ownership interest in the real property associated with the Facilities is commensurate with each Party's Ownership Share of the Facilities. The Parties further agree to execute and deliver such deeds of conveyances or other instruments as shall be necessary in order that the percentage ownership of the real property reflects the agreed upon Ownership Shares described in this Section 7.2. Compensation will be made for changes in land ownership or interests (exclusive of improvements thereto) based on the original cost of the real property which the Parties agree was $375,000.
d. Each Party is authorized to grant such mortgages, security interests, liens or other encumbrances with respect to its ownership interest (and solely its ownership interest) in the Facilities or the revenues thereof or income therefrom in connection with its arranging for financing of its share of the costs hereunder. Any such mortgage or other security interest shall be made expressly subject to the rights of the other Party, including the waiver of the right of partition affirmed in this section. The instrument creating the mortgage or other lien upon Cary's or Apex's

interest in the property shall provide that upon the occurrence of any foreclosure or similar succession to ownership by a new party, the new owner will enter into an agreement with the remaining Parties to this agreement to carry out the obligations under this agreement of the Party selling or otherwise disposing of its interest.

Section 7.3. Use of Jointly Owned Property. Each of Apex and Cary, as a joint owner of the real property, may make use of the real property for purposes of facilitating the operation of the Apex Distribution System or the Cary Distribution System, as the case may be, provided, however, that no such use shall impede or disrupt the current or future operation of the Facilities. Such use of the real property may include utilizing unused areas of the real property for temporary storage, the installation of pumps and mains and lines that are part of each Party's Distribution System, and use of unused areas for training purposes. Cary, as Lead Agency, shall be responsible for determining whether any such use disrupts the operation of the Facilities.

Section 7.4. Annual Funding. Cary and Apex will include their cost shares, as recommended by the Advisory Committee, in their respective annual budgets. No contracts awarded by the Lead Agency above the amounts in Section 6.5 that were not in the approved annual budget will be binding upon Apex until monies are approved by the Apex Town Council.

ARTICLE 8
JORDAN LAKE ALLOCATION

Section 8.1. Current Allocation. The Parties jointly hold a water supply Allocation from the State of North Carolina for 32 percent of the water supply storage in Jordan Lake, of which 73.4 percent of that total Allocation is assigned to Cary and 26.6 percent of that total Allocation is assigned to Apex. Table 2 shows the historic Allocations and how they have been shared. While the current safe yield of the total water supply storage is estimated at 100 mgd, the Parties recognize that the Allocations are granted as a percentage of the water supply storage, so the percentages listed in Table 2 govern each Party's Allocation and take precedence over the current estimated safe yield.

Table 2. Cary and Apex Jordan Lake Allocations

	Total Cary/Apex Allocation	Cary Portion		Apex Portion	
		Incremental	Resulting Total	Incremental	Resulting Total
Original (1993)	12% (12 mgd)	77% (9.24 mgd)	77% (9.24 mgd)	23% (2.76 mgd)	23% (2.76 mgd)
Round 1 (1996)	16 % (16 mgd)	77% (3.08 mgd)	77% (12.32 mgd)	23% (0.92 mgd)	23% (3.68 mgd)
Round 2 (2001)	21% (21 mgd)	77% (3.85 mgd)	77% (16.17 mgd)	23% (1.15 mgd)	23% (4.83 mgd)
Round 3 (2002)	32% (32 mgd)	66.6% (7.33 mgd)	73.4% (23.5 mgd)	33.4% (3.67 mgd)	26.6% (8.5 mgd)

Section 8.2. Round 3 Payment. The Parties recognize that since the Round 3 Allocation in 2002 and continuing through the payment to the state for calendar year 2012, Cary continued billing Apex for 23 percent of all Allocation costs without accounting for Apex's larger share of the Round 3 incremental Allocation. Within 30 days of the date on which Cary and Apex enter into this Agreement, Apex shall pay Cary $88,190.05 for the difference in what was billed and what should have been billed by Cary. This amount is the sum of i) the incremental Round 3 Allocation capital payments (33.4% instead of 23% of $766,611.60) and ii) the O&M and Administration payments (26.6% instead of 23% of $235,067.83).

Section 8.3. Round 4 and Future Allocations. The Parties are participating with other members of the Jordan Lake Partnership in Round 4 of the Jordan Lake water supply storage Allocation process and submitted a final application in November 2014 to increase the joint Cary/Apex Allocation from 32 % (32 mgd) to 46.2 % (46.2 mgd) as shown in Table 3. Of the requested increase, 3.5 % or 3.5 mgd represents transfer of the existing Wake County (for RTP South) 3.5% Allocation to Cary, and 3.5 % or 3.5 mgd represents the existing Town of Morrisville Allocation managed by Cary under separate agreement. The final Round 4 Allocations, as well as any future incremental Allocation(s) granted will be documented by updating Table 2 in a Letter of Agreement signed by the Town Manager of Cary and the Town Manager of Apex.

Table 3. Cary and Apex Jordan Lake Round 4 Draft Allocation Application Amounts					
Total Cary/Apex Allocation	Cary Portion			Apex Portion	
	Incremental	Transfer from Wake County and Managed for Morrisville	Resulting Total	Incremental	Resulting Total
46.2% (46.2 mgd)	70.8% (5.1 mgd)	7.0% (7.0 mgd)	77% (35.6 mgd)	29.2% (2.1 mgd)	23% (10.6 mgd)

Section 8.4. Allocation Contract Conditions. Each Party shall maintain compliance with applicable conditions in the current and any future Allocation contracts with the state. Cary shall prepare and submit reports required by the state; Apex shall supply any data needed regarding Apex activities for such reports.

ARTICLE 9
INTERBASIN TRANSFER

Section 9.1. Interbasin Transfer Certificate. The Parties jointly hold an Interbasin Transfer Certificate granted by the State of North Carolina on March 12, 2015.

Section 9.2. Compliance Management.

a. The Lead Agency will manage the regulatory tasks associated with certificate modification, management and reporting.
b. Cary and Apex will each maintain compliance with applicable programmatic conditions in the 2015 IBT Certificate, including any future amendments or modifications made to the jointly held 2015 IBT Certificate or replacement certificate.

Section 9.3. Costs of Management.

a. Costs of management and compliance, including, but not limited to, hiring, will be treated as Fixed Current Expenses.
b. Compliance with the operational aspects of the 2015 IBT Certificate, including compliance with any future amendments or modifications of the 2015 IBT Certificate or any replacement certificate, that vary depending on the amount of water being produced and used, including, but not limited to, any mutual aid water purchase costs from other water supply providers, will generally be treated as Variable Current Expenses.
c. Each Party shall be wholly responsible for any and all costs associated with improvements or modifications made to facilities solely owned by that Party to comply with current or future requirements related to the 2015 IBT Certificate or any replacement certificate.

Section 9.4. Certificate Modification. If any 2015 IBT Certificate amendment, modification or replacement results in any change in the responsibilities of Cary and Apex, such responsibilities will be documented in a Letter of Agreement signed by the Town Manager of Cary and the Town Manager of Apex.

ARTICLE 10
MUTUAL AID

Section 10.1. Mutual Aid between Cary and Apex. Both Parties agree to provide water to the other upon request, on a mutual aid basis, at one or more of the Interconnection Points shown in Exhibit B, as long as providing such water supply will not infringe upon the providing Party's ability to meet the water demands of its own customers. For billing and payment purposes, at the sole discretion of the providing Party any water provided at the Interconnection Points may be counted as water entering the receiving Party's Distribution System from Facilities, and deducted from the amount delivered from Facilities to the providing Party's system at the Delivery Points. The ownership and maintenance responsibilities of each Interconnection Point shall be shared jointly by Apex and Cary based upon their respective Ownership Shares as provided in Article 3

Section 10.2. Mutual Aid with Other Jurisdictions. Either Party may enter into mutual aid agreements with other jurisdictions for water supply to their systems. Such mutual aid agreements may be long-term agreements, but shall address only the supply of water to the other non-party jurisdiction on a short-term basis while emergency, technical, weather-related, or other operational conditions are being addressed by such jurisdiction. Any mutual aid agreement shall include a provision permitting denial of mutual aid and the cessation of water supply, and such provision can be invoked if providing such water supply will infringe upon the other Party's ability to meet the water demands of its customers. Any costs for mutual aid water obtained by either Party to address issues unrelated to Facilities shall be borne solely by that Party.

Section 10.3. Purchase for Facilities Operation. If the Lead Agency obtains water from another jurisdiction in order to operate Facilities so that water can be delivered to both Cary and Apex's Distribution Systems (including maintaining compliance with the 2015 IBT Certificate, or compliance with any future amendments or modifications of the 2015 IBT Certificate or replacements thereof), any costs for such water obtained will be treated as a Variable Current Expense.

ARTICLE 11
MISCELLANEOUS

Section 11.1. Assignment. Neither Party may assign this Agreement without the written consent of the other Party.

Section 11.2. Amendments. This Agreement may be amended by the mutual agreement of the governing bodies of Cary and Apex.

Section 11.3. Duration and Termination. This Agreement shall be for an initial period of approximately 30 years ending June 30, 2047. It shall continue thereafter until June 30, 2057, unless terminated by either Party by written notice to the other Party before June 30, 2042. It shall continue thereafter until June 30, 2067, unless terminated by either Party by written notice to the other Party before June 30, 2052. On the effective date of the termination, the terminating Party shall be paid for its share of the Facilities in accordance with Article 3 and all rights, title and interest in said Facilities and real property or property interest shall be conveyed to the remaining Party. The price shall be determined by an independent appraisal by a qualified firm selected by the Parties.

Section 11.4. No Waiver of Non-Compliance with Agreement. No provision of this Agreement shall be deemed to have been waived by a Party hereto unless such waiver shall be in writing and executed by the same formality as this Agreement. The failure of any Party hereto at any time to require strict performance by the other of any provision hereof shall in no way affect the right of the other Party to thereafter enforce the same. In addition, no waiver or acquiescence by a Party hereto of any breach of any provision hereof by the other Party shall be taken to be a waiver of any succeeding breach of such provision or as a waiver of the provision itself.

Section 11.5. Breach. In the event of breach of this Agreement, the Parties shall be entitled to all such legal or equitable remedy as may be available, including specific performance.

Section 11.6. Dispute Resolution. If any dispute or other matter arising under this Agreement cannot be informally resolved, such dispute or other matter shall be subject to resolution in a court of competent jurisdiction. Such disputes, or any other claims or other controversies arising out of and between the Parties to this Agreement, shall be subject to and decided by the appropriate general court of justice of Wake County, North Carolina.

Section 11.7. Additional Parties. Additional parties may be added to this Agreement only by mutual agreement of Cary and Apex as evidenced by an amendment hereto.

Section 11.8. Binding Effect. This Agreement shall be binding upon and inure to the benefit of Cary and Apex, and their respective successors and assigns. Whenever in this Agreement either a specific Party is named or referred to, such reference shall be deemed to include the successors or assigns thereof, and all the covenants and agreements in this Agreement contained by or on behalf of any Party hereto shall bind and inure to the benefit of the respective successors and assigns thereof whether so expressed or not.

Section 11.9. Severability. In the event any provision of this Agreement shall be held invalid or unenforceable by a court of competent jurisdiction, such holding shall not invalidate or render unenforceable any other provision hereof.

Section 11.10. Execution in Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original and all of which shall constitute but one and the same instrument.

Section 11.11. Applicable Law. This Agreement shall be construed and governed in accordance with the laws of the State of North Carolina.

Section 11.12. Notices. Unless otherwise provided, all notices shall be in writing and shall be sent properly addressed by first class mail to the Parties at the addresses shown below:

Town of Cary
PO Box 8005
Cary, North Carolina 27512-8005
Attention: Town Manager

With a copy to the Director of Water Resources

Town of Apex
PO Box 250
Apex, North Carolina 27502-0250
Attention: Town Manager

With a copy to the Water Resources Director

All notices shall be effective three (3) days after having been deposited, properly addressed and postage prepaid, in the U.S. Postal Service. Any Party hereto may change the person to whom or the address to which notices should be provided by giving notice to the other parties of the change.

SIGNATURE PAGES FOLLOW

IN WITNESS WHEREOF, the parties hereto have caused this CARY/APEX WATER AGREEMENT to be duly executed in their corporate names by their duly authorized officers, such CARY/APEX WATER AGREEMENT having been ratified by resolution of their respective governing boards and spread upon their minutes, all as of the date first above written.

TOWN OF APEX

By: _____
Town Manager

Date: April 10 2017

This instrument has been pre-audited in the manner required by the Local Budget and Fiscal Control Act.

By: T. Vance Holloman
Finance Officer
Town of Apex

TOWN OF CARY

By: Sean R. Stegall

Sean R. Stegall, Town Manager

Date: 04.30.17



Town Seal added
by Virginia H. Johnson
Town Clerk 4-30-17

This instrument has been pre-audited in the manner required by the Local Budget and Fiscal Control Act.

By: Michelle Boos

Finance Officer
Town of Cary

Exhibit A. Overall location map showing all the jointly owned Facilities and defining "Delivery Points" (where joint ownership ends and flow splits off to Cary or Apex service areas).

1. Intake structure, pump station
2. Raw water pipeline(s)
3. CAWTF
4. Finished water pipeline(s)
5. Delivery Points

Exhibit B. Interconnection Points

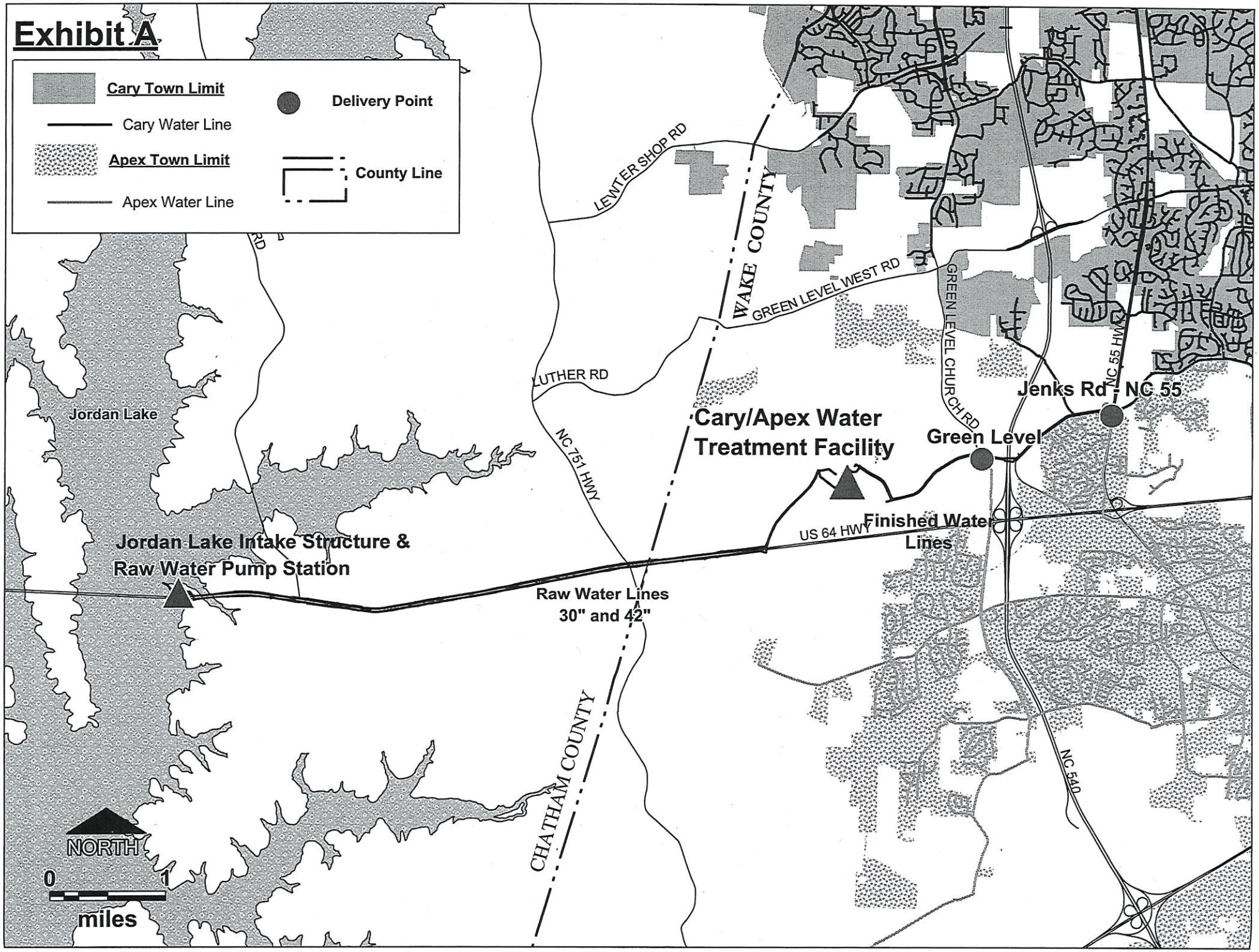
Exhibit A
Cary Town Limit
Cary Water Line
Apex Town Limit
Apex Water Line
Delivery Point
County Line
LEWTER SHOP RD
WAKE COUNTY
GREEN LEVEL WEST RD
GREEN LEVEL CHURCH RD
NC 55 HWY
Jenks Rd - NC 55
LUTHER RD
Jordan Lake
Cary/Apex Water Treatment Facility
Green Level
NC 751 HWY
US 64 HWY
Finished Water Lines
Jordan Lake Intake Structure & Raw Water Pump Station
Raw Water Lines 30" and 42"
CHATHAM COUNTY
NC 540
NORTH
0
1
miles

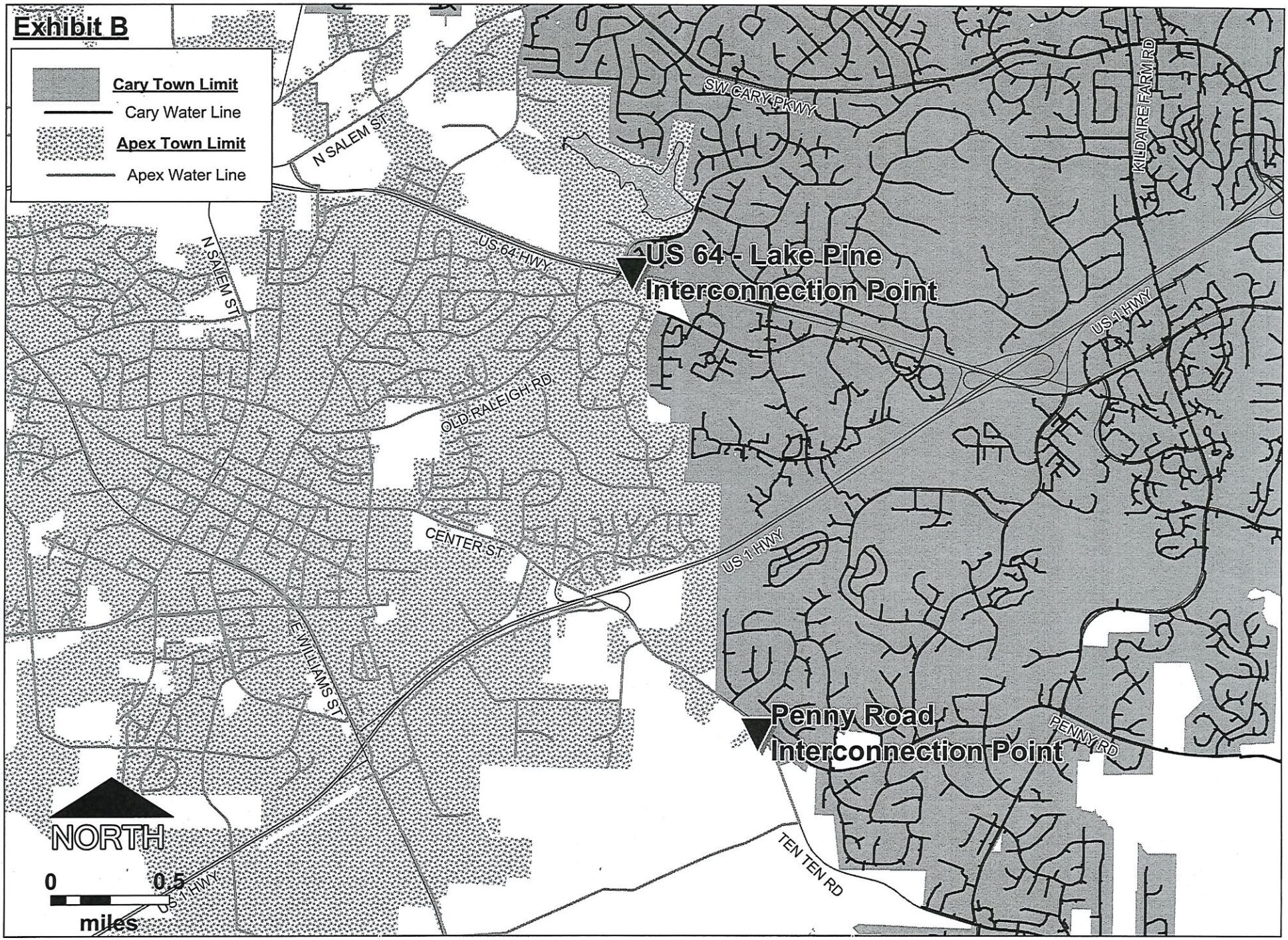
Exhibit B
Cary Town Limit
Cary Water Line
Apex Town Limit
Apex Water Line
US 64 - Lake Pine
Interconnection Point
Penny Road
Interconnection Point
SW CARY PKWY
KILDAIRE FARM RD
N SALEM ST
US 64 HWY
US 1 HWY
OLD RALEIGH RD
CENTER ST
E WILLIAMS ST
PENNY RD
TEN TEN RD
NORTH
0
0.5
miles

RESOLUTION NO. 2017-0404-04

RESOLUTION AUTHORIZING 2017 CARY/APEX WATER TREATMENT FACILITY AGREEMENT

WHEREAS, Apex and Cary have jointly conducted a wide range of planning, permitting and construction activities to meet the water supply needs of their respective service areas since 1980; and

WHEREAS, Apex and Cary together hold a water supply allocation from the State of North Carolina for water supply storage in B. Everett Jordan Lake ("Jordan Lake"), of which 23.5 percent is assigned to Cary and 8.5 percent is assigned to Apex; and

WHEREAS, Apex and Cary were jointly granted a new Interbasin Transfer certificate from the State of North Carolina on March 12, 2015, which replaced the previous Interbasin Transfer Certificate that had been issued jointly to Cary, Apex, Morrisville and Wake County in 2001; and

WHEREAS, Apex and Cary entered into an Agreement dated April 26, 1988 regarding the ownership and operation of the Cary/Apex Water Treatment Facility ("CAWTF") which was amended January 26, 1989; August 1, 1995; August 3, 1999; April 5, 2000; January 15, 2005; and December 20, 2011; and

WHEREAS, Apex and Cary jointly own the CAWTF which has a current maximum day capacity of 40 million gallons per day (mgd), of which 77 percent (30.8 mgd) is owned by Cary and 23 percent (9.2 mgd) is owned by Apex; and

WHEREAS, Apex and Cary jointly own related raw water intake and transmission facilities as well as finished water pipelines and other ancillary facilities that deliver water to the service areas of Apex and Cary, all of which is owned 77 percent by Cary and 23 percent by Apex; and

WHEREAS, Apex and Cary have planned and designed for the expansion of the CAWTF to a maximum day capacity of 56 mgd and have commenced with construction of such expansion and the addition and expansion of other related water supply facilities, all of which 77 percent will be owned by Cary and 23 percent will be owned by Apex; and

WHEREAS, Apex and Cary desire to provide the terms pursuant to which they may, jointly and/or separately, enter into agreements to provide untreated or treated water to other jurisdictions provided such provision of water to others does not infringe on the other party's ownership interest or ability to use its share of the capacity; and

WHEREAS, Apex and Cary desire to enter into this Agreement to, among other things, address the CAWTF expansion and provide a process for the sale of water to other jurisdictions; and

WHEREAS, the North Carolina General Statutes §160A-322 authorizes the Town to enter into contracts for the supply of water and other public services and §153A-278 authorizes two or more units of local government to cooperate in the exercise of certain powers in accordance with the provisions of Chapter 160A, Article 20, Part 1.

NOW THEREFORE, the Town Council of the Town of Apex resolves that:

The 2017 Cary/Apex Water Agreement is hereby approved and the Town Manager is authorized and directed to execute the Cary/Apex Water Treatment Facility Agreement in substantially the form attached to this Resolution.

This Resolution shall be effective upon adoption.

Adopted: April 4, 2017

THE TOWN OF APEX

By: _____
Lance Olive, Mayor

APEX 1873 NORTH CAROLINA (Corporate Seal)

ATTEST:

_____
Donna B. Hosch, Town Clerk, CMC, NCCMC

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: CONSENT AGENDA

Meeting Date: December 17, 2019

Item Details

Presenter(s): Drew Havens, Town Manager

Department(s): Administration

Requested Motion

Motion to allow the Apex Farmers' Market to utilize a portion of their Town appropriation in FY 2019-20 for management services.

Approval Recommended?

Yes

Item Details

The Apex Farmers' Market received a grant of $10,000 as part of the Town's annual program to provide funding to non-profit agencies providing services in Apex. Their application stated that the Town's funding would be used for their programs, including their new "Apex Eats" program. While this program has funding needs that are being met by the Town's grant, they are asking to have the latitude to use some of the grant for management support. The attached letter from Lise Zublena, the Board Chair of the Farmers' Market, states, "Our most significant expenses cover the management of the operations and vendor relations, which is roughly 90% of budget. The various tasks required to operate our year-round farmers market are estimated to be 40 hours a week."

Because the Council approved the grant for program support, and our stance has been that we discourage the funding of salaries we wanted to obtain your approval of a shift in the use of this year's grant. Our posture on funding salaries is because we make no guarantees on funding availability and we did not want to be responsible for an agency not being able to pay someone if they were counting on our funding. In this case, if Council approves this modification in the use of Town funding, the funds would not be used to directly fund salaries, but rather pay a contracted agency for management support.

Attachments

- Letter from Farmers' Market Board of Directors

December 4th, 2019

Dear Drew,

Over the course of the last five years, funding availability for Farmers Markets has changed significantly. Despite our increase in sponsorship and community donations, we discovered that we simply could not operate the way we had anticipated upon creating the organization.

This year we performed a regional and national study on Farmers Market operations. We used the information gathered in this study to reorganize our operations in a way that would allow us to continue to offer our weekly, vibrant market but stay closer to our more reliable operational budget. Historically, our income consists of vendor fees which add up to approximately $4,000 a year. We also rely heavily on the $10,000 town grant which brings our total estimated income to about $14,000 a year. We cannot operate this year round weekly market and provide the services needed to our community and our vendors without additional financial and in kind support.

We request the ability to use town funding to support covering costs of our overall operations/program management and vendor relations. Our most significant expenses cover the management of the operations and vendor relations, which is roughly 90% of budget. The various tasks required to operate our year-round farmers market are estimated to be 40 hours a week. We have signed an outside agency for the 2020 season who will manage all aspects of operations for the market at less than half the salary as a pro bono action.

This year, we are investing in becoming a 501c3 organization so that we can reduce our operating costs even further and increasing the “face” of the market through increased engagement community collaboration with the town. We are working to continue to make our organization more valuable to the community and streamline operations so that we can continue to grow and thrive.

Thank you for your consideration,

The Apex Farmers Market Board

Lise Zublena
Doug Clark
Eileen Herbst

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: PUBLIC HEARING

Meeting Date: December 17, 2019

Item Details

Presenter(s): Amanda Morrell, Landscape Architect - Stantec with Shannon Cox, Long Range Planning Manager – Town of Apex

Department(s): Planning Department

Requested Motion

Public Hearing and possible motion regarding adoption of the Downtown Plan.

Approval Recommended?

Planning staff recommend approval.

The Planning Board unanimously recommended approval at their December 9, 2019 meeting.

Item Details

In January 2019, The Town of Apex, with the Stantec Consultant Team, began a public process to develop the Apex Downtown Master Plan & Parking Study (Downtown Plan). The Town Council will consider the draft Downtown Plan, hear comments from the public, and make a decision regarding potential plan adoption.

Attachments

- Staff report
- Downtown Plan Public Draft
- Downtown Plan Comment and Response Summary

STAFF REPORT

Apex Downtown Master Plan & Parking Study

December 17, 2019 Town Council Meeting

In January 2019, The Town of Apex, with the Stantec Consultant Team, began a public process to develop the *Apex Downtown Master Plan & Parking Study* (Downtown Plan). The Town Council will consider the draft Downtown Plan, hear comments from the public, and make a decision regarding potential plan adoption.

The Downtown Plan is intended to establish strategies and key recommendations to serve as a roadmap towards making downtown Apex a more livable, walkable, and thriving urban place. The plan is intended to be the primary vision-setting and policy-directing strategy to lead the ongoing revitalization of downtown for the next 20 years. In addition to establishing priorities for downtown's future land use and development, housing needs, retail market, public spaces, and parking; the plan is expected to guide real estate and infrastructure investments and planning, programming, and economic development activities going forward. The Downtown Plan addresses the entire area within the Apex Peakway loop, with an emphasis on the core blocks around Salem Street.

The planning process, including establishment of principles, goals, and priority projects was guided by a Steering Committee with representation from:

- Apex Town Council
- Apex Planning Board
- Apex Farmers Market
- Apex Downtown Business Association
- Apex Historical Society
- Downtown developers
- Downtown business owners
- Downtown residents
- Downtown places of worship
- Apex Chamber of Commerce
- Apex Transit Committee
- Apex Public Art Committee
- Apex Parks, Recreation, and Cultural Resources Advisory Commission

In addition to citizen representation on the Steering Committee, the Apex community was engaged through two online surveys (one general, one for the parklet project), a public workshop, the project web page, PeakFest, a week-long charrette, and a public presentation of draft recommendations. Information about the Downtown Plan was distributed through a flyer in utility bills, social media, the Town's website, flyers posted throughout downtown and at places frequently visited by citizens, email notifications, and through support from the Steering Committee. Meetings on specific topics were held with invited participants to gather detailed input for the plan, including: transportation; infrastructure; public safety and accessibility; institutions; retail; restaurants; housing; art and history; and tourism, programming, and public space. Finally, a briefing was held for Town Council midway through the planning process.

The resulting Downtown Plan is attached for consideration. Digital appendices are available online at: https://www.apexnc.org/DowntownPlan.

Public Comments:

Staff is recommending some changes to the draft Downtown Plan released for public review on November 15, 2019. Comments received and any recommended changes are described in Attachment 2. Any additional comments received following the preparation of this staff report will be described during the presentation.

STAFF REPORT

Apex Downtown Master Plan & Parking Study

December 17, 2019 Town Council Meeting

Planning Board Recommendation:
The Planning Board unanimously recommended adoption of the Downtown Plan during their December 9, 2019 meeting.

Staff Recommendation:
Planning staff requests that the Town Council adopt the Downtown Plan, with the changes as recommended by staff.

Attachments:
Attachment 1 – Draft *Apex Downtown Master Plan & Parking Study*
Attachment 2 – Summary of comments and recommended changes to the public draft



Stantec

APEX DOWNTOWN MASTER PLAN & PARKING STUDY

DRAFT 11.15.19

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09 Implementation 164

Digital Appendix Available at
https://www.apexnc.org/1318/Downtown-Plan

ACKNOWLEDGEMENTS

This planning effort would not have been possible without the commitment of many individuals who are enthusiastic about the vision presented within this document. Dedicated town staff and elected officials, passionate Steering Committee members, involved citizens and stakeholders, along with a team of skilled consultants made for a dynamic combination.

DOWNTOWN PLAN APEX NORTH CAROLINA

Elected Officials

Mayor Lance Olive
Mayor Pro Tem Nicole Dozier
Council Member Bill Jensen
Council Member Wesley Moyer
Council Member Audra Killingsworth
Council Member Brett Gantt
Mayor-elect Jacques Gilbert
Council Member-elect Terry Mahaffey
Council Member-elect Cheryl Stallings

Key Town Staff

Shannon Cox, Project Manager, Long Range Planning Manager
Dianne Khin, Planning Director
Bonnie Brock, Deputy Town Clerk
Amanda Bunce, Current Planning Manager
Jenna Shouse, Long Range Planner
Joanna Helms, Economic Development Director
Stacie Galloway, Communications Manager
Drew Havens, Town Manager
Shawn Purvis, Assistant Town Manager
David Hughes, Assistant Town Manager
Chief John Letteney, Police Chief
Chief Keith McGee, Fire Chief
John Brown, Parks, Recreation & Cultural Resources Director
Marty Stone, Assistant Town Manager
Sarah Rayfield, Senior Planner
Angela Reincke, Parks and Greenways Planner
Jose Martinez, Public Works & Transportation Director
Randy Bennetts, Street Supervisor
Erika Sacco, Information Technology Director
Captain Ann Stephens, Patrol Commander
Russell Dalton, Senior Transportation Engineer

Stantec

Consultant Team

Prime Consultant: Stantec Urban Places
Craig Lewis, Principal-in-Charge
Amanda Morrell, Project Manager
Dylan McKnight, Assistant Project Manager
Tim Tresohlavy, Parking & Mobility Lead
Jaquasha Colon, Urban Designer
Crystal Ross, Urban Designer
Erica Ortman, Transportation Planner
Ashley Thompson, Urban Designer
Ginny Young, Urban Designer
Subconsultants
Zimmerman Volk Associates | Laurie Volk
Streetsense | Larisa Ortiz

Steering Committee Members

Alexis Jenssen, Apex Farmers Market
Brett Gantt, Town Council Planning Committee, Town of Apex
Erin Thompson, Apex Historical Society
Joe Foresta, Downtown Developer
Julia Beam, Apex Downtown Business Association
Karin Cleary, Downtown Resident
Kyle Denis, Downtown Business Owner
Lance Olive, Mayor, Town of Apex
Meredith Kromenhoek, Downtown Business Owner
Nick Bryant, Apex Transit Committee, Town of Apex
Reggie Skinner, Planning Board, Town of Apex
Shane Reese, Apex Downtown Business Association
Shannon Flaherty, Apex Chamber of Commerce
Stuart Jones, Downtown Business Owner
Tim Shaw, Apex Baptist Church
Tom Colwell, Public Art Committee & Parks, Recreation, and Cultural Resources Advisory Commission

Digital Appendix Available at
https://www.apexnc.org/1318/Downtown-Plan



EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Downtown Master Plan & Parking Study sets a course in Apex for transformational resilience. The success of great downtowns today depends on the experiences available for both residents and visitors. Being competitive in the marketplace means setting those experiences apart from other communities. Downtown Apex has a unique history and physical bones to rely on, but this plan's recommendations push the creation of really great places. Most importantly, the creation of really great PEOPLE places!

The plan is the result of a community-driven process that promotes vibrancy. Meaningful outreach and engagement of the citizens that live, work, and play in Apex was the key ingredient to producing a plan with public buy-in and political will. The community input was distilled to create three guiding principles which would influence every key goal and recommendation of the plan. Those principles ultimately informed the Top 10 projects for implementation.

1
Put People First

2
Celebrate Salem Street

3
Embrace Authentic Apex

Why this Plan? Why Now?

Community planning is about preparation. In the case of the Downtown Master Plan & Parking Study, the Town of Apex is preparing for a future of its own making. One built on beautiful historic bones and rich stories of generations past while looking forward to a future full of vibrancy and new memories. With an increasing population placing demand on what downtown needs to be and a national shift in people seeking urban living, the plan's timing could not be more perfect. The clear actions set forth must be methodically and diligently pursued as each step brings downtown Apex one step closer to the vision of prosperous vibrancy.

The Process & Key Findings

The planning process was less than a year in length in order to create short feedback loops between the design team and the community. The energy and momentum a process like this creates is palpable and yields quicker implementation of key recommendations. With decision makers and the general public at the table together along with a team of design experts, the resulting vision is truly insightful, boldly realistic, and fully backed by a bevy of champions.

The plan is built on principles and goals, but it is also built on data. Extensive research and analysis was conducted related to housing, retail, and parking with resulting development programs grounded in market reality. Quality, well-placed mixed-use development with appropriate amounts of well-managed parking begin to shift an often missed historic downtown into a vibrant downtown district no one wants to miss out on! Pushing the amount and types of housing within walking distance to that excitement is another vital component of forecasting success.

Guiding Principles

Put People First
For the vision of downtown Apex to be realized, people must be put first.

Celebrate Salem Street
The "Main Street" environment of Salem is the center of social interaction and community activities and all energy should emanate from this core.

Embrace Authentic Apex
The changes recommended in this plan are not meant to turn downtown into something different; rather to ensure the unique authenticity of Apex is enduring, embraced, and enhanced for residents and visitors to experience and enjoy.



Without change there is no innovation, CREATIVITY, or incentive for improvement. Those who initiate change will have a better opportunity to manage the change that is inevitable.

-William Pollard

Key Goals

The Guiding Principles influence the nine Key Goals established for the plan. These goals are intended to push the possibilities for downtown toward a more vibrant future.

Manage Parking Efficiently & Effectively
Parking strategies will involve a "new" parking supply in combination with placemaking, enforcement, programs, and alternate mobility options to yield an efficient and effective system.

Make Salem Street the Best Public Space in the Region
This is a bold goal that will be achieved through incremental investments to not just the streetscape and public spaces, but also the way the ground floor tenant mix is curated and the types and variety of activities that are programmed.

Create Vibrant Spaces for People to Gather
This goal will be realized through a variety of opportunities in and around downtown in spaces both expected and that might come as a surprise!

Expand Housing Options that Promote Equity
Providing quality housing options that mix income levels and generations should be provided within a walkable and bikable distance to the downtown core.

Create Connections to Downtown
Multi-modal connectivity to downtown is a critical element of bringing more people downtown safely.

Encourage a Diversity of Activities and Programming
This goal requires the creation of public spaces suitable for a diversity of activities.

Roll Out the Welcome Mat with Small Town Charm
Visual cues, such as quality development and signage at the gateways to downtown, will invite people into the community and set the pace for their experience.

Honor the History of Downtown
This goal is not about trying to recreate times gone by, but it is about celebrating the unique history of Apex in a prominent way through signage, art, and public space design in downtown.

Re-imagine Spaces through Art, Innovation, and Creativity!
The plan looks at forgotten spaces with creativity and strives to re-imagine those areas as vibrant, sustainable places for **PEOPLE**!

TOP 10 PROJECTS (IN PUBLIC PRIORITY ORDER)

1 Transform the Salem streetscape



2 Energize the alleys... Seaboard, Commerce, and Fire Station



3 Re-purpose the parking area at the Depot into the premier public space downtown



4 Add a net gain of 200 parking spaces within a 5-minute walk, and 100 within a 3-minute walk



5 Attract five new restaurants/ bars/breweries and a boutique hotel to Salem Street



6 Re-envision the fire station site as a civic + mixed use development



7 Install wayfinding signage in and around Downtown



8 Revitalize the Tunstall House, grounds, and strollway as a pastoral treasure and link between Salem Street and the civic center



9 Make the transit station at NC 55 and Salem Street a multi-modal and iconic gateway



10 Construct 100 new housing units within a 10-minute walk (1/2 mile) of Downtown



Matrix of Guiding Principles, Key Goals, and Top 10 Projects

Guiding Principles Met	Top 10 Projects	Key Goals: Manage Parking Efficiently & Effectively	Make Salem Street the Best Public Space in the Region	Create Vibrant Spaces for People to Gather	Expand Housing Options that Promote Equity	Create Connections to Downtown	Encourage a Diversity of Activities and Programming	Roll Out the Welcome Mat with Small Town Charm	Honor the History of Downtown	Re-imagine Spaces through Art, Innovation, and Creativity!
1,2,3	1-Transform the Salem streetscape	■	■	■		■	■	■	■	■
1,2,3	2-Energize the alleys...Seaboard, Commerce, and Fire Station		■	■		■	■	■	■	■
1,2,3	3-Re-purpose the parking area at the Depot into the premier public space downtown	■	■	■			■	■	■	■
1,2,3	4-Add a net gain of 200 parking spaces within a 5-minute walk, and 100 within a 3-minute walk.	■	■			■				
1,2,3	5-Attract five new restaurants/ bars/ breweries and a boutique hotel		■	■		■	■	■		■
1,2,3	6-Re-envision the fire station site as a civic + mixed use development		■	■	■		■	■	■	■
1,2,3	7-Install wayfinding signage in and around Downtown	■	■			■				■
1,2,3	8-Revitalize the Tunstall House, grounds, and strollway as a pastoral treasure and link between Salem Street and the civic center	■		■		■	■	■	■	■
1,2,3	9-Make the transit station at 55 and Salem an iconic civic building and gateway feature		■	■		■			■	■
1,2,3	10-Construct 100 new housing units within a 10-minute walk (1/2 mile) of Downtown				■	■		■		

Guiding Principles
1-Put People First
2-Celebrate Salem Street
3-Embrace Authentic Apex

How We Know We Succeeded (also found in Chapter 9)

- Salem Street will be full of people – day and night.
- Retail and restaurant rents will outperform office.
- We've added 100 more housing units to the downtown area.
- We've created a REAL parking problem.
- People of all ages, ethnicities, and economic levels will be downtown.
- Entrepreneurs will have opened 10 more businesses.
- Children will be playing and making memories in downtown.
- Residents and visitors will know the story of downtown Apex.
- People will reach downtown Apex by biking, walking, bus, and car.
- Partnerships and old-fashioned hard work will have made it happen.

Implementation Matrix (also found in Chapter 9)

Order of Magnitude	Estimated Cost Range
$	$1 - $50,000
$$	$50,000 - $250,000
$$$	$250,000 - $1 million
$$$$	$1 million - $2 million
$$$$$	$2 million - $5 million
$$$$$$	$5 million+

Key Recommendations Table Legend

Level of Public Funding Required (Order of Magnitude $ - $$$$$$)
Operating or Capital Expenditure (City)
Private or Non-City Expenditure

[$] [O+C] [Private] [6-10] [Code/Policy] [Program/Study]

Timeframe for Implementation
[1-5] [6-10] [11-15] [16-20] or On-going

▨ = **Top 10 Project**

Reference Number	Project/Task	Page Number	Level of Public Funding Required	Operating or Capital Expenditure	Private or Non-City Expenditure	On-going	Year 1-5	Year 6-10	Year 11-15	Year 16-20	Year 20+	Code/Policy	Program/Study
4 Retail Market Conditions & Strategies													
4A	Improve the public realm for retail by adding interim parklets along Salem Street to allow for more spillover retail/dining experiences.	72	$	O+C	Public/ Private		X						
4B	Strengthen downtown Apex as a "theme/festival" destination district by adding 60-70,000 square feet of space to create 150,000 square feet total, which will increase the capture rate and grow the trade area by connecting the disconnected micro-climates with new offerings.	72	$$$$$$	O+C	Public/ Private		X	X					
4C	Ensure the appropriate tenant mix by aligning retail recruitment efforts with demographics/demand and leakage opportunities.	72	$	O	Public/ Private	X							X
4D	Develop communication materials based on a new downtown brand to share market information and the overall downtown investment strategy with potential investors and tenants.	72	$	O			X						
4E	Program spaces with ambient entertainment to encourage greater visitation to downtown on non-event days.	72	$	O	Public/ Private	X							X
4F	Promote and program events that drive retail sales and are done in collaboration with merchants and drive people into stores rather than keep them outside of stores.	72	$	O	Public/ Private	X							X

Reference Number	Project/Task	Page Number	Level of Public Funding Required	Operating or Capital Expenditure	Private or Non-City Expenditure	On-going	Year 1-5	Year 6-10	Year 11-15	Year 16-20	Year 20+	Code/Policy	Program/Study
6 Parking Conditions & Strategies													
6A	Prioritize and invest in consistency and character of the Apex streetscapes.	101	$$$$$$	C			X	X					
6B	Improve sidewalk and crosswalk conditions within the core of downtown.	101	$$$	C			X						
6C	Improve consistency of parking signage and wayfinding in and around downtown.	101	$	C			X						
6D	Review current parking enforcement program including current time-limited locations and compare with high-demand parking utilization counts.	102	$	O			X						X
6E	Conduct data collection for a parking turnover analysis (length of stay) for high-demand parking areas.	102	$	O		X							X
6F	Allow overnight parking in the downtown core to make downtown residential viable and support safe travel of patrons who choose to ride-share home.	102	$	O	Public/ Private	X							X
6G	Work with the new Downtown Development Coordinator and Downtown Business Association on a strategy to increase turnover for on-street locations.	102	$	O			X						X
6H	Create a Downtown Ambassador's program for (polite) enforcement efforts.	102	$	O			X						X
6I	Initiate a no cost warning ticket for first-time 'violators'.	102	$	O			X						X
6J	Add a net gain of 200 public parking spaces within a 5-minute walk, with a minimum of 100 within a 3-minute walk.	102	$$$	C			X						
6K	Establish leased parking agreements with private parking owners.	103	$	O	Public/ Private		X						
6L	Create a valet program for evenings and weekends.	103	$	O	Public/ Private			X					X
6M	Conduct a preliminary engineering feasibility study for a potential parking deck.	103	$	C			X						X
6N	Consider establishing hourly paid parking along Salem Street.	103	$	O				X					X
6O	Incorporate a bike-share program with stations around key destinations in downtown.	103	$	C			X						X
6P	Balance demand more evenly by (a) encouraging turnover in lots that reach 85% occupancy, and (b) allowing longer-term parking in lots that were below 60% occupied.	105	$	O		X							X
6Q	Prepare for national smart mobility trends by reaching out to peer communities, attending national or regional conference sessions, planning studies aimed at feasibility-level analysis, and continually reaching out to the citizens of Apex for involvement and guidance.	106	$	O		X							X
6R	Evaluate all emerging technology packages and select an app-based parking occupancy system for the Town of Apex's public parking areas.	106	$$$	C			X						X
7 Development Conditions & Strategies													
7A	Work with developers to create neighborhoods that mix housing typologies in a range of price points and also provide common open space.	115	$	O	Public/ Private	X						X	
7B	Adopt an affordable housing action plan and seek guidance from peer communities in North Carolina, such as Davidson, to understand their approach to affordable/workforce housing.	115	$$	O			X					X	X
7C	Encourage the active reuse of historic structures with businesses that add vibrancy to Salem Street.	117	$	O	Public/ Private	X						X	
7D	Attract a boutique hotel to downtown Apex to provide an alternative hospitality option within walking distance of the core.	117	$	O	Public/ Private			X					
7E	Promote sensitive infill of housing and commercial in the Justice Heights neighborhood.	117	$	O	Public/ Private	X						X	
7F	Direct incremental infill within the downtown core of both mixed use and all forms of urban housing.	118	$	O	Public/ Private		X	X					

Reference Number	Project/Task	Page Number	Level of Public Funding Required	Operating or Capital Expenditure	Private or Non-City Expenditure	On-going	Year 1-5	Year 6-10	Year 11-15	Year 16-20	Year 20+	Code/Policy	Program/Study
7G	Require new development to build quality street network connections based on an overall connectivity vision.	120	$	O	Public/ Private	X						X	
7H	Discourage outparcel development that functions independently and encourage phased infill that shares parking and access while addressing the streets.	120	$	O	Public/ Private	X						X	
8 Key Goals													
8A	Transform the Salem streetscape.	126	$$$$$	O+C			X						
8B	Energize the alleys...Seaboard, Commerce, and Fire Station.	137	$-$$		Private		X						
8C	Attract five new restaurants/bars/ breweries and a boutique hotel to Salem Street.	139	$	O	Public/ Private		X						
8D	Recruit and form relationships with developers familiar with towns like Apex to implement urban housing in downtown.	142	$	O	Public/ Private	X							
8E	Work to meet demand for downtown housing and improve the housing stock through institutional partnerships.	142	$$	O+C	Public/ Private	X							X
8F	Construct 100 new housing units within a 10-minute walk (1/2 mile) of downtown	142	$	O	Public/ Private		X	X					
8G	Re-purpose the parking area at the Depot into the premier public space downtown.	146	$$$$	C	Public/ Private		X	X					
8H	Make the transit station at NC 55 and Salem Street a multi-modal, iconic, gateway feature.	148	$$$$$$	C				X					
8I	Install wayfinding and gateway signage in and around downtown based on a new branding campaign.	149	$	C			X						
8J	Attract local breweries downtown and encourage co-location.	150	$	O	Public/ Private		X						
8K	Work with local and regional artists to implement public art projects along Salem Street that honor its history and vision for the future.	154	$	C	Public/ Private		X						
8L	Host a mural competition to generate excitement for public art downtown.	154	$	O	Public/ Private		X						X
8M	Revitalize the Tunstall House, grounds, and strollway as a pastoral treasure and link between Salem Street and the civic center	157	$$$	O+C	Public/ Private	X							

Reference Number	Project/Task	Page Number	Level of Public Funding Required	Operating or Capital Expenditure	Private or Non-City Expenditure	On-going	Year 1-5	Year 6-10	Year 11-15	Year 16-20	Year 20+	Code/Policy	Program/Study
8N	Re-envision the fire station site as a civic and mixed-use development.	158	$$$$$$	C	Public/ Private		X						X
8O	Seek out and create a list of spaces around downtown that could use a little love; create a committee dedicated to tactical interventions in those spaces.	160	$	O+C	Private	X							X
8P	Utilize available resources to ensure the community develops and operates in a way that protects the environment and promotes sustainability for future generations.	162	$	O+C	Public/ Private	X						X	X
9 Implementation													
9A	Modify front and side setbacks, building heights, parking, and the location of certain zoning districts to ensure the Unified Development Ordinance allows for the desired character of downtown.	167	$	O			X					X	
9B	Audit local businesses to ensure they are taking ownership of their online presence and monitoring patron reviews.	170	$	O	Public/ Private	X							X
9C	Expand the toolbox of local grants, programs and incentives available through city budget appropriations.	170	$$$	O+C		X						X	
9D	Schedule a commercial broker tour of downtown with representation from the entire Raleigh region.	170	$	O	Public/ Private		X						
9E	Initiate a retail attraction committee whose responsibilities include developing a prospect database.	170	$	O	Public/ Private		X						X
9F	Create a full marketing package for the downtown district that includes a “Call for Business” web page as a retail attraction tool.	170	$$	O			X						
9G	In addition to state and federal tax credits, expand the local development and investment program to include local tax incentives for housing projects.	171	$$$	O+C		X						X	
9H	Utilize the streets and alleys as key people spaces for programming.	173	$	O	Public/ Private	X							
9I	Offer event grant funding to support downtown vitality by non-city organizations.	173	$$	O+C	Public/ Private	X							X
9J	Perform annual reviews to assess progress related to the items in the plan’s implmentation matrix with staff, council, and ADBA representatives.	184	$	O	Public/ Private	X							X



01
INTRODUCTION TO THE PLAN

01 INTRODUCTION TO THE PLAN

Creating a plan that promotes transformative change is about understanding the overall principles and goals while also considering the current successes to build upon. Downtown Apex is already a success in so many ways; probably most importantly, downtown is a success in the hearts and minds of its citizens. The community exudes a true feeling of local pride and an authenticity which cannot be replicated in the region.

Stantec, a multi-disciplinary team of professionals specializing in building great places, was hired by the town to lead the process. With great care and attention, the team set out to understand downtown Apex—from economics to parking to public space. Through an intense public outreach process, Apex citizens crafted ideas that will improve their quality of life today and for future generations. Detailed design studies to promote vibrancy were created with a continuous feedback loop of public input during a week-long design charrette.

The recommendations offer high-quality solutions intended to spur additional investments in downtown housing, retail and commercial development, the arts and history, and the multi-modal transportation system including parking. Development decisions based on sound market realities and national best practices will propel downtown Apex into the future.

7
number of restaurants currently in downtown Apex

12
number of retail shops currently in downtown Apex

7
number of AirBnBs within the Apex Peakway

1.1 Purpose

This planning process sets strategy and key recommendations to serve as a roadmap towards making downtown Apex a more livable, walkable, and thriving urban place. The plan is intended to be the primary vision-setting and policy-directing strategy to lead the on-going revitalization of downtown for the next 20 years. In addition to establishing priorities for downtown's future land use and development, transportation network, parks and open spaces, and major development projects, the plan is expected to guide real estate and infrastructure investments and planning and economic development activities going forward.

The resulting plan places special emphasis on the importance of good urban design and the role it plays in creating places of lasting value. The plan is cognizant of changes in technology and the potential impacts on real estate and urban redevelopment best practices. Moreover, understanding and accounting for potential technological disruptions and market shifts, such as autonomous vehicles and the changing landscape for brick-and-mortar retail, are important considerations as well.

1.2 State of Downtown Apex

Downtown Apex exudes a quaint hometown feel with charming architecture and friendly people. Historic homes and churches portray a feeling of community and generational traditions, while newer investments, such as free downtown wi-fi, the Tobacco & Mule Exchange renovation, and even the town's civic campus, tell visitors that Apex is evolving. The current restaurant offerings on Salem Street alone create a destination district for the region with the power to attract residents and visitors alike. Retail shops are well positioned to take advantage of these patrons, but strides are still possible in creating the right tenant mix for the area. Downtown is dominated visually by cars—mostly because single-occupant vehicles are the predominant mode of access to the district. Aspects of the pedestrian experience need attention including the lack of shade trees once parked and walking around the area. Despite any current criticism of design details, there is something special about downtown Apex...something impalpable.



This page includes a letter from the mayor during the planning process as well as the mayor during the adoption process—a demonstration of unity for the Town of Apex's future.

A Note from Town Leadership

Founded in 1873, the downtown area of Apex, NC is the historic wonder that brings people back again and again. Just as gold is refined by fire, our downtown structures were made more precious and enduring after fire destroyed many of the wooden buildings over a century ago, and were then rebuilt with brick. From the union depot and the former town hall to the M&F Bank and the century-old homes, a walk through downtown Apex provides a real glimpse of the past. Yet, it is clearly up-to-date, with unique indoor and outdoor eating and drinking options, and shops offering all things old and new.

Many of the town staff, council, business owners and citizens have invested hours researching and proposing ideas to make the future vision a reality in developing this Downtown Master Plan. Stantec and their team of professionals have guided the process and helped us formalize this document to provide us with a "north star" as we weigh ideas over the next 10 to 20 years. This will ensure that we spend your money wisely and only on the things that fit within the big picture.

As we move forward to the town's sesquicentennial anniversary, we fondly hold Apex's past in our minds while we anticipate the vitality of its future. We remain a friendly town that enjoys a leisurely lunch and a relaxing night out with friends. We are truly a "Millennial Mayberry".

On behalf of the Apex Town Council, I thank you for your commitment to Apex and hope you will take advantage of all the offerings and enjoy downtown Apex, as I have done for the past 40 years of my own life. Here's hoping you have the peak of a good life here!

-Mayor Lance Olive

When I think of my hometown Apex, my vision of where we have come from and what is yet to come continues to excite me as a citizen and incoming mayor. Throughout the history of our great town we have been able to maintain an authentic small town character that continues to attract many to relocate and call Apex home.

Our downtown has remained a staple in our community as it speaks of the rich history and foundation of our existence. Moreover, it serves as a gathering place for citizens and visitors to enjoy while fueling economic vitality for our town through our business community.

Through this vision, I see the spectrum of diversity illuminating our town even brighter. Our new Downtown Plan will energize the community and create a pathway for the advancement of our vision throughout the entire town.

I commend our town staff, citizens, business owners, and stakeholders who worked collaboratively to create this plan. I'm excited! Please join me and fellow citizens in celebrating the genesis of yet another victory for Apex. There is nothing we can't accomplish, when we work together.

-Mayor Jacques K Gilbert

1.3 The Study Area

Downtown Apex is located southwest of Raleigh, and its origins date back to 1869. The area was the highest point on this portion of the Chatham Railroad which ran from Virginia to Florida. The study area for the Downtown Master Plan and Parking Study is defined as the 2.5 square mile area generally bounded by the Apex Peakway with an emphasis on the core blocks around Salem Street between Hunter Street to the north, E. Williams Street to the south, Upchurch Street to the west, and Tunstall Avenue to the east.

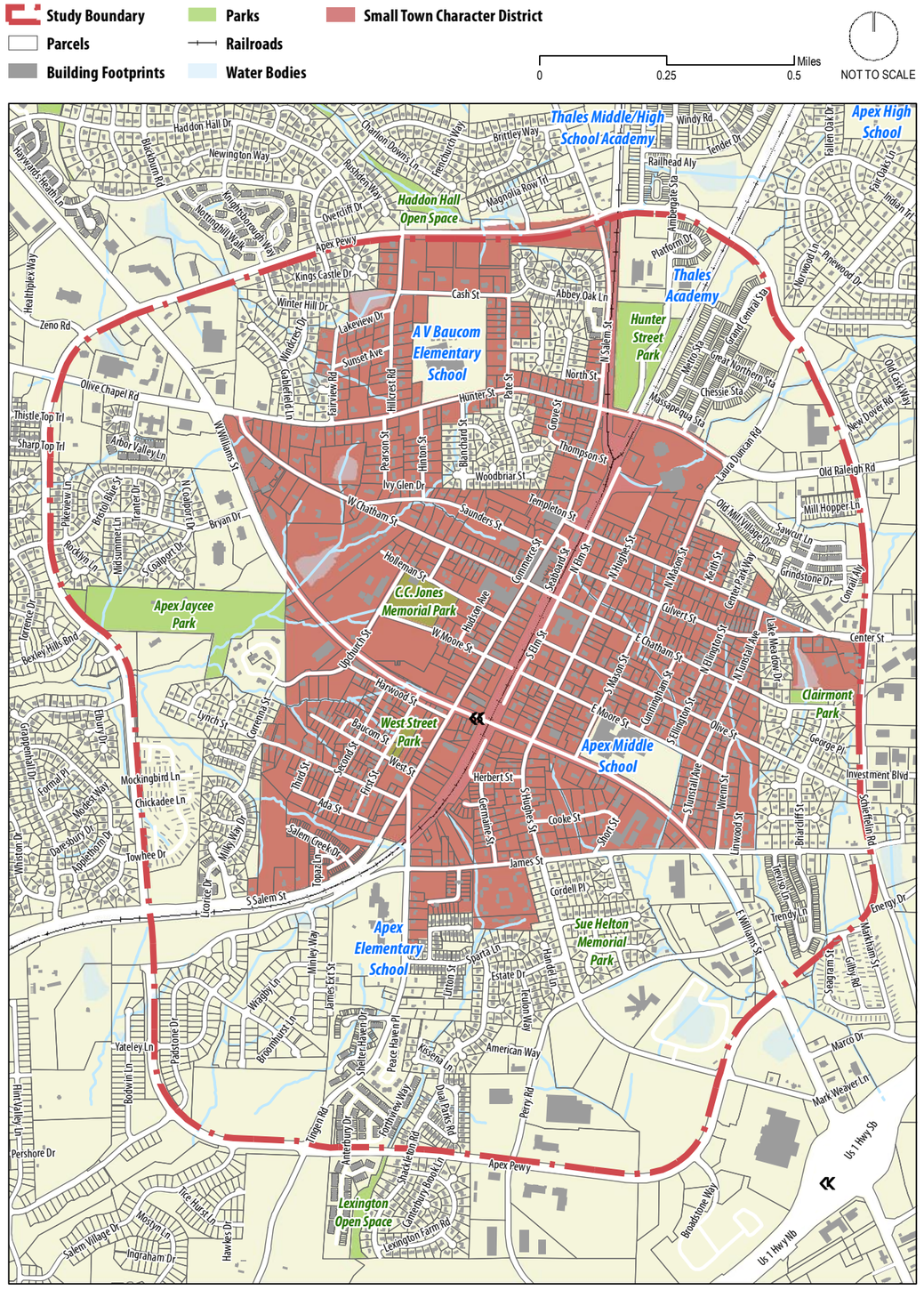
Salem Street is the "Main Street" environment of downtown Apex and serves as the north-south spine of the town. North Carolina Highway 55 (NC 55) is the east-west arterial within the study area. The CSX Railroad owns and operates a rail line and freight switch yard that parallels Salem Street for its entire length.

The historic blocks of downtown Apex along Salem Street looking north





The blocks between Chatham and Center streets represent the heart of downtown Apex



Study area defined as area within the Apex Peakway

1.4 Metrics of Great Downtowns

Great downtowns are places where people come together. This includes:



Places to Relax



Places to Eat



Places to Play



Places for Art & Culture



Places to Shop



Great downtowns are complex, organic, and sometimes messy!

1.4.1 Ten Core Elements for Successful Downtowns

Successful downtowns find resilience by tapping into what makes all places great...people! Through the creation of dynamic, enjoyable, and accessible spaces, downtowns provide the ultimate economic engine for communities.



1 **Put people first in order to maximize the human experience.**



2 **Understand the market and trends related to where people want to live.**



3 **Rightsize the mobility and parking for people, bikes, cars, and transit.**



4 **Connect the community with comfortable journeys and lively destinations.**



5 **Engage with art by investing in public beauty.**



6 **Interweave multi-functional public space of all sizes.**



7 **Design for women (and children) because they are the influential spenders.**



8 **Preserve the authentic by keeping the character while creating new memories.**



9 **Fill in the gaps to provide a continuous pedestrian realm.**



10 **Design for walkable urbanism by insisting ground floors yield vibrancy.**

1.5 Guiding Principles

The cornerstone of any great plan is the principles it stands on. These principles will be passionately pursued in every detail of plan implementation.

Put People First

Planning places for people is the first underlying principle upon which every decision should be based. Pedestrians and cyclists, residents and visitors, and business owners and their patrons should be prioritized over moving vehicles. For the vision of downtown Apex to be realized, people must be put first.

Celebrate Salem Street

The emotional and physical heart of downtown Apex is Salem Street. The blocks of contiguous shops and restaurants between Center Street and Chatham Street are envisioned as so much more—stretching their success spatially in all directions. This "Main Street" environment is the center of social interaction and community activities and all energy should emanate from Salem Street.

Embrace Authentic Apex

As one of the only historic downtown districts in the Triangle Region, Apex has something special. Yet, it isn't just the historic buildings that contribute to its authenticity. It's the familiar stories that are still known and told by lifetime residents, the sounds of trains passing through as they have for 150 years, moments that let parents feel good about giving their kids a wholesome childhood in a fast-paced world, passersby who stop and greet each other, and the imperfections that make the overall place feel pretty perfect. This guiding principle is a reminder that the changes recommended in this plan are not meant to turn downtown into something different; rather to ensure the unique authenticity of Apex is enduring, embraced, and enhanced for residents and visitors to experience and enjoy.



▲ *Designing downtown with spaces for people to enjoy is important even to the youngest residents*



▲ *Unique shops like Apex Outfitters embrace what is authentic about the community while offering hip merchandise*

1.6 Key Goals

The Guiding Principles influence the nine Key Goals established for the plan. These goals are intended to push the possibilities for downtown toward a more vibrant future.

Manage Parking Efficiently & Effectively

Lack of parking should not discourage people from coming to or investing in downtown Apex. Yet providing parking, on its own, does not address any of the guiding principles for this plan. Effective and efficient strategies to address parking needs are critical so that those projects that do put people first, celebrate Salem Street, and embrace authentic Apex can move forward. Parking strategies will involve a "new" parking supply in combination with placemaking, enforcement, programs, and alternate mobility options to yield an efficient and effective system.

Make Salem Street the Best Public Space in the Region

To thrive, downtown Apex must be known throughout the Triangle area as a place for people to gather, shop, dine, and enjoy small-town life. This is a bold goal that will be achieved through incremental investments to not just the streetscape and public spaces, but also the way the ground floor tenant mix is curated and the types and variety of activities that are programmed.

Create Vibrant Spaces for People to Gather

Vibrant spaces are comfortable, beautiful, accessible, and used by **PEOPLE!** This goal will be realized through a variety of opportunities in and around downtown in spaces both expected and that might come as a surprise!

Expand Housing Options that Promote Equity

With an understanding of the potential housing market around downtown Apex, this goal promotes the construction of various housing typologies in a range of price points. Providing quality housing options that mix income levels and generations should be provided within a walkable and bikable distance to the downtown core.

Create Connections to Downtown

Multi-modal connectivity to downtown is a critical element of bringing more people downtown safely. Prioritizing critical sidewalk connections, and installing traffic calming elements such as on-street parking on neighborhood streets will create a more walkable and bikable community. Local and regional transit will also play a key role in connecting people to downtown Apex.

Encourage a Diversity of Activities and Programming

Downtown is known for its large-scale festivals, but the community also needs smaller, more frequent programming to promote vibrancy. This goal requires the creation of public spaces suitable for a diversity of activities.

Roll Out the Welcome Mat with Small Town Charm

Visitors come to downtown Apex for a unique, local, and quaint experience. Visual cues, such as quality development and signage at the gateways to downtown, will invite people into the community and set the pace for their experience.

Honor the History of Downtown

This goal is not about trying to recreate times gone by, but it is about celebrating the unique history of Apex in a prominent way through signage, art, and public space design in downtown.

Re-imagine Spaces through Art, Innovation, and Creativity!

The plan looks at forgotten spaces with creativity and strives to re-imagine those areas as vibrant, sustainable places for **PEOPLE**!

Steering Committee member played a vital role throughout the process and will continue to be plan ambassadors now that the document is complete



DOCUMENT HIGHLIGHTS

58
Key Recommendations

10
Projects to Tackle First

10
Measures of Success

1.7 The Document

The Downtown Master Plan & Parking Study document strives to convey data, input, and recommendations in a way that is clearly understood by the reader. The intent is for this to be a living document that creates action and accountability during the evolution of downtown.

Executive Summary

The Executive Summary conveys key plan highlights related to process, key findings, and subsequent principles, goals, and projects.

Chapter One Introduction to the Plan

Chapter One introduces the plan and study area while also sharing best practices for successful downtowns.

Chapter Two Understanding the Study Area

Chapter Two shares an overview of the study area's geography and infrastructure along with relevant past planning efforts.

Chapter Three Summary of Public Input

Chapter Three summarizes the public process and offers highlights from the input received. Outreach activities are described and key findings that would later inform the recommendations are shared.

Chapter Four Retail Market Conditions & Strategies

Chapter Four distills the retail market analysis for the downtown core along with recommended strategies related to both the physical and business environments to improve retail success of the area.

Chapter Five Housing Market Conditions & Strategies

Chapter Five conveys the housing analysis which explored current housing stock available and what typologies may be missing based on demographic trends for the study area. Ultimately, the chapter recommends a potential capture rate for new units in downtown Apex.



Plan participants looking ahead to a vibrant future in Apex

Chapter Six Parking Conditions & Strategies

Chapter Six presents the current parking situation as a clear data set and merges those findings with anecdotal evidence from the community to provide active parking management techniques for the downtown area.

Chapter Seven Development Conditions & Strategies

Chapter Seven presents the overall master plan for the study area by illustrating the various catalyst sites investigated during the process and includes a summary of development data.

Chapter Eight Key Goals

Chapter Eight tells the story of the Apex vision and how each key goal paints part of the picture of vibrancy. Tangible design examples are provided for each of the nine key goals.

Chapter Nine Implementation

Chapter Nine focuses on moving the plan from vision to reality with policy, financing, and programming strategies. Detailed strategies related to the Top 10 projects are provided along with a complete implementation matrix, which includes every key recommendation found throughout the document. The document wraps up with a few thoughts on how we can measure if the plan has succeeded.

Key Recommendations are called out in this manner throughout the document. These recommendations tie directly to the Implementation Matrix in Chapter 9.

1.8 How Will the Town Ensure Progress?





02
UNDERSTANDING THE STUDY AREA

02 UNDERSTANDING THE STUDY AREA

Prior to public engagement and design, the team desired to have a deep understanding of the area's existing conditions. The town's geographical location within the Triangle Region is vitally important when studying circulation patterns, the potential trade area, and future development opportunities. The physical conditions of the land, including topography and hydrology, set definitive parameters for design within the study area.

The team also explored all relevant past planning efforts to garner salient data and findings which might inform this process. Analyzing the area's current regulations, land uses, multi-modal facilities, public art locations, and key gateways began to reveal areas of potential design and policy interventions.

11
Miles to Research Triangle Park

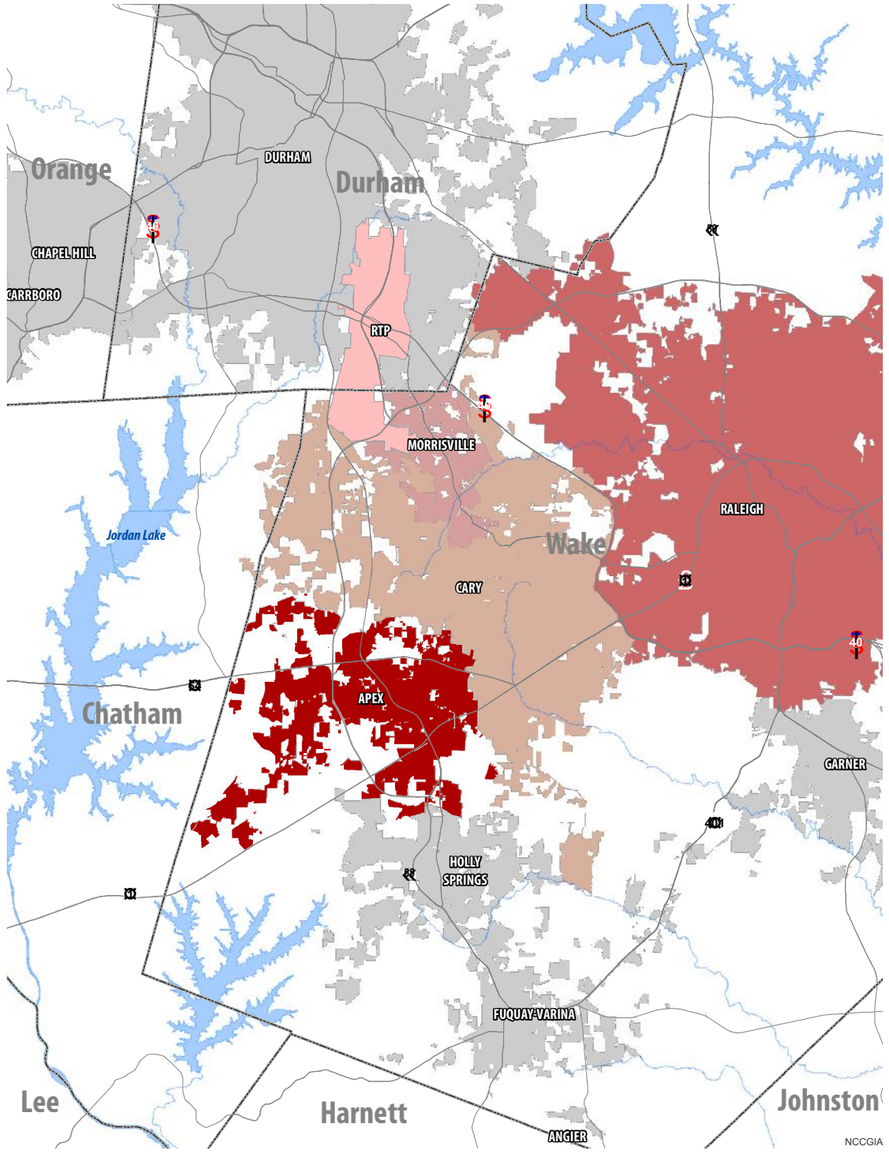
12
Miles to Raleigh

2.5
Square miles within study area

2.1 Study Area Location

Within Apex, the study area is located in the area created by NC 540 to the west, US 64 to the north, and US 1 to the south. Substantial growth in Apex is occurring largely west and, to some extent, south of the study area. The Town of Apex is located within Wake County in what is known as the Triangle Region of Piedmont North Carolina. Research Triangle Park, an employment area anchored by three major research universities, is located eleven miles to its north, and the capital city of Raleigh is located twelve miles to the northeast. The nearly 14,000 acre Jordan Lake and its associated state recreation facilities are just eight miles to the west of Apex. Cary and Holly Springs are neighboring communities located to the north and south respectively. The overall town's area includes approximately 19 square miles, while the study area encompasses the 2.5 square miles within the Apex Peakway.





Town of Apex in Wake County, North Carolina

The "Peak City" of Apex is the highest point between the capital city of Raleigh and the Deep River, a key tributary of the Cape Fear River as noted in a 1905 USGS survey.

2.2 Land Use – Existing and Planned

Within the study area, non-residential land uses are concentrated most heavily along the Williams Street and Salem Street corridors, as well as along the eastern side of the Apex Peakway from North Salem Street to Perry Road. The unique shops, restaurants and businesses along Salem Street within the National Register Historic District comprise the "main street" of the downtown area and were of special focus in the Downtown Plan.

There are three public schools within the study area – AV Baucom Elementary School on Hunter Street, Apex Middle School on East Williams Street, and Apex Elementary School along Tingen Road.

The two largest public parks are Hunter Street Park, best known for the Trackside Skate Plaza but also featuring a dog park, fields and a shelter; and Apex Jaycee Park, also featuring playing fields as well as a playground. Smaller, neighborhood, public parks include Clairmont Park, at the terminus of East Chatham Street; West Street Park, on West and First streets; and Sue Helton Memorial Park within the Perry Farms subdivision. CC Jones Memorial Park is a private park located between Holleman and West Moore Streets. The Town's Parks, Recreation, and Cultural Resources Department also operates the Halle Cultural Arts Center on North Salem Street at Templeton Street.

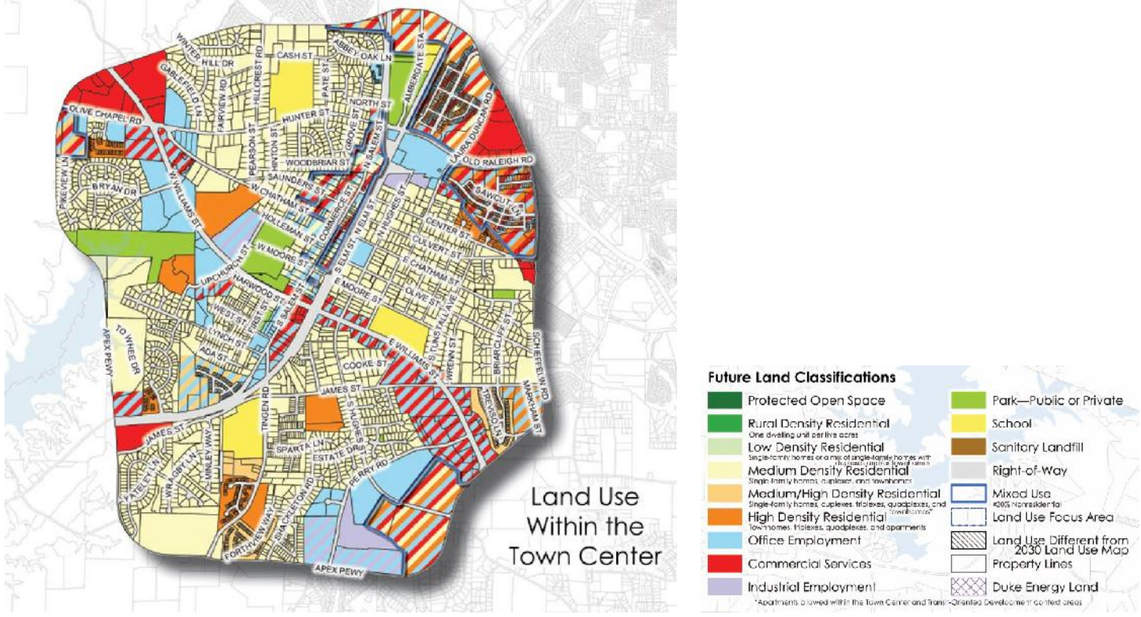
Local government has a strong presence within the study area. The Town's main municipal campus is at the intersection of Hunter Street and North Mason Street and includes the Town Hall and Community Center. The Community Center will soon undergo an expansion project to include a senior center. There are two fire stations within the study area. Fire Station No. 1 is located on North Salem Street at Seaboard Street. Fire Station No. 3 is located on Hunter Street near West Chatham Street. The Apex Police Department is also located in the heart of the study area, along Saunders Street just west of North Salem Street. The historic train depot on North Salem Street at Center Street is owned by the Town. It is currently occupied by the Chamber of Commerce and is the office of the Town's new Downtown and Small Business Coordinator. The Town's main Public Works offices are located on West Williams Street at Upchurch Street.

There are numerous churches within the study area, with two of the largest in the heart of the study area along Chatham Street - Apex Baptist Church and Apex United Methodist Church. There are three churches along Center Street in the vicinity of the Apex Peakway, including the Apex Masjid. There are also several churches near South Salem Street south of NC 55, including St Mary's AME Church and True Way Church, both along Lynch Street. Notably, the regionally-important Raleigh North Carolina Temple of the Church of Jesus Christ of Latter Day Saints is located along West Williams Street at Bryan Drive.

Multi-family residential uses are generally in close proximity to the NC 55 corridor, with some apartments also concentrated in the vicinity of James Street, Tingen Road and the Apex Peakway. There are two mobile home parks within or close to the study area. Shangri-La Mobile Home Park is located at the Apex Peakway and South Salem Street intersection. Apex Mobile Estates is located along Schieffelin Road near the future corridor of the Apex Peakway. The balance of the land use within the study area is mostly medium-density residential, with a few duplexes, but mostly single-family homes of a variety of ages on lots of varying sizes.

In February 2019, the Town Council adopted Advance Apex: The 2045 Land Use Map Update. A land use screening was conducted as part of that planning effort to identify areas susceptible to change. Most of the area within the Apex Peakway was depicted as developed, with parcels identified as under- or undeveloped mostly small and scattered. The land use vision within the study area is consistent with current development patterns. A change in the 2045 update was to identify the study area as the Town Center context area. Within this context area, the "High Density Multi-Family Residential" (HDMF) zoning district is allowed in areas envisioned as Medium/High Density Residential land use.

During the planning process for the Downtown Plan, several development projects, in addition to the community center expansion, were in various stages of planning or construction. At the intersection of Apex Peakway and Laura Duncan Road there is non-residential development activity including a grocery store with outparcels, a new gas station and convenience center, and a daycare (just outside of the study area). Plans for a tap station are under review at the corner of NC 55 and South Salem Street. There are also approved plans for a vet hospital along S Salem Street and office employment/commercial uses along Upchurch Street. Residential development activity includes continued build-out of Villages of Apex and Old Mill Village, new single-family townhomes along South Salem Street, and a proposed project for apartments with a potential affordable housing component at Apex Peakway and South Hughes Street.



New land use classifications for the 2045 Future Land Use Plan

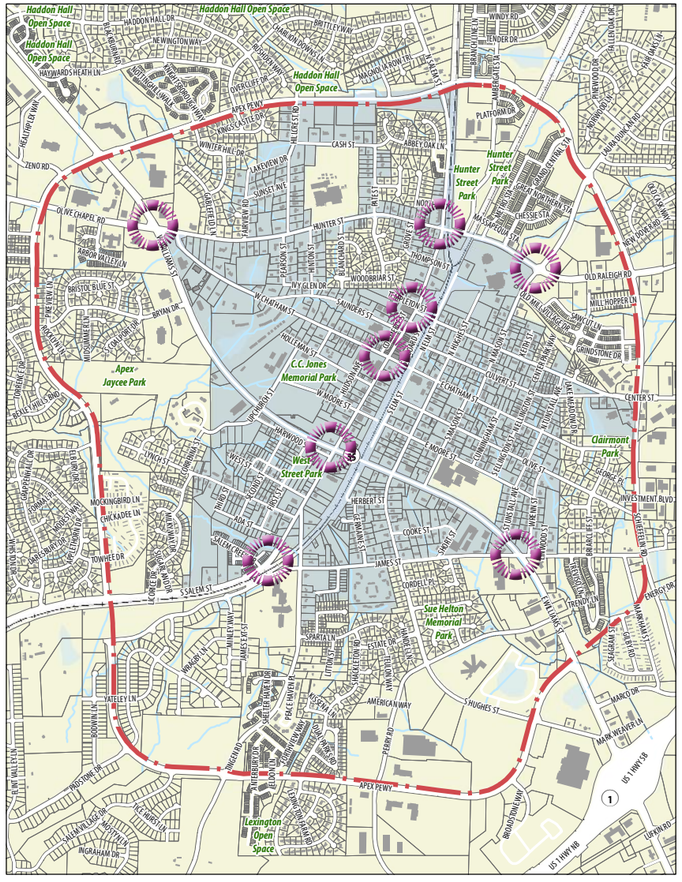
2.3 Transportation – Existing and Planned

2.3.1 Roadways

The Apex Peakway bounds the study area and is planned as a four-lane, median-divided thoroughfare. There are two remaining gaps in this loop road – one on the southwest side of the study area between South Salem Street and James Street, and another on the southeast side of the study area where Schieffelin Road and Marco Drive currently provide connectivity. The design is nearly final for a project that would complete the gap between South Salem Street and James Street and includes a bridge over the railroad and quadrant loop between the Apex Peakway and South Salem Street. Once this new roadway is open, the at-grade railroad crossing at Tingen Road is required to close.

The North Carolina Department of Transportation has a funded project to widen NC 55 through the study area to a four-lane, median-divided, facility. The project will include completing pedestrian facilities on both sides of the road through the study area and replacement of the railroad bridge parallel to and just east of Salem Street. Other major roads within the study area include Salem Street, Olive Chapel Road/ Hunter Street/Old Raleigh Road, Laura Duncan Road, and Center Street. Each of these thoroughfares connect to highways outside of the study area (US 64 or US 1). West Chatham Street and Hughes Street serve as urban, two-lane thoroughfares, serving relatively heavy volumes of mostly local traffic. Within the heart of downtown, the street network is a tight, urban, grid; however, this pattern disintegrates in the southeast and western parts of the study area.

2.3.2 Key Gateways within the Peakway



Key Gateway

2.3.3 Bicycle and Pedestrian Facilities

There is substantial demand for non-motorized travel within the study area. The Town adopted its first Comprehensive Bicycle Plan, Bike Apex, in January 2019 and an updated transportation plan, Advance Apex: The 2045 Transportation Plan in February 2019. Bike Apex recommend and prioritize bicycle lanes along Old US 1 Highway, with shared lane markings on Salem Street within the study area. Bike Apex also recommends and prioritizes bicycle lanes on Olive Chapel Road west of NC 55, with shared lane markings on Hunter Street and Old Raleigh Road within the study area. Shared lane markings are also recommended for Center Street, within the study area, transitioning to bicycle lanes and a sidepath on Ten Ten Road outside of the study area. Side path is proposed along the Apex Peakway loop, James Street, South Hughes Street, and Tingen Road. A future grade-separated bicycle and pedestrian crossing of the railroad at Tingen Road is envisioned to provide bicycle and pedestrian connectivity to downtown once the vehicular connection in this location is closed. An extension of Beaver Creek Greenway through Jaycee Park and connecting to NC 55 is also planned. Advance Apex recommends a policy of prioritizing pedestrian projects within the Town Center context area.

Pedestrian facilities are incorporated in all planned roadway projects (Apex Peakway, NC 55) as well as the waterline replacement project along West Chatham Street. The Town has a funded project to improve pedestrian facilities between Apex Middle School and Salem Street including filling sidewalk gaps and improving pedestrian crossings. Completing the sidewalk connection at three railroad crossings – Center Street, Chatham Street, and Hunter Street has been prioritized in Capital Improvement Planning but has not yet been funded.

2.3.4 Rail and Transit

Rail is a substantial part of the history of downtown Apex and is still part of the Town's fabric today. Within the study area there is a rail line paralleling Salem Street, branching into two lines just south of Hunter Street. One branch continues north parallel to North Salem Street and the other continues parallel to Ambergate Station. These lines are owned by CSX railroad and serve freight traffic. CSX also operates a rail maintenance yard in the area between Town Campus, North Salem Street and Center Street. Amtrak service has two daily trains running through downtown Apex, but the closest stop to the study area is in downtown Cary. Commuter rail service to downtown Apex is envisioned in local and regional long-range transportation plans but is not funded.

Plans are underway to increase bus service to the study area. The adopted Wake Transit Plan recommends a new bus route with peak-hour service from Holly Springs to downtown Cary through Apex. This route will be operated by GoCary with service anticipated to start in January 2020. In the study area, stops are anticipated in the vicinity of Apex Peakway and South Hughes Street near Cambridge Village, NC 55 and South Hughes Street near Compare Foods, South Salem Street and East Moore Street, and South Salem Street and Hunter Street. Existing bus route 311 is operated by GoTriangle between Apex and RTP. This route uses NC 55 through the study area. Existing bus route 305 is operated by GoTriangle between Apex and Raleigh. Plans for this route include extending service to NC 55, increasing the span to all day, and increasing the frequency to 30 minutes during peak hours and 60 minutes off-peak.

The Town has also been working on plans for the first local bus route, GoApex Route 1. The route is planned to serve downtown Apex. While capital and operating costs are not yet funded for GoApex Route 1, service could start as early as 2021 if anticipated grant funding is secured. Ultimately a transfer center serving each of these routes is envisioned at the intersection of NC 55 and South Salem Street. Since this center is not likely to move forward prior to the NC 55 road widening project, the intersection of South Salem Street and Moore Street has been identified as a possible interim location.

2.4 Zoning and the Unified Development Ordinance

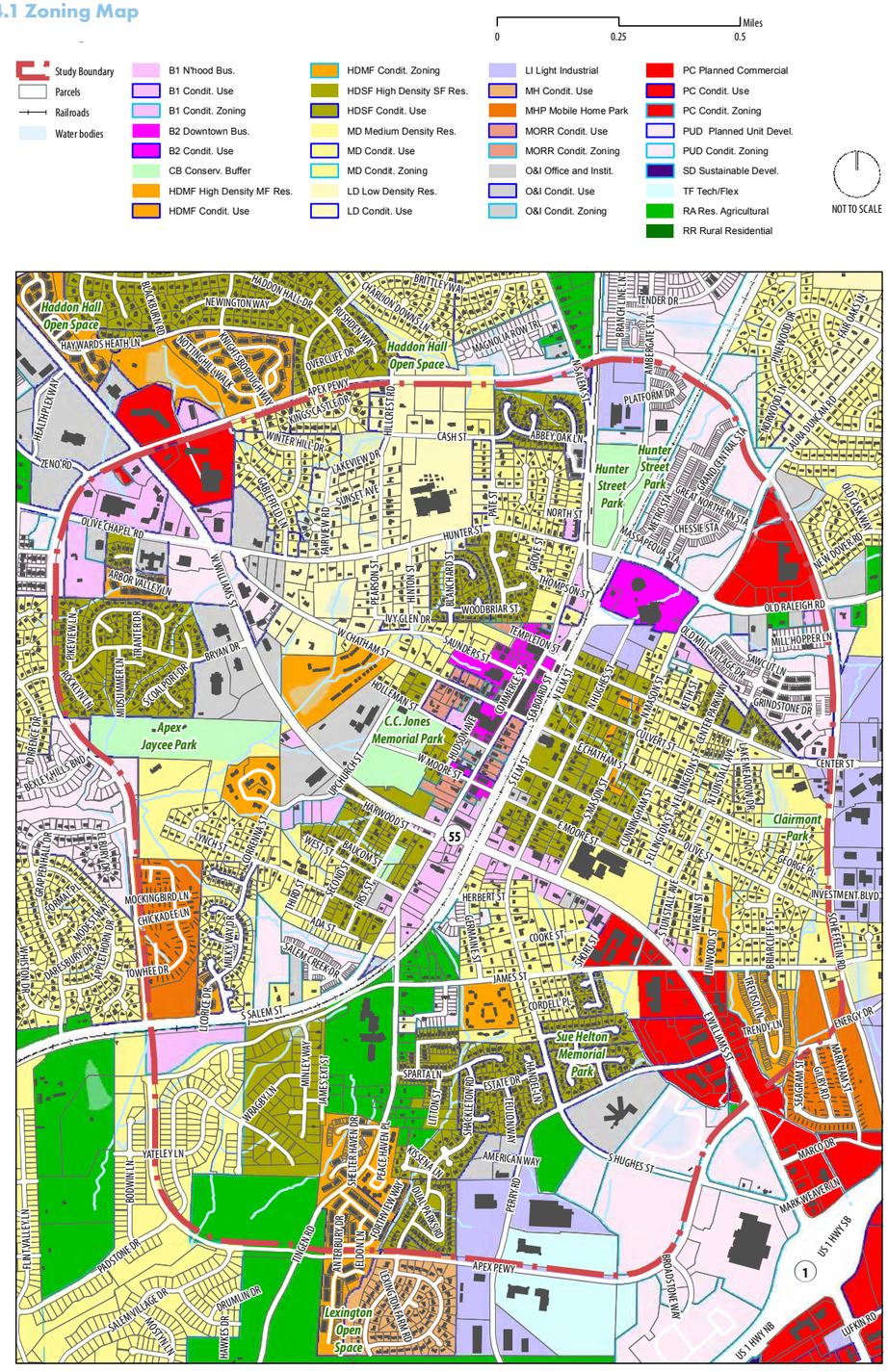
The Town maintains a zoning map and Unified Development Ordinance (UDO) that dictate allowable uses and set specific requirements for development and redevelopment on each parcel within the study area. It is especially important to note that there is both a Small Town Character Overlay District (Overlay District) and a Central Business District (CBD) that encompass the heart of downtown. The Overlay District surrounds Apex's Historic District. The overlay identifies the architectural qualities that define the downtown character and includes design standards to maintain that character. In addition to establishing architectural and use standards, within the Overlay District buffers, Resource Conservation Area, and community amenities are not required. The CBD is within the Overlay District and includes the blocks along North Salem Street from north of Center Street to Chatham Street. Within the CBD, there are no minimum parking requirements, and only active uses are allowed in storefront locations (meaning the first floor of all spaces abutting North Salem Street, East Chatham Street, West Chatham Street, Saunders Street, and Templeton Street, as well as along all public parking lots and garages). In addition, within the CBD, setbacks are reduced to none on the front and sides and 10 ft on the rear.

While the UDO should be referenced for a complete list of allowable uses within the CBD and Overlay District, during the conversations that occurred during this planning process it was especially important to note that in the area zoned as B2 (Downtown Business), which includes all of the parcels within the CBD, microbreweries and microdistilleries are a permitted use. It is also important to note that accessory apartments are also permitted uses in areas designated as B1 (Neighborhood Business District) and B2 and that accessory apartments, single-family, townhomes, and multi-family or apartments are permitted uses in areas within the Overlay District zoned as MORR (Mixed Office-Residential-Retail District) which includes most of the residential parcels along South Salem Street. Duplexes, triplexes, and quadplexes are not currently permitted anywhere within the Overlay District.

The Unified Development Ordinance can be found here:

https://www.apexnc.org/233/Unified-Development-Ordinance

2.4.1 Zoning Map





03
SUMMARY OF PUBLIC INPUT

03 SUMMARY OF PUBLIC INPUT

The Town of Apex desired to have a vision for downtown created by its citizens, and the community definitely showed up! The public engagement process was robust and comprehensive in nature. Both high tech and high touch tools were utilized, and approximately 6,000 people participated in the dialogue process!

Champions and critics alike came to the table to have their voices heard, but also, to listen to one another's perspectives and ideas. The public input received pointed the design team toward key public and private investments necessary for transformative change.

This process did more than just create a planning document with key recommendations and beautiful drawings; this process helped build community. The citizens of Apex are on fire for the vibrancy they desperately want in downtown, and their participation in this vision gave them the opportunity to begin planting the seeds of change.

135
Citizens attended the Public Open House

1,768
Citizens responded to the online survey

3,700
Views of the final presentation on Facebook

3.1 How We Got the Word Out

Public outreach in the community of Apex needed to cross both print, digital, and social media platforms to ensure all sectors of the population were hearing about the engagement events. Beyond the written word, face-to-face interactions and personal encouragement were keys to the success of this public engagement strategy.

3.1.1 Print Outreach

Town staff tapped into the use of utility bill mailers to ensure every citizen would know about the Public Open House where their early input would be vital to the creation of the vision. Paper fliers were also posted around town and in local businesses for both the open house and the charrette event. Save the Date cards were given to open house participants to keep on their refrigerators as a reminder of the June design charrette.

Local business owners took it upon themselves to help spread printed material business-to-business and to their patrons. The Town of Apex Planning Department also hosted a booth at Peak Fest prior to the first public workshop to spread the word, encourage participation, and gather initial input.

3.1.2 Digital & Social Outreach

A robust email and social media campaign followed the planning process online reaching thousands of Apex citizens via Twitter, Instagram, and Facebook.

The Steering Committee were outreach **CHAMPIONS** and shared the process on podcasts, at the farmers market, on social forums, and by literally going door-to-door to invite residents to the various events.





I alone cannot change the world, but I can cast a stone across the waters to create many ripples.

-Mother Teresa

3.2 Steering Committee

Eighteen of Apex's most energetic, passionate, and knowledgeable citizens joined the design team from the first day of the process as the Project Steering Committee. Their importance to the success of this vision cannot be overstated.

3.2.1 Meetings

The Steering Committee held regular meetings throughout the process and served as a guiding compass for the designers. Meetings included interactive brainstorming, listening sessions, studies of best practices, project updates, and mapping exercises.

The committee clearly stated during these meetings that they wanted to make downtown Apex a vibrant destination while still honoring the area's small town history. The members identified key locations for the team to investigate and always provided thoughtful feedback and direction to the designers.

3.2.2 Parklet Challenge/Parklet Survey Results

During the May 9th meeting of the Steering Committee, the design team shared a concept called Tactical Urbanism with the members. Tactical urbanism is a form of creative implementation that encourages low-cost, high-impact solutions. The idea is to illustrate to the community how short-term action yields long-term change by intervening in the public realm with enhancements that help build community. Tactical urbanism works most effectively when there is a perceived shortcoming, and in Apex, that shortcoming is narrow urban sidewalks with limited outdoor dining opportunities.

The design team laid down a Steering Committee Challenge to design and install a temporary parklet for the week of the charrette. Members were encouraged to think outside of the box and given the "Tactical Urbanist's Guide to Materials and Designs" created by the Street Plans Collaborative. The other caveat was that the parklet's budget was $0, and all materials were to be donated, sponsored, or borrowed.

The committee took the challenge and completely knocked it out of the park! Members used their local networking skills and gathered enough materials to create a dreamy oasis on Salem Street in front of FRESH. Local Ice Cream. The parklet was decked out with painted pallets, high top tables and stools, trees and greenery, and even string lights!

A survey was given to all parklet visitors in order to gauge public reaction to the tactical intervention on Salem Street. Overwhelming positive responses inspired the Steering Committee to begin looking for their next tactical project!

> 85% Agree

The Parklet...

- **Improves the character of Salem Street**
- **Makes them more likely to visit Salem Street**
- **Makes them more likely to visit local businesses**
- **Is a place where it is easy to meet and talk to others**
- **Is a good use of parking spaces**

(389 participants surveyed)

The parklet added additional seating space for patrons outside of FRESH. Local Ice Cream ▼

Town staff and Steering Committee members gather plant material and install safety measures for the parklet ▼



Town staff and Steering Committee members (plus their families) all pitched in to create the parklet on Salem Street ▼





▲*Steering Committee members kept the parklet looking fresh by watering the plants and changing up the space every now and then with new materials*

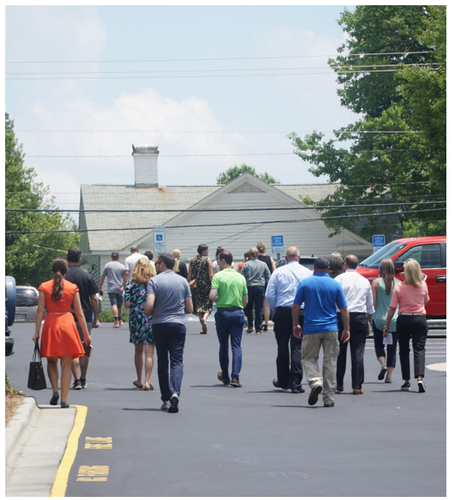


3.2.3 Walking Tour/Place Game Results

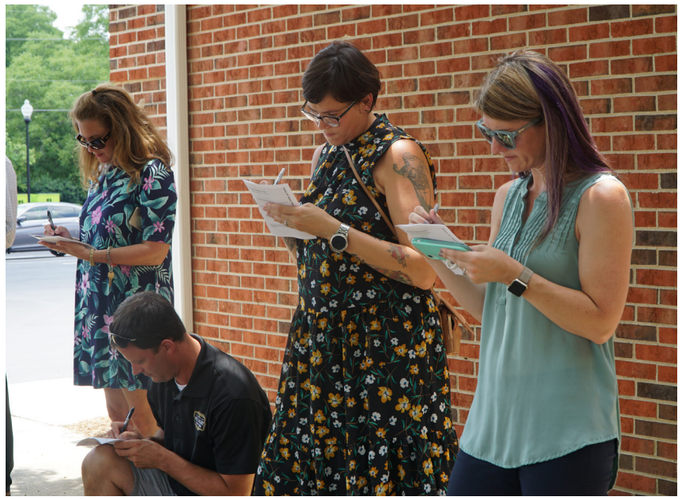
The Steering Committee braved the summer heat and joined the design team on the first day of the charrette for a walking tour of Salem Street's core blocks. The team distributed an audit tool created by the Project for Public Spaces known as "The Place Game". Once the tour and conversations concluded, each participant rated Salem Street based on four criteria on a scale of 1 (Poor) to 4 (Good). As shown at the right, their responses placed Salem Street in the **FAIR** range of sociability, comfort/image, access/linkages, and uses/activities.

The overriding takeaway from comments and conversations was the **need for additional shade in the downtown walking experience**. The group agreed that shade trees and wider sidewalks along Salem Street were two key recommendations for the plan development.





Walking tour participants trek across the Apex Baptist Church parking lot as they investigate the quality of spaces in and around Salem Street



Steering Committee members fill out their Place Game audit forms after the walking tour of Salem Street



If you plan cities for cars and traffic, you get cars and traffic. If you plan for people and places, you get people and places.

-Fred Kent, Founder of Project for Public Spaces

3.3 Focus Group Meetings

On April 8th and 9th, 2019, the design team and town staff led a two-day event that included nine meetings of varying topic areas. Town staff and leaders identified and invited key stakeholders to these meetings, and attendance was extremely high with approximately 65 unique individuals attending. Steering Committee members also participated in at least one, if not more, of the meetings. All input provided during the event can be found in the appendix of this document, but a few key findings from each session are found below.

3.3.1 Summary of Input

Transportation

- Enhanced transfer point at Salem and 55 will be a key pivot point for four regional bus routes in the future.
- Salem Street has potential for high multi-modal transportation demand.
- Downtown circulator is envisioned to connect to regional commuter services and serve higher density residential areas.

Infrastructure

- Electric system can handle triple the current capacity.
- Town is currently converting high pressure sodium lighting to LED (5,000 fixtures).
- Water/sewer infrastructure downtown is aging.

Public Safety & Accessibility

- Perception exists of significant parking problem with citizens, particularly during events/festivals.
- The fire station on Salem Street is a true civic building allowing a wide variety of events/activities.
- Perception of pedestrian safety on Salem Street is an issue.

Institutional

- Small percentage of middle/high school students are walking/biking to school currently.
- Event based shared parking does occur.
- Programming at schools and churches does bring people to downtown.

Retail

- Downtown was vacant twenty years ago, but the streetscape in the late 90s changed the game.
- Town is most proud of UDO amendment to restrict uses in bottom floors between Chatham and Center Streets.
- Retailers feel there is a need for additional outdoor dining space and safety measures for pedestrians.
- Retailers shared many locals are not aware of downtown.
- Downtown retail doesn't seem to be keeping pace with the tremendous growth of the town.

Restaurants

- Restaurants are the anchors of downtown with seven choices in a two block area.
- Outdoor dining is a challenge because of sidewalk width and liquor license issues.
- Restaurants generate large percentage of tax dollars, and feel they need more support.

Housing

- Realtors see a desire for duplex/triplex/quad options for affordable housing.
- Larger lots within the core need to have the ability to subdivide and add accessory dwelling units.
- Market demand exists for all price ranges of housing opportunities.

Art/History

- Public Art Committee intends to develop a public art trail enhancing connectivity between downtown, the Town Campus and Hunter Street park.
- Tunstall House was donated to the town and is a potential link from civic campus to downtown.
- Public art committee has several planned projects in and around downtown.

Tourism/Programming/Public Space

- Apex is known for its larger festivals including Peakfest and Pigfest.
- Alleys can have a funky vibe in the future.
- Downtown lacks a brewery scene and public spaces.

Apex Legacy Lunch Focus Group Meeting

Citizens who grew up in Apex during the mid-20th century were invited to speak to the design team and town staff about times gone by. Participants shared memories of riding their bicycles downtown and working to make purchases in the many shops located on Salem Street. The event and stories shared were captured on video as a way to preserve the oral history of Apex for future generations.

Legacy Lunch participants reminisced and shared their love for downtown and the memories it holds







3.4 Public Open House

On May 9th, 2019, the design team and town staff held a Public Open House upstairs at the Halle Cultural Arts Center. Over 130 citizens attended the event aimed at understanding the community's vision for downtown. Participatory activity stations were set up in the space including a welcome station with a live/work/play map, a visual preference survey, a graffiti station, a photo booth, a bucket spending exercise, a parking station, and a retail station.



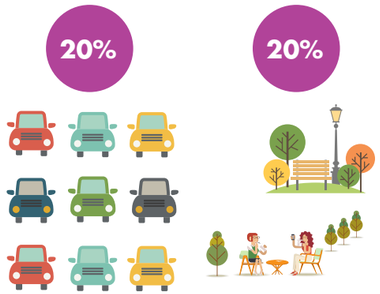
Open house participants were each given a passport to have checked at each station which qualified them for a chance to win Apex swag.

Wayfinding Signage Style Preference



TRADITIONAL/ HISTORIC STYLE

Public Spending Priorities



PARKING SOLUTIONS

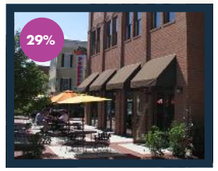
PUBLIC SPACE

Top Building Scale



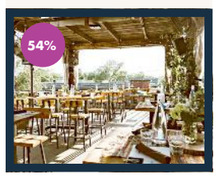
TWO TO THREE STORIES

Top Placemaking Tool



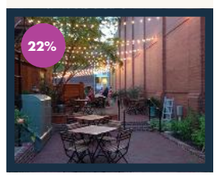
OUTDOOR DINING

Top Unique Offering



ROOFTOP DINING/BAR

Top Public Space



ALLEYWAYS/ COURTYARDS

Top Streetscape Elements



STREET TREES

WIDE SIDEWALKS

In Downtown Apex, I LOVE...



Downtown Apex needs LESS...

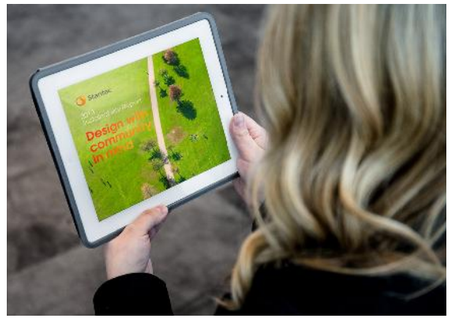


Downtown Apex needs MORE...



The wordles are a compilation of feedback received on the graffiti boards related to what people love about downtown, what people think downtown needs less of, and what people think downtown needs more of. A wordle simply illustrates the ideas heard more often in a larger font, so the larger the individual word, the more times we heard that answer! These are comprehensive results from both Peakfest and the Public Open House.

The online survey reached more people than any other single outreach tool early in the process

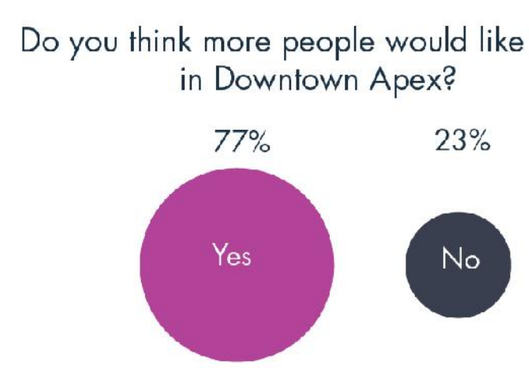


1,768
responses to the online survey

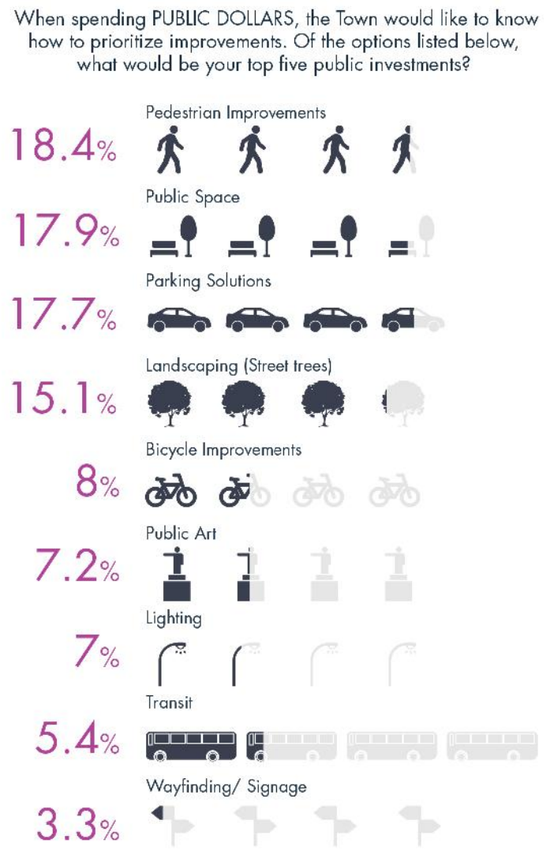
3.5 Online Survey

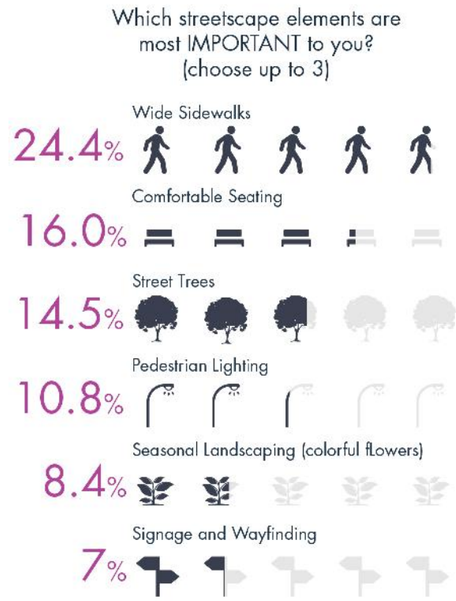
One extremely powerful digital input tool during this process was the online survey that reached a staggering 1,768 responses! The twenty question survey was designed to take less than five minutes to complete. All survey results can be found in the appendix of this document, but a few of the most relevant findings are found below and to the right.











3.6 The Charrette

The charrette was the cornerstone event of the public engagement process. The four-day intense workshop brought a design team with transportation planners, parking experts, traffic engineers, urban designers, policy planners, and landscape architects together who set up an open public design studio. Topic area discussions were held over the course of the week for anyone who wanted to provide input. A constant feedback loop of information was created between the designers and the community. Each afternoon, the drawings were pinned up on the wall for discussion and public reaction. The process allowed for an efficient work flow and a community-driven vision with political will necessary for implementation.

3.6.1 Interest Group Meetings

The topic areas discussed during the week included:

- Neighborhoods and Housing Interest Group Meeting
- Mobility and Street Design Interest Group Meeting
- Public Art Interest Group Meeting
- History Interest Group Meeting
- Youth Interest Group Meeting
- Meeting of the Millennials
    - An evening event upstairs at The Provincial targeting input from the millennial generation of Apex.
- Brewery, Restaurant, and Retail Interest Group Meeting
- Parking Interest Group Meeting
- Public Space Interest Group Meeting

Key takeaways from the week of meetings included the following input:

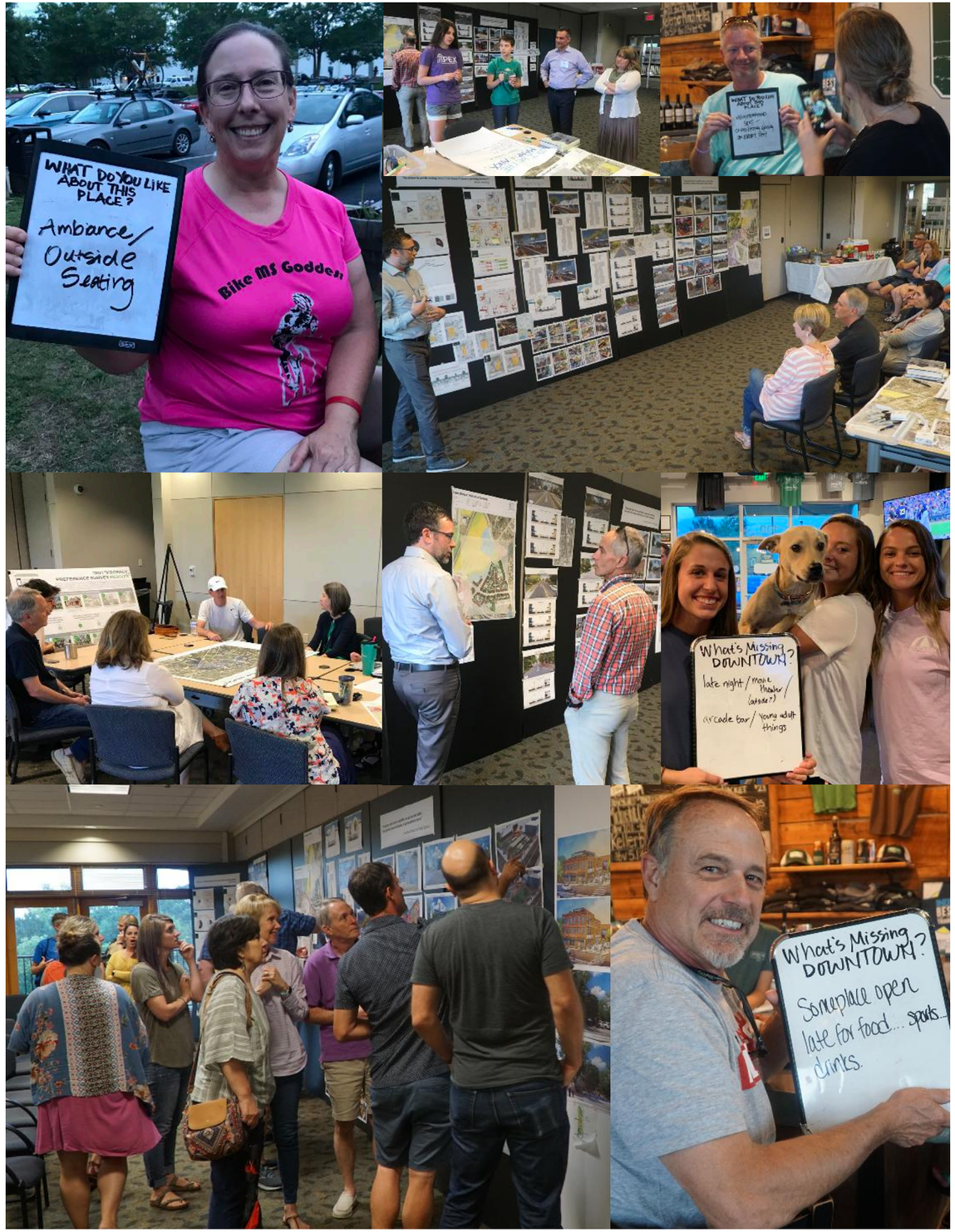
- Public art surveys reveal the majority of Apex citizens would like to see murals in downtown.
- NC 55 and Salem Street is a key intersection where potential visitors can be enticed toward downtown.
- Fire Station alley has potential for unique treatment including artwork and lighting.
- Alleys need to be transformed and the atmosphere improved.
- Capital projects are in the works for pedestrian improvements around downtown.
- Citizens desire to promote active lifestyles including walking and biking for all ages.
- Citizens want to see the exploration of potential higher density housing in downtown that includes affordable housing typologies.
- The design needs to enhance safety for pedestrians and address speeding cars.
- Citizens desire to expand downtown in various directions.
- A plethora of interesting historic features and facts need highlighting.
- Rooftop dining is a missing amenity downtown.

3.6.2 Brewery Visits

On two evenings during the charrette, the design team visited the local breweries currently located outside of downtown—Brueprint Brewing Company & Southern Peak Brewery. The intent of these visits was to "tap" into a group of Apex residents that patronize these spots and try to understand what about the environment draws them in. The design team found willing participants to have casual conversations with and posed a few simple questions to them. Everyone seemed to be in agreement that finding a spot for a brewery (or a few!) would be a big draw for downtown.

3.6.3 Youth Survey

During the youth interest group meeting, members of the design team and town staff went to open gym hours at the Community Center to engage directly with Apex's younger generation. Post card surveys were distributed and collected at both the community center and the Hunter Street Skate Park. Around half of the youth answered "maybe" when asked if they are thinking of moving back to Apex after college. So, the evolution of downtown over the next ten years will be critical to their decision making process.



Imagery from the week-long design charrette

3.7 Polling at Public Presentations

On the evening of September 12th, 2019, the team returned to the community to present a compilation of work completed during the design charrette along with the Guiding Principles, Key Goals, and a Top 10 Projects List. Prior to developing the final document, the team wanted feedback on a few key issues related to the plan. Those issues are described at the right, and polling results can be found on the next page.

Issue 1

Which solution do you prefer for Salem Street of the four provided?

Issue 2

Rank the Top 10 projects in the order YOU believe they should be prioritized.

Issue 1 Results

71%

of participants at the final public presentation prefer the Salem Street solution that removes 30 on-street parking in order to expand the urban sidewalks on both sides and plant street trees





Salem Street Options (clockwise from top left): On-street parking one side; No on-street parking; Alternating on-street parking (short); Alternating on-street parking (long)

Issue 2 Results

Ranking of the Top 10 Projects (1 being the top priority for respondents)

1. Transform the Salem streetscape
2. Energize the alleys...Seaboard, Commerce, and Fire Station
3. Re-purpose the parking area at the Depot into the premier public space Downtown
4. Add a net gain of 200 public parking spaces within a 5-minute walk, with a minimum of 100 within a 3-minute walk
5. Attract five new restaurants/bars/breweries AND a boutique hotel
6. Re-envision the fire station as a civic and mixed use development
7. Install wayfinding signage in and around Downtown
8. Revitalize the Tunstall House, grounds, and strollway as a pastoral treasure and link between Salem Street and the civic center
9. Make the transit station at NC 55 and Salem Street a multimodal, iconic, gateway feature
10. Construct 100 new housing units within a 10-minute walk (1/2 mile) of Downtown

143 people attended the final public presentation at Town Hall while another 3,700 people viewed the live stream on Facebook!





04
RETAIL MARKET CONDITIONS & STRATEGIES

04 RETAIL MARKET CONDITIONS AND STRATEGIES

The retail market analysis was led by Streetsense's Larisa Ortiz. Her comprehensive approach recognizes that having sufficient customer demand is only one component of a wide variety of issues and challenges that may be affecting the success of downtown merchants. Her retail diagnostic methodology is comprised of four key elements:

MARKET ANALYSIS: Is there sufficient demand for retail goods and services?
PHYSICAL ENVIRONMENT: Can customers easily patronize businesses and how do they get around to cross shop once they are there?
BUSINESS ENVIRONMENT: What other options are there for customers, and how does downtown fit into the competitive landscape? Is there room for more retail given the options that consumers already have in the marketplace?
ADMINISTRATIVE CAPACITY: Is the downtown well managed, and are you in a position to execute on the recommendations of the plan?

The resulting retail program recommendations served as a guidepost for the urban designers when exploring how and where downtown Apex should grow. The full retail analysis can be found in the appendix of this document.

43
Total number of current storefronts

24%
Increase in residential population within a 5-mile radius of downtown since 2010

875
Linear feet of Salem Street that is the current home of three distinct retail micro-climates

4.1 Classifications & Definitions

4.1.1 District Classification

The current retail square footage (95,000 square feet) in downtown Apex marks it as a "Neighborhood Center." (according to the International Council of Shopping Centers (ICSC) classification of retail districts) "Neighborhood Centers" have, on average, 30,000-125,000 square feet of retail, focus on convenience goods and services, and have a small, local trade area of approximately three miles (Primary and Secondary). They attract nearby residents, but they do not have the amount of retail necessary to draw in visitors from a wider area. The 95,000 sf of existing retail is located in three distinct microclimates which fails to create a cohesive feeling in the overall district. Combining these areas so they functionally act as a single environment, the town has the opportunity to improve market penetration and even grow the size of the current trade area. People will travel further if they know they have more things to experience and do.

By contrast, "Theme/Festival" districts (according to ICSC) have, on average, 80,000-250,000 square feet of retail. Apex is on the lower end of that range and does have some features of a "Theme/Festival" district, but it is not quite large enough to draw in significant visitor traffic from the wider region, which was confirmed in stakeholder interviews. While several events are well-attended, Apex remains unknown to many in the surrounding area. Additional square footage (60,000-70,000 square feet) would solidify Apex as a "Theme/Festival" district. These types of districts have a much larger trade area (as large as 25-75 miles), drawing people in for events, day trips, weekend trips, etc.

Neighborhood Center

What Downtown Apex is Today
Concept: Convenience-oriented offerings

Theme/Festival District

What Downtown Apex could be in the Future
Concept: Leisure, tourist, retail and service-oriented offerings with entertainment as a unifying theme. Often in urban areas, they may be adapted from older—sometimes historic—buildings, and part of a mixed-use project.

Based on the International Council of Shopping Centers (ICSC) classification of retail districts



People do not buy goods and services. They buy relations, stories, and magic.

-Seth Godin, American author

4.1.2 Terminology

"Trade Area" refers to the geographic area from which most shoppers hail and is affected by many factors. Physical impediments, such as lakes, pose hard barriers, while highways and good access can have the opposite effect, increasing the area customers will travel from. In practice, trade area is further informed by the quantity and type of retail offerings.

Primary Trade Area is designed to capture consumers in the nearby vicinity of downtown that visit regularly.

Secondary Trade Area is designed to capture occasional or weekend consumers that visit downtown, but not regularly.

PHYSICAL ENVIRONMENT
Access & Visibility
Public Realm
Private Realm

BUSINESS ENVIRONMENT
Business Mix
Competitive Offerings

ADMINISTRATIVE CAPACITY
Key Partners
Zoning & Regulations

MARKET ANALYSIS
Residential Demand
Employee Demand
Visitor Demand
Retail Gap Analysis

An award winning retail analysis methodology known as Commercial DNA developed by Larisa Ortiz of Streetsense

4.2 Market Data & Demographics

4.2.1 Defining the Trade Area

The "trade area" for Downtown Apex as a retail location depends largely on a few key factors: the total retail square footage, existing tenant mix and anchors, visibility, access, and nearby competition. Downtown Apex is a highly accessible commercial district by car with access provided through many regional connectors including NC 540, US 64, US 1, and NC 55. This makes downtown easy to get to for regional residents and also easy to find for out-of-town visitors. As a result, trade areas were determined by drive times—10-15-minute drive (5-mile radius) and 20-30-minute drive (12-mile radius).

Unfortunately, downtown currently lacks high-quality directional signage at key perimeter locations that could capture the attention of potential driving customers and point them to the core retail of Salem Street.

4.2.2 Understanding Retail Demand

Downtown customers are made up of three market segments: Residents, Daytime Workers, and Visitors. The retail leakage data in this study (4.2.3) is only a reflection of the residential customer.

Residents

The residential population within a 5-mile radius of downtown Apex has grown 24% since 2010 and is expected to continue growing 13% over the next five years creating greater demand for retail and restaurants (i.e. more square footage). Within a 10-minute drive, nearly a third of residents are aged 40-60 (Gen X) and a quarter of residents are children <15. Downtown Apex has a strong base of young families as its local customers. Young families suggest a tenant mix that is rooted in family friendly restaurants, activities, and entertainment.

The population in Downtown Apex has been diversifying and will continue to see a large increase in the Asian population, with growth of over 23% in the next five years alone. The Hispanic population and Black/African American populations will also continue to grow by 12% and 5% respectively by 2023. Growing diversity might suggest opportunities for new food concepts and a greater diversity in retail offerings.

The residential population within a 5-mile radius of downtown Apex has higher educational attainments, compared with Wake County. More than 87% of residents have at least some college education. Retailers consider higher educational attainment as a positive predictor of spending. More than half of households within a 5-mile radius earn in excess of $100,000 annually, raising potential spending by local residents. This exceeds rates of high earning households in Wake County (35%). (*All demographic and market data presented from year 2010 are based on the Decennial Census while 2018 and 2023 figures have been projected by proprietary data provider, ESRI Business Analyst Online.)*

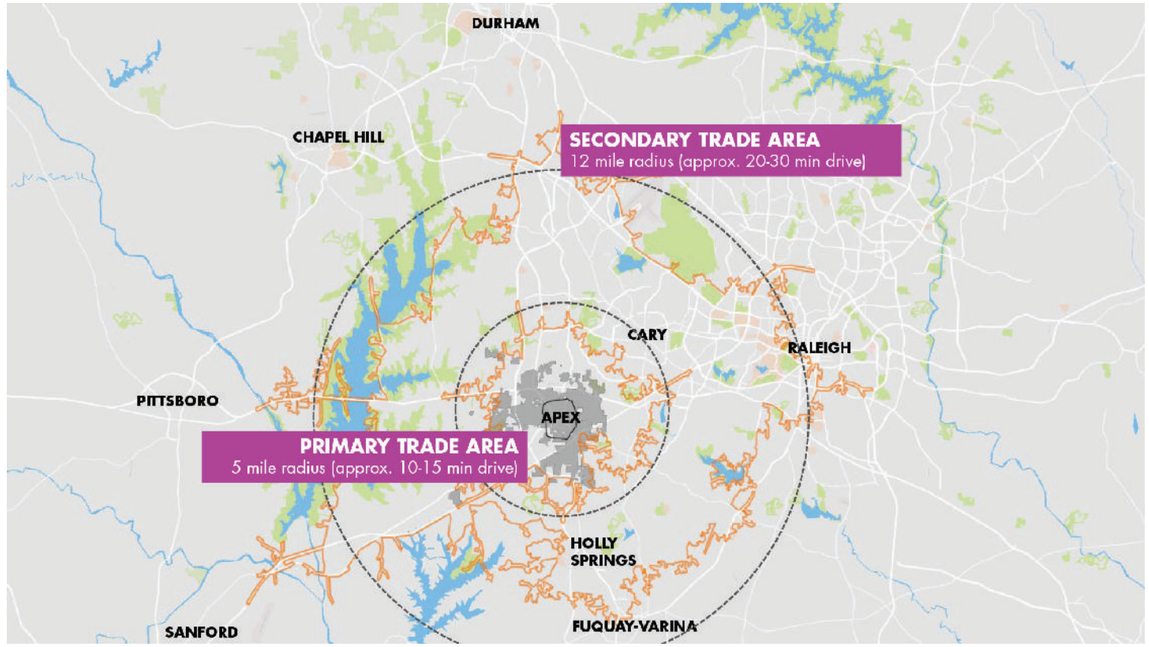
Daytime Workers

Workers form another key base for downtown spending.. Although there are over 35,000 daytime workers within a 5-mile radius of downtown Apex, a majority are employed close to surrounding competitive malls with cheap, fast-service restaurants.

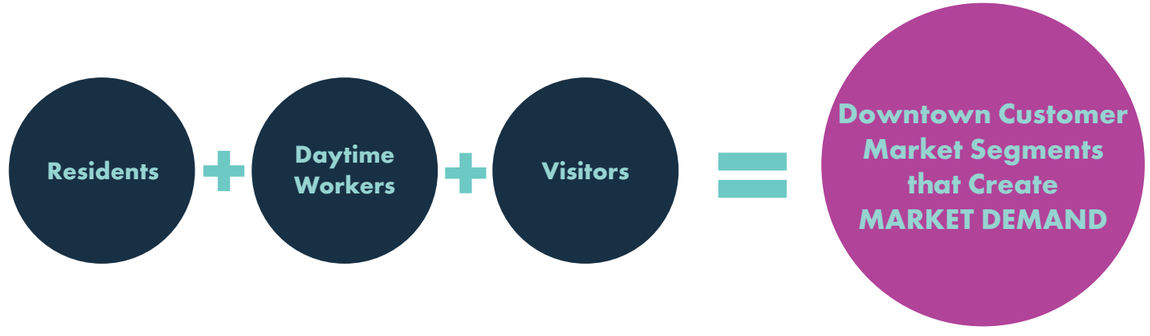
In order to effectively capture worker spending, downtown restaurants need affordable and fast-service lunch and after-work options. Over 40% of daytime workers have high potential spending power with earnings of more than $3,333 per month. *(All daytime population figures are based on 2002-2015 LEHD Origin Destination Employment Statistics (LODES) provided by the Census Bureau.)*

Visitors

Events drive significant visitation. Currently, there are mixed responses from business owners on sales impact. Care should be taken to think about events that drive retail sales and are done in collaboration with merchants. Events that drive people into stores rather than keep them outside of stores need to be added to this roster. *(Visitor data is drawn from pedestrian counts installed downtown (provided by City))*



Map of the Primary and Secondary Trade Areas for Downtown Apex



4.2.3 Understanding Retail Gap

If retail sales are greater than resident demand, businesses are selling more than residents are buying. This typically means shoppers are coming from outside the trade area to shop. Typically, it is a best practice to not add additional business types with a large surplus.

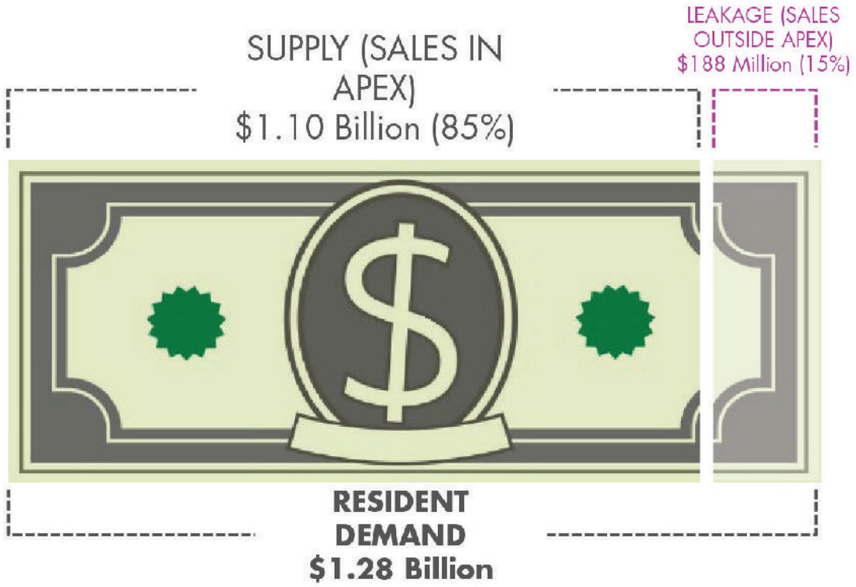
If resident demand is greater than business sales, resident spending may be "leaking" out of the trade area. In other words, they are going elsewhere to shop. Opportunities may exist to add business types to serve those needs. For every $1 of demand by residents within 5 miles/10-minute drive of Apex, $0.15 is being spent outside that same area (10-minute drive).

When total demand for all retail trade and food and drink categories are combined against total supply of all retail trade and food and drink categories*, there is an overall leakage of 15% that is being spent outside the trade area of 5 miles/10-min-drive.

**Note: Categories that were included in this calculation only included traditional brick-and-mortar retail suited to Salem St such as Furniture & Home Furnishings, Electronics and Appliance, Building materials, Garden Equipment and Supply, Food and Beverage, Health and Personal Care, Clothing and Accessories, Sporting Goods, Hobby, Books & Music, Miscellaneous Goods, and Food Services and Drinking Places.*

Despite an overall leakage, this does not mean that each individual retail category included in this calculation has leakage. In this case, Grocery Stores and General Merchandise as individual categories have a surplus that was negated by larger leakage in other categories.

Only when other retail trade categories that are not suited to the fabric of Salem Street such as motor vehicle and parts dealers, gasoline stations, and non-store retailers (e.g. direct selling establishments) are included in the overall leakage calculations, Apex has a surplus of $277 million.



▲ *Supply & Demand which reveals leakage of sales at 15%*

Therefore, the largest surplus categories include the following: Motor Vehicle and Parts Dealers, Gasoline Stations, Non-Store Retailers, Grocery Stores, and General Merchandise Stores.

The town should be conservative about capture rates for a niche offering, but even at 15%, and taking into account the fact that some categories (furniture, building materials, etc.) are not the focus of this effort, there is the opportunity to add more retail to downtown in the categories that will further reinforce the "Theme/ Festival" ICSC category. While adding more retail/food & beverage is an option—this new retail must be focused on areas where there are gaps in the retail environment. The goal of this new retail is to create a cohesive downtown that functions as one, rather than as three distinct districts.

"Theme/Festival" districts are also in keeping with how retail is changing. Nationally, a decline is being seen in some categories (apparel, electronics) owing to online shopping, so rooting this effort in an area of retail where there remains strength is an opportunity. A 15% capture rate (or less) reflects current conditions, and there is demand to add approximately 60-70,000 square feet of additional retail. There is also an opportunity to increase capture rate and grow trade area by connecting disconnected micro-climates. Resilient retail categories include food (specialty food, restaurants), entertainment (sporting, hobby, etc.) and services (personal care).

The two categories that are shown below with strikethroughs indicate categories that were not included in potential retail SF expansion calculations. These categories have been excluded from supportable SF calculations due to their mismatch in merchandise and offerings from the Theme/Festival district of Apex, as well as, due to overall decline of these categories in brick-and-mortar stores as they face increasing competition from online sales.

RETAIL CATEGORY	TOTAL LEAKAGE	SUPPORTABLE SF (100% CAPTURE RATE)	30% CAPTURE RATE	15% CAPTURE RATE
Clothing & Accessories	$66,340,407	246,527	73,958	36,979
~~Furniture & Home Furnishings~~	~~$45,791,993~~	~~116,667~~	~~35,000~~	~~17,500~~
Restaurants/ Other Eating Places	$43,879,863	113,531	34,059	17,030
~~Building Materials, Garden Equipment & Supply~~	~~$43,779,366~~	~~230,523~~	~~69,157~~	~~34,578~~
Health and Personal Care	$24,128,820	25,404	7,621	3,811
Miscellaneous Goods	$21,073,241	52,447	15,734	7,867
Specialty Food	$7,869,393	17,374	5,212	2,606
Sporting Goods, Hobby, Books & Music	$2,137,536	5,717	1,715	858
TOTAL POTENTIAL NEW RETAIL SF:		**461,000**	**138,299**	**69,151**

◀ *Capture rate is independent of the 15% leakage from the previous page. Capture rates are applied to each retail category experiencing leakage to realistically measure the supportable expansion of offerings in these categories given that it is unlikely for any location to capture 100% of demand leaking out of the area. In this case, a lower 15-30% capture rate is likely for downtown Apex given strong competitive offerings in surrounding malls and towns. A multitude of other factors also impact the capture rate, including store operators, quality and price point of new merchandise, accessibility/visibility of downtown to customers, etc.*

*Supportable SF (or 100% Capture) = Total Leakage/ Sales per SF**
**Industry-standard sales per SF figures were applied for each retail leakage category in the table*

4.3 Physical Environment

The public realm and the private realm are examined separately because the funding sources and type of partnerships necessary to advance investments differ so significantly. The town itself will have more control and influence over the public realm improvements and investments but can work with the private sector to provide guidance and leadership.

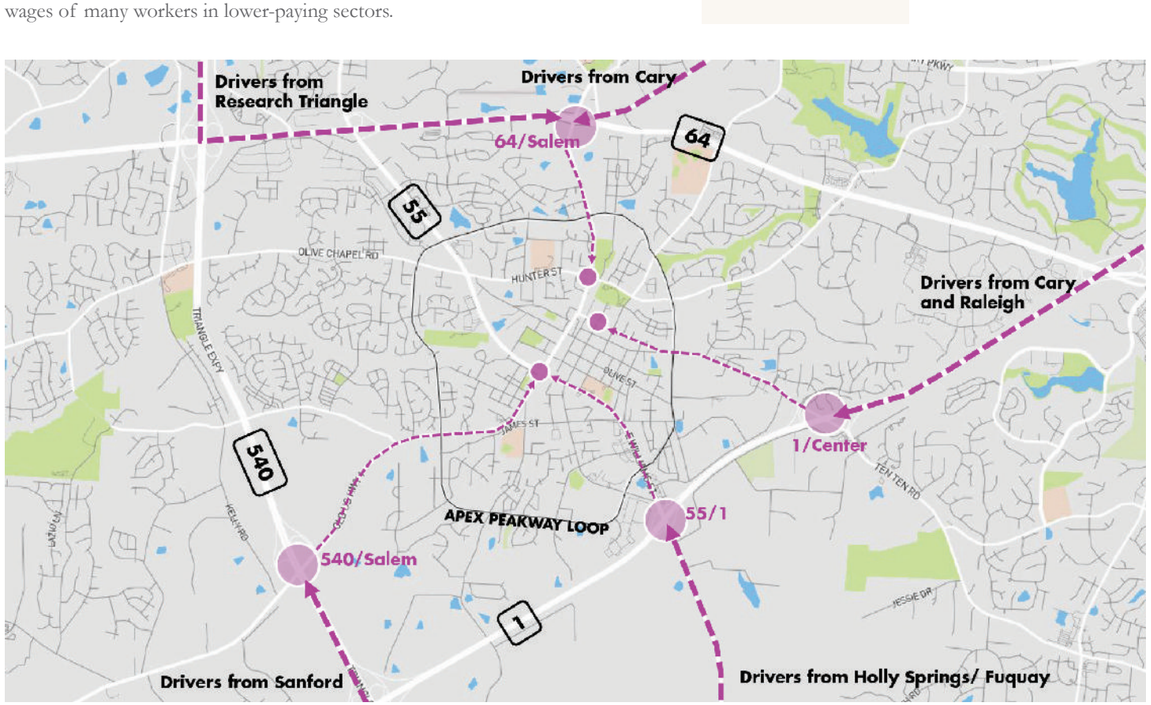
4.3.1 Access & Visibility

The majority of Apex residents and workers own cars; therefore, they drive to downtown and demand parking. Car ownership is driving the current need to ensure that downtown Apex is easily accessible to people arriving by car. Workers whose jobs are within a quarter mile are also likely to drive. To encourage workers in the area to walk downtown at lunch time, ensure sidewalks connecting major employment centers/ buildings to downtown are well-maintained, wide and accessible, well-shaded (street trees), and offer ambient entertainment. This may include public artwork along sidewalks or murals along blank passive walls. However, note that there are only 692 workers within ¾ of a mile of downtown. Workers within close vicinity of downtown are employed in accommodation and food service (26.6%), finance and insurance (14.5%), professional/scientific and technical services (8.2%), and administration &support, waste management and remediation (7.5%). Lunchtime price points therefore need to be reflective of wages of many workers in lower-paying sectors.

99%
Of owner households within a 10-min drive of downtown own at least one vehicle.

27%
Of owner households within a 10-min drive of downtown own 3 or more vehicles.

493
Workers are employed within a quarter mile of downtown Apex



Prioritizing improvements in signage and wayfinding at points of entry for visitors from other major towns and cities such as Cary/ Raleigh/ Research Triangle/ Holly Springs, etc. is key to capturing a new untapped customer base. The entry points indicated on the diagram indicate priority points of entry rather than routes that are likely being used by more local customer segments from areas just outside of Apex such as Walden Creek.

As mentioned earlier, the main entryways to Apex are the routes that see some of the highest vehicular counts. These gateways are opportunities to raise the awareness of downtown Apex and its offerings. With over 90% of downtown diners and shoppers arriving by private vehicle, wayfinding at critical junctures should be larger and more visible to capture the attention of visitors and new passersby. The lower average daily traffic (ADT) count and reduced speed limits in the downtown core creates a generally safe and comfortable environment for pedestrian shoppers. Downtown Apex has the potential to capture larger amounts of daily traffic from surrounding highways with the right signage.

Pedestrian counts tell us that the downtown is most active on weekends and during lunch and dinner. High pedestrian activity is also seasonal; this information is helpful for soft goods retailers who might be interested in capturing additional customers during these times. While many stores are closed on Mondays, the pedestrian data suggests that Monday is as favorable a day from a pedestrian count perspective as any other day.

4.3.2 Public Realm

Salem Street has clean sidewalks and existing lighting that create a comfortable and attractive environment for pedestrian shoppers. Although sidewalks are well maintained, businesses are constrained by the overall width and the brick paver strip along the curb makes that experience feel even more narrow. Merchants are often unable to display furniture and merchandise that would otherwise activate the public realm. The tight row of parallel parking spaces also creates a visual wall, limiting cross-shopping opportunities. The downtown core also lacks well-programmed open space that drives visitation by accommodating activities, community events, and entertainment. All of these extend "dwell time". Increasingly, activated open space is helping to drive visitation in downtown environments. In this case, the current open space is underutilized and underwhelming. Opportunities need to be explored to further enhance a comprehensive set of downtown experiential offerings (which are critical to competing with on-line).

4.3.3 Private Realm

Downtown businesses in ground floor spaces have creatively taken on a myriad of storefront marketing tactics, including branded signage and awnings, transparent windows, painted facades, and outdoor merchandise displays. Businesses are poised to take advantage of opportunities for more outdoor space (e.g. sidewalks, open space, parklets). Passive and vacant ground floor uses create a 200 foot gap between Salem Street retail offerings and those located in the Promenade/Tobacco Exchange, separating the two nodes from each other and reducing the likelihood for cross-shopping opportunities.



Gaps in the retail experience discourage cross-shopping north of Saunders Street

4.4 Business Environment

4.4.1 Downtown Anchors

Downtown Apex is characterized by a variety of local and unique retail and restaurants as well as civic anchors. Salem Street between Chatham and Saunders, the Tobacco Exchange and Salem Street Promenade, and Salem Heritage Plaza comprise the three retail microclimates. The Halle Cultural Arts Center, Chamber of Commerce (located in the historic depot), the fire station, and the Baptist and Methodist churches all serve as civic anchors in the core downtown district. While Downtown Apex has a dense set of offerings, including unique, small-town specialty goods and family-friendly eating and drinking places, stakeholders indicated there is a lack of awareness of these offerings.



Civic Anchor

Local Eating/Drinking Places

4.4.2 Doing Business in Apex

Restaurants are actively marketing their businesses through social media and online review platforms. These efforts have been funded and initiated by individual businesses.

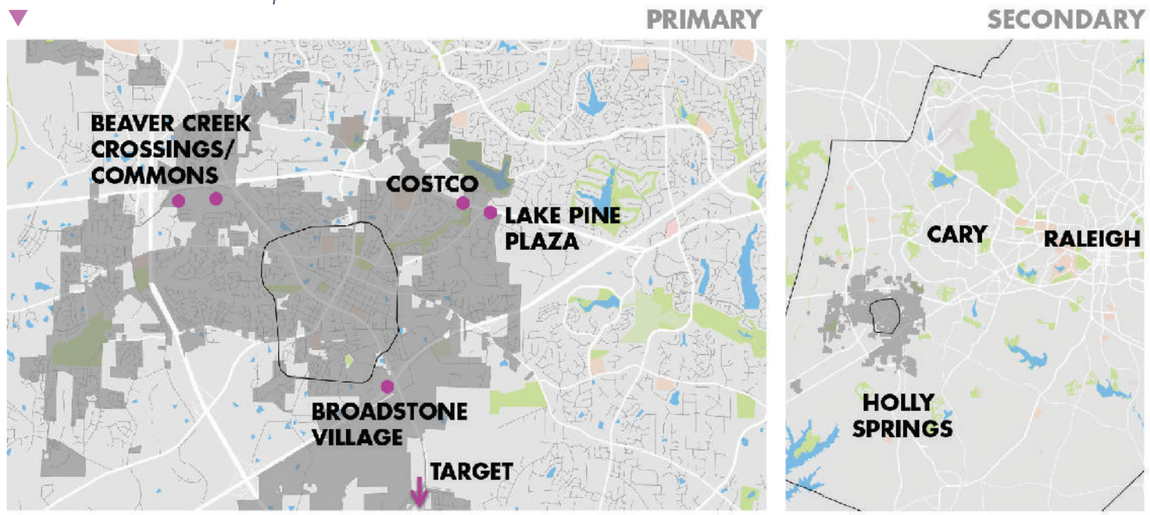
However, there is currently no overarching downtown brand and no robust, collective marketing platform for retail and restaurant businesses. Without a strong downtown brand, each individual business must fend for themselves. A downtown brand can help communicate a set of offerings that will help to draw visitors. Visitors typically spend 4 minutes for every 1 minute of travel. So a traveler who travels 15 minutes wants at least an hour of things to do. By marketing a 2-3 hour experience, or having people think of a visit as lasting 2-3 hours, the town is strengthening opportunities to draw from a trade area that is 30-45 minutes.

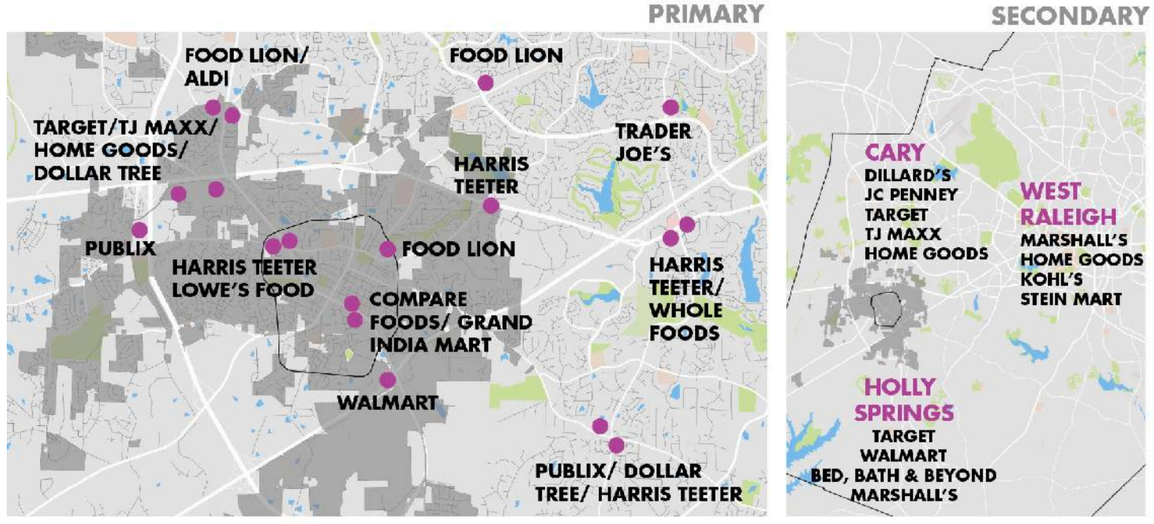
There is a also a mismatch in store operating hours between retailers and restaurants. While restaurants are open until 9PM on most nights, retail is completely closed by 6PM most nights.

4.4.3 Competitive Districts

A number of general merchandise and malls exist in the surrounding area which contributes to the retail leakage the study discovered. On busy event days and weekends, downtown Apex retailers and restaurants compete for demand with nearby competitive districts. Local residents are shopping for convenience and neighborhood goods and services in a variety of nearby shopping centers as the maps to the right illustrate. Economies of scale and the sheer diversity of offerings at these big box stores make it unlikely that downtown can compete directly against these businesses. Hence, the push to make the experience of downtown Apex unique and vibrant in a way these competitors cannot be.

Primary and Secondary Trade Area Competitive Districts around Downtown Apex





Primary and Secondary Trade Area Competitive Shopping Centers around Downtown Apex

4.5 Administrative Capacity

Successful downtown retail strategies rely on vital economic development partners from all sectors. A few of those key partners are listed in the table below and include public sector, non-profits, and civic organizations.

The hiring process for a new "Downtown and Small Business Coordinator" was happening concurrently with the development of this plan. Their role as an advocate and liaison for downtown will be a key tool for the advancement of this plan. The position fills the gap in resources and staff capacity which don't currently fully cover the management and promotion of downtown.

The other piece of the administrative puzzle is good downtown zoning and signage regulations that support vibrant environments. The specific policy recommendations related to this item can be found in Chapter 9.



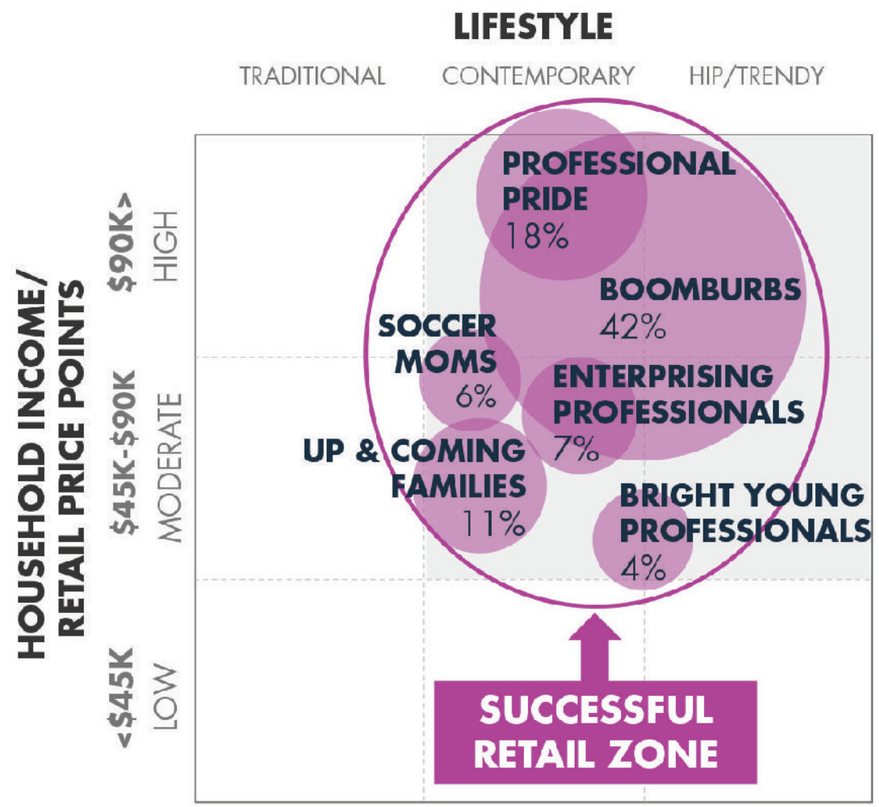
PUBLIC SECTOR/ TOWN	**TOWN OF APEX COMMUNICATIONS** - Branding study (rebranding not targeted specifically towards downtown Apex/businesses)	**POTENTIAL FOR DOWNTOWN COORDINATOR** -Dedication to downtown improvement, growth, and maintenance	**APEX PUBLIC ART COMMITTEE** -Volunteer-based, no guaranteed stream of funding
NON-PROFIT/ ECON DEVELOPMENT	**DOWNTOWN BUSINESS ASSOCIATION** - Volunteer based group of business owners supporting each other and promoting downtown Apex and its businesses. The ADBA does not have any employees or guaranteed funding.	**CHAMBER OF COMMERCE** - Over 500 members (However, only 1% are downtown Apex business owners) - Marketing collateral/town map (draw attention to surrounding shopping centers; doesn't feature downtown Apex businesses)	
CIVIC/VOLUNTEER GROUPS	**CHURCHES, MOSQUE, AND SCHOOLS** - Baptist and Methodist Church provide additional parking spaces - School children early release results in large influx of kids. May present opportunity for tailored retail, dining, and public space		

Matrix of economic development partners working together toward a successful retail strategy

4.6 Strategic Positioning

Psychographic analysis was conducted with ESRI Tapestry Segmentation to identify customer groups in the 5-mile radius in order to describe the socioeconomic characteristics of these residents. ESRI Tapestry Segmentation provides an accurate, detailed geodemographic segmentation system that integrates consumer's spending habits, concerns, and values with residential characteristics to explain why they buy, to identify markets, and to classify U.S. neighborhoods. For complete ESRI segment descriptions, please refer to the appendix of this document.

By utilizing psychographic data, laid on a matrix that looks at household income (from resident provided data), successful retail will meet the needs of customers who fall in the moderate to high and contemporary to hip/trendy quadrants. This is not to say that other businesses will not do well, but that the likely successful business will serve this dominant customer base. In order to effectively capture additional spending by local residents and workers in the primary trade area, downtown Apex needs to offer more contemporary and trendy comparative retail and eating/drinking places.



Psychographic Analysis Tapestry Segmentation for 5-mile radius

4.7 Retail Recommendations

The following recommendations are designed to improve the success of retail in downtown Apex. They can also be found in the implementation matrix of Chapter 9.

4.7.1 Physical Environment

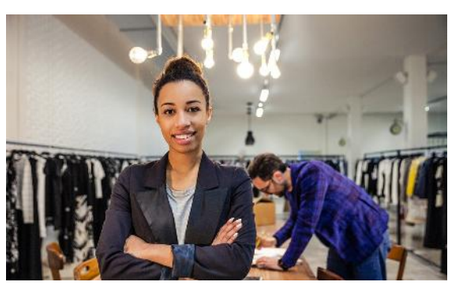
Key Recommendations

- *4A-Improve the public realm for retail by adding interim parklets along Salem Street to allow for more spillover retail/dining experiences.*
- *4B-Strengthen downtown Apex as a "theme/festival" destination district by adding 60-70,000 square feet of space to create 150,000 square feet total, which will increase the capture rate and grow the trade area by connecting the disconnected micro-climates with new offerings. Any new retail supply should be clustered at existing nodes and/or serve to connect the microclimates.*
- *4C-Enhance signage and wayfinding at critical entry points to downtown Apex by using large, visible historic signs and unique public art elements.*
- *4D-Encourage workers in the area to walk downtown at lunch time by ensuring sidewalks connecting major employment centers/buildings to downtown are well-maintained, wide and accessible, well-shaded (street trees), and offer ambient entertainment. This may include public artwork along sidewalks or murals along blank passive walls. The price point for lunch options must also be reflective of the lower-paying sector wages.*
- *4E-Program spaces with ambient entertainment to encourage greater visitation to downtown on non-event days.*

4.7.2 Business Environment

Key Recommendations

- *4F-Ensure the appropriate tenant mix by aligning retail recruitment efforts with demographics/demand and leakage opportunities (including, but not limited to, affordable, quick lunch and after-work options to capture worker spending, new food and retail concepts to cater to a growing diversity in residents, and family-friendly restaurants, activities, and entertainment to meet the demand of the young family customer base).*
- *4G-Encourage existing restaurants or other new full-service restaurants to extend service on weekend mornings to meet breakfast demand from local residents.*
- *4H-Work with local retailers and restaurateurs to create a downtown district with consistent and complimentary hours of operation.*
- *4I-Develop communication materials based on a new downtown brand to share market information and the overall downtown investment strategy with potential investors and tenants.*
- *4J-Promote and program events that drive retail sales and are done in collaboration with merchants during slower business hours to drive foot traffic in stores.*
- *4K-Expand downtown offerings for the youth population. This may include offering lower after-school price points on certain menu items merchandise (particularly for casual take-out snacks/food and miscellaneous goods). In addition, support local social service/education providers who are able to offer non-retail options such as free after-school activities and programs in public spaces.*
- *4L-Increase resources for the newly hired Downtown and Small Business Coordinator in order to effectively implement the above programs and strategies that will enhance the downtown business environment.*



Aligning the tenant mix with current demographic demand will be vital to the future of retail on Salem Street.



Enhancing the public realm of Salem Street by allowing temporary parklets can greatly increase retail/restaurant sales. Parklets should be piloted to reduce cost and time of implementation and to test favorability with customers and business owners before sinking large investments. In the long term, parklets may be installed permanently once the right locations have been identified through pilots.

Top 3 Public Choices for New Businesses in Downtown Apex



Brewery & Beer Garden | **Restaurants** | **Experiential Retail (i.e. kitchen store with cooking classes)**

Top 3 Public Choices for Ideas to Spice up the Retail Environment



Parklet for Outdoor Dining | **Active Entertainment** | **Parklet for Relaxation**

Public input gathered reflects a desire for breweries, restaurants, and experiential retail which is all on trend nationally along with parklets and ambient entertainment to enhance the retail environment.



05
HOUSING MARKET CONDITIONS & STRATEGIES

05 HOUSING MARKET CONDITIONS AND STRATEGIES

Housing experts Zimmerman/Volk Associates (ZVA) led the investigation into the potential market for new dwelling units within the study area. The team needed to determine the target households, appropriate residential mix, and the optimum market position for new units.

Housing preferences and socio-economic characteristics of households were a key determinant in defining housing potential. Demographics are important, but so are lifestage and lifestyle patterns. As in all real estate, location is critical to housing success. Creating the right mix of for-rent and for-sale housing units within a walkable distance of downtown is how a twenty-four hour population emerges. Varied price points and unit sizes help foster a mixed-income, mixed generation community.

No matter how desirable the downtown commercial environment becomes, without housing options (including affordable units) in walking and biking distance to the core, people will be forced to live in surrounding zipcodes. The absence of people living downtown stunts the potential for the area in a real way. The plan strives to illustrate the market potential shown in this chapter in subsequent design scenarios.

The entire housing study can be found in the appendix of this document.

2,380
households have the potential to move within and to the town each year

1,080
households have the potential to move within and to the study area each year

103-144
households represent the annual potential capture rate for the study area

In brief, the housing study determined:

- **Where** the potential renters and buyers of new and existing housing units in the Town of Apex and the study area are likely to move from (the draw areas);
- **How** many households have the potential to move within and to the town and the study area each year if appropriate housing units were to be made available (depth and breadth of the market);
- **Who** the households are that represent the potential market for new units in the study area (the target markets);
- **What** their housing preferences are in aggregate (rental or ownership, multi-family or single-family);
- **What** their range of affordability is by housing type (income qualifications);
- **What** their current housing alternatives are (rental and for-sale residential development in the Apex market area);
- **What** the target households are currently able to pay to rent or purchase new dwelling units in the study area (base rents and prices); and
- **How** quickly the new units will lease or sell (absorption forecasts).

5.1 The Current Housing Context

In May 2019, ZVA compiled data from a variety of sources, including telephone interviews, individual property, and rental websites on eight selected rental properties built since 2007 representing more than 2,000 rental apartments in Apex. Most of these properties are purpose-built investment-grade assets with property sizes ranging from 165 units (at the seniors' apartment project, Cambridge Village of Apex) to 316 units (Colonial Village at Beaver Creek). All are at functional full occupancy, 95 percent or more occupied, in initial lease-up, or under construction.

Walk Score, a number between 0 and 100 denoting the walkability of a specific address or neighborhood, has grown in importance as a value criterion. Walk Scores between 70 and 90 are considered to be very walkable, where most errands can be accomplished on foot. Walk Scores below 50 indicate that most or almost all errands require an automobile. The Walk Scores of the eight surveyed rental properties range between 9 and 34, well below the Walk Scores at which walkability adds rental premiums, typically 70 and above.





This is a very clear trend everywhere in the U.S. The properties that have the highest walkability scores are achieving the highest rents and occupancy.
-Jonathan Holtzman, Chairman & CEO, City Club Apartments

The following information includes, by unit type, the number of properties surveyed, the approximate number of units, the general unit sizes and rent ranges, and the rents per square foot.

5.1.1 Multi-Family Rental Properties

Detailed information on the eight surveyed rental properties is summarized below.

Studios (one property)

- Only Cambridge Village of Apex, the seniors rental property, leases studio apartments. These range in size between 433 and 506 square feet, and rent for $2,845 per month (between $5.62 and $6.57, the highest per-square-foot rents in the area). The wide range of services provided here account for the significantly higher rents.

One-Bedroom Units (8 properties)

- Excluding Cambridge Village of Apex, rents for one-bedroom apartments range from $998 per month at Colonial Village at Beaver Creek on Creekside Drive to $1,878 per month, also at Colonial Village. One-bedroom units at Cambridge Village rent for more than $3,500 per month.
- One-bedroom units range in size from 572 square feet at Cambridge Village to 965 square feet at Meridian at Ten Ten on Brynmar Oaks Drive.
- Again excluding Cambridge Village, one-bedroom rents per square foot range between $1.30 at Village at Broadstone Station on Broadstone Way to $2.50 at Colonial Village. Rents per square foot at Cambridge Village range between $5.49 and $6.21.

Two-Bedroom Units (8 properties)

- Rents for two-bedroom flats range from $1,155 per month for a two-bedroom/one-bath apartment at Village at Broadstone Station, to $2,248 per month at Colonial Village. Rents for two-bedroom apartments range between $4,695 and $5,495 per month at the Cambridge Village seniors property.
- Two-bedroom units range in size from 1,027 square feet at Colonial Village, to 1,441 square feet at Flats at 540 on Reedybrook Crossing. Two-bedroom seniors units at Cambridge Village are as small as 818 square feet.
- Two-bedroom rents per square foot fall between $0.97 at Village at Broadstone Station and $2.06 at Colonial Village. At Cambridge Village, two-bedroom rents per square foot fall between $4.29 and $5.74.

Three-Bedroom Units (7 properties)

- Three-bedroom apartments are offered at all but Cambridge Village, with rental rates ranging between $1,302 at Village at Broadstone Station and $2,808 per month at Colonial Village.
- Three-bedroom apartments contain between 1,203 square feet at Colonial Village and 1,461 square feet at Village at Broadstone Station.
- Three-bedroom apartment rents per square foot range between $0.89 at Village at Broadstone Station and $2.33 at Colonial Village.

Nearly all of the properties provide a range of community amenities, typically pools, fitness centers, clubhouses or residents' lounges, business centers, and dog parks; less typical amenities include a movie theater, cabanas, and sports courts.

5.1.2 Single-Family Attached For-Sale Properties

The information below details resale listings, new construction, and proposed new construction townhouses being sold at 20 properties located in the Town of Apex. The units have been built post-2005, and most have been built within the past two years.

The Walk Scores of the surveyed for-sale properties range between 0 and 47. The following information includes, per area, the number of properties surveyed, the general unit sizes and price ranges, and the prices per square foot from the least- to the most-expensive units:

Central Apex
- 10 Properties (new/resales)
- 1,340 to 2,406 square feet
- $249,990 to $359,990
- $125 to $187 per square foot

Western Apex
- 6 Properties; 11 individual listings (new)
- 1,736 to 3,157 square feet
- $255,900 to $419,231
- $125 to $164 per square foot

Northern Apex
- 1 Property (new)
- 1,984 to 2,479 square feet
- $283,900 to $349,900
- $139 to $151 per square foot

Southern Apex
- 3 Properties (resales)
- 1,655 to 2,004 square feet
- $247,900 to $279,900
- $125 to $154 per square foot

Note: Central, western, northern, and southern boundaries were delineated by MLS database and no map was provided.

5.1.3 Single-Family Detached For-Sale Properties

The information below details resale listings, new construction, and proposed new construction single-family detached houses being sold at 20 subdivisions located in the Town of Apex. All of the new construction has been built in 2018 or 2019; most of the resales are less than five years old.

As with the townhouses, the following information includes, per area, the number of subdivisions surveyed, the general unit sizes and price ranges, and the prices per square foot from the least- to the most-expensive units:

Central Apex
- 5 Subdivisions; 4 individual listings (new/resales)
- 1,800 to 5,333 square feet
- $324,000 to $725,000
- $136 to $205 per square foot

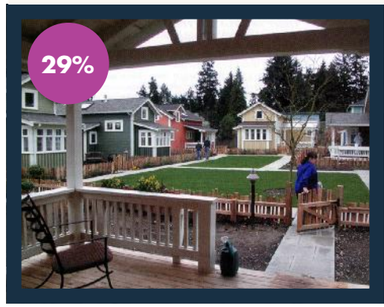
Western Apex
- 12 Subdivisions (new/resales)
- 1,938 to 6,458 square feet
- $317,535 to $949,900
- $115 to $229 per square foot

Northern Apex
- 2 Subdivisions (new)
- 2,824 to 3,663 square feet
- $414,990 to $529,467
- $119 to $160 per square foot

Southern Apex
- 1 Subdivision (new/resales)
- 3,045 to 4,410 square feet
- $469,900 to $642,463
- $125 to $161 per square foot

Current housing context reflects what is available in terms of residential properties along with rents and prices (available alternatives for a household who might be moving to Apex). This reflects the context in which new development will occur and is what most developers look to when deciding whether to take on a project in a given area.

Top 3 Public Choices for Infill Single Family Housing



Cottage Courts



Small Home-Narrow Lot



Accessory Dwelling Unit-Granny Flat/Carriage House

Top 3 Choices for Multifamily Housing



Upper Lofts in Mixed Use



Live-Work Units



Duplex

▲ *Public input gathered reflects a desire for smaller, more affordable units in the study area*

5.2 Market Potential

Analysis of migration, mobility, socio-economic and lifestyle characteristics of households currently living within defined draw areas was integral to the determination of the potential market for new and existing housing units within the Town of Apex and the study area.

Additional supporting data was drawn from the 2017 American Community Survey for the study area, for the Town of Apex, and for Wake County. Information obtained from real estate brokers, sales and leasing agents, plus field investigation played into the market potential determination.

Where are the potential renters and buyers of new and existing housing units in the Town of Apex likely to move from?

Average Annual Market Potential by Draw Area

Town of Apex:	**19.3%**
Balance of Wake County:	**34.7%**
Regional Draw Area:	**6.1%**
Balance of the U.S.:	**39.9%**
Total:	**100.0%**

The LOCAL draw area, covering all households living within the Apex town limits.
The COUNTY draw area, covering all households living in the balance of Wake County.
The REGIONAL draw area, covering households with the potential to move to the Town of Apex from Durham and Johnston Counties, North Carolina.
The NATIONAL draw area, covering all households with the potential to move to the Town of Apex from all other U.S. counties.

How many households have the potential to move within and to the town each year?

2,380 households

How many households have the potential to move within and to the STUDY AREA each year over the next five years?

1,080 households

What are their housing preferences in aggregate?

HOUSING TYPE	NUMBER OF UNITS	PERCENT OF TOTAL
Multi-Family For-Rent (Lofts/Apartments, leaseholder)	**586**	**54.3%**
Multi-Family For-Sale (Lofts/Apartments, Condo/co-op ownership)	**81**	**7.5%**
Single-Family Attached For-Sale (Townhouses, ADUs, fee-simple/condominium ownership)	**113**	**10.5%**
Single-Family Detached For-Sale (Houses, ADUs, fee-simple ownership)	**300**	**27.7%**
TOTAL	**1,080**	**100.0%**

What is their range of affordability by housing type?

The 1,080 households that represent the annual potential market for new and existing housing units in the study area have also been grouped by income, based on the Raleigh, NC MSA median family income (AMI), which, for fiscal year 2019 has been determined by HUD to be $93,100 for a family of four. Summarizing the incomes and financial capabilities of the 1,080 target households that represent the annual potential market for new units in the Study Area:

12.4% (134 households) have incomes below 30% of the AMI

10.6% (115 households) have incomes between 31 and 60% AMI

15.4% (166 households) have incomes between 61 and 80% AMI

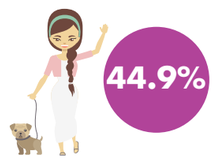
7.9% (85 households) have incomes between 81 and 100% AMI

53.7% (580 households) have incomes above 100% AMI

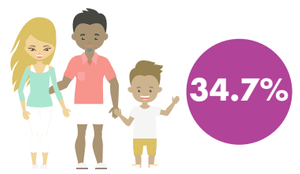
This study examines affordability based on the following general income groupings:

- *Households with incomes below 30 percent AMI (the majority of these households typically qualify only for public housing or older existing units);*
- *Households with incomes between 31 and 60 percent of AMI (these households typically qualify for low-income housing tax credit units, existing older affordable rental housing, or heavily subsidized ownership housing);*
- *Households with incomes between 61 and 80 percent of AMI (these households typically qualify for workforce or affordable rental housing or subsidized ownership housing);*
- *Households with incomes between 81 and 100 percent AMI (these households typically qualify for existing rentals or new workforce or affordable for-sale housing); and*
- *Households with incomes above 100 percent AMI (these households generally have sufficient incomes to rent or purchase market-rate housing).*

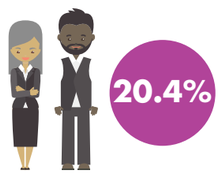
Who are the households that represent the potential market for new units in the Apex Study Area?



Younger Singles & Childless Couples



Traditional & Non-Traditional Family Households



Empty Nesters & Retirees

5.3 Market Capture

Based on a 15 to 20 percent capture of the annual average market for rental housing units, and a 10 to 15 percent capture of the annual average market for for-sale housing units, the Apex Study Area could potentially absorb an annual average of between 103 and 144 new multi-family and single-family attached and detached housing units with rent and price points that correspond to target household financial capabilities over the next five years.

For a study area of this size and scale, there is a high degree of confidence in a capture rate of up to 20 percent for new multi-family rental development and up to 15 percent for new multi-family for-sale and single-family attached and detached for-sale development.

103-144 units the **ANNUAL MARKET CAPTURE** for units within the **STUDY AREA** each year over the next five years

515-720 units in 5 Years

Annual Market Capture by Housing Type

HOUSING TYPE	NUMBER OF UNITS	PERCENT OF TOTAL
Multi-Family For-Rent (Lofts/Apartments, leaseholder)	61-82	49.3%
Multi-Family For-Sale (Lofts/Apartments, Condo/Co-op ownership)	7-11	8.8%
Single-Family Attached For-Sale (ADUs/Duplexes/Triplexes/Rowhouses/Townhouses, fee-simple)	10-14	11.7%
Single-Family Detached For-Sale (ADUs/Urban Houses, fee-simple)	25-37	30.2%
Total	103-144	100.0%

5.3.1 Recommended Apex Housing Typologies | Buildings & Units

Building Typologies

Courtyard Apartment Building: An urban-scale, pedestrian-oriented equivalent to conventional garden apartments.

Loft Apartment Building: Either adaptive re-use of older warehouse or manufacturing buildings or a new-construction building type inspired by those buildings.

Mansion Apartment Building: A two- to three-story flexible-use structure with a street façade resembling a large detached or attached house (hence, "mansion").

Liner Building: An apartment building with apartments and/or lofts lining two to four sides of a multi-story parking structure.

Mixed-Use Building: A pedestrian-oriented building, either attached or free-standing, with apartments and/or offices over flexible ground floor uses that can range from retail to office to residential.

Podium Building: A small-scale apartment building construction type with two or more stories of stick-frame residential units (lofts or apartments) built over a single level of above-grade structured parking, usually constructed with reinforced concrete.

Duplex/Triplex/Rowhouse/Townhouse: Similar in form to the conventional suburban equivalent except that the garage—either attached or detached—is located to the rear of the unit and accessed from an alley or auto court. Unlike the conventional units, urban duplexes/triplexes/rowhouses/townhouses conform to the pattern of streets, typically with shallow front-yard setbacks. Accessory dwelling units can be in the form of attached townhomes as well.

Single-Family Detached Houses: Includes cottages and bungalows, as well as mansions along with accessory dwelling units (ADUs).

Multifamily Unit Typologies

Apartment: A conventionally-finished apartment unit.

Hard Loft: Unit interiors typically have high ceilings and commercial windows and are minimally finished (with minimal room delineations such as columns and fin walls), or unfinished (with no interior partitions except those for bathrooms).

Soft Loft: Unit interiors typically have high ceilings, are fully finished and partitioned into individual rooms.

Mezzanine Loft: Lofts with an additional half level, the mezzanine, that typically occur only on the uppermost full floor of a multi-family building.

Microloft: Several cities across the country are changing minimum unit size requirements as part of a strategy to attract young knowledge workers. Millennial knowledge workers have responded positively to efficiency units as small as 220 square feet, often leasing out new microloft projects within a matter of days.

Maisonette Apartment: An apartment that is integral to a multifamily apartment building, but that includes a private, individual entrance at street level. When sited with shallow setbacks, the entrance to the apartment on the first floor is elevated above sidewalk level to provide privacy and a sense of security.

Penthouse: An apartment situated on the top floor of a multifamily apartment building that has exclusive use of a portion of the building's roof as a private terrace.

5.4 Optimum Market Position

As noted previously, **1,080 households** of all incomes represent the annual market potential for new and existing housing units in the Apex study area. This housing analysis is focusing on the **831 households with incomes at or above 61 percent Average Median Income (AMI)**, which covers the incomes required to rent or purchase new workforce and market-rate housing units. That includes an average of:

- 410 potential renter households
- 73 potential condominium purchaser households
- 97 potential rowhouse/townhouse purchaser households
- 251 potential detached house purchaser households

This total of 831 households with incomes at or above 61 percent of the AMI comprise the annual potential market for new residential development in the Apex study area over the next five years. Therefore, the optimum market position for new housing in the study area has been developed based on a variety of factors, including but not limited to:

- The tenure and housing preferences, financial capabilities, and lifestages of the target households;
- The assets and amenities located throughout the Apex Study Area; and
- Current market area residential market dynamics.

Based on these factors, the optimum market position for new rental and for-sale housing within the Apex study area is summarized on the next page. Market position includes proposed unit sizes/configurations, unit rents/prices, and rents/prices per square foot. Most housing developers are looking for this bottom line related to the optimum market position.

831

households with incomes at or above 61% AMI comprise the annual potential market for new workforce and market-rate residential development in the study area over the next five years

Case Study: Improve Housing Stock via Institutional Partnerships

In many small towns across the country, institutional partnerships have resulted in improved downtown housing stock via the implementation of home improvement grant programs. For example, the Oswego Renaissance Association (Oswego, NY) is a partnership between the Shineman Foundation, Pathfinder Bank, Novelis, Exelon Generation, State University of New York Oswego and others. This strategic, multi-year program aims to revitalize the City of Oswego's neighborhoods by providing grants to homeowners.

In particular, the annual Renaissance Block Challenge Grant provides matching funds to property owners who apply in clusters of 5 or more properties within a single block. Each property owner receives a matching grant award for up to $1,000 in expenses towards exterior home improvements, landscaping, and street improvements. In 2015 alone, seventeen separate city blocks participated and to date has led to over $1.5 million of private investment being leveraged into Oswego's Renaissance Block neighborhoods.

Optimum Market Position: MF Rental Units

Microlofts, Studio, 1 & 2 bedroom lofts
Monthly rents: $1,000 to $1,750
Unit Sizes: 450 to 1,100 sq. ft.
($1.59 to $2.22 psf)

1 to 3 bedroom apartments
Monthly rents: $1,250 to $2,200
Unit Sizes: 750 to 1,350 sq. ft.
($1.63 to $1.67 psf)

Optimum Market Position: MF For Sale Units

1 to 3 bedroom condominiums
Base prices: $175,000 to $425,000
Unit Sizes: 1,000 to 2,450 sq. ft.
($173 to $175 psf)

Optimum Market Position: SF Attached Units

2 bedroom triplexes/rowhouses
Base prices: $165,000 to $210,000
Unit sizes: 950 to 1,250 sq. ft.
($168 to $174 psf)

2 and 3 bedroom duplexes/townhouses
Base prices: $250,000 to $375,000
Unit sizes: 1,400 to 2,150 sq. ft.
($174 to $179 psf)

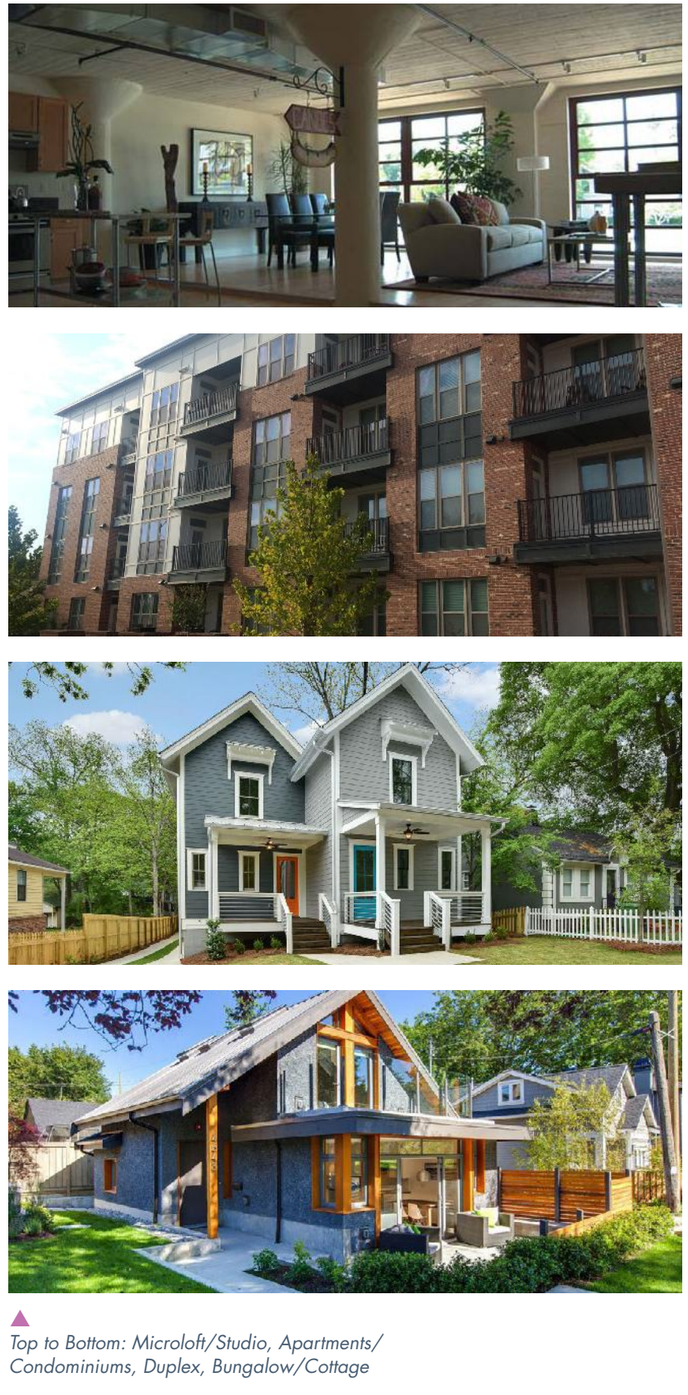
Optimum Market Position: SF Detached Units

1 and 2 bedroom cottages/bungalows
Base prices: $145,000 to $225,000
Unit sizes: 800 to 1,300 sq. ft.
($173 to $181 psf)

3 to 5 bedroom houses
Base prices: $275,000 to $525,000
Unit sizes: 1,500 to 2,950 sq. ft.
($178 to $183 psf)

NOTE

Key recommendations related to housing are incorporated throughout Chapters 7 and 8.



Top to Bottom: Microloft/Studio, Apartments/ Condominiums, Duplex, Bungalow/Cottage



06
PARKING CONDITIONS & STRATEGIES

06 PARKING CONDITIONS AND STRATEGIES

Parking is personal. The availability of parking that is proximate to one's destination is personally valuable. The challenge becomes the number of people in a vibrant downtown that are valuing the same public parking spaces, at the same time of day. Under this condition, a community has the beginnings of a 'parking problem.'

To effectively manage parking, the team needed to have concrete data related to supply and demand along with anecdotal evidence provided by the public. Armed with both these items, the team brought valuable expertise to bear in exploring strategies to more actively manage public parking in downtown.

As in many communities, the perception of a parking issue was far greater than the reality. However, perception is a critical determinant of area patronage, so employing simple strategies to shift negative feelings will improve the situation tremendously.

Promotion of multi-modal transportation enhancements and emerging technologies related to smart mobility give the single-occupant car owner viable alternatives when visiting downtown other than searching for a parking space.

1,148
total parking spaces in the core area of downtown, although there are 1,665 total parking spaces near Downtown

4
sites investigated for a potential parking deck

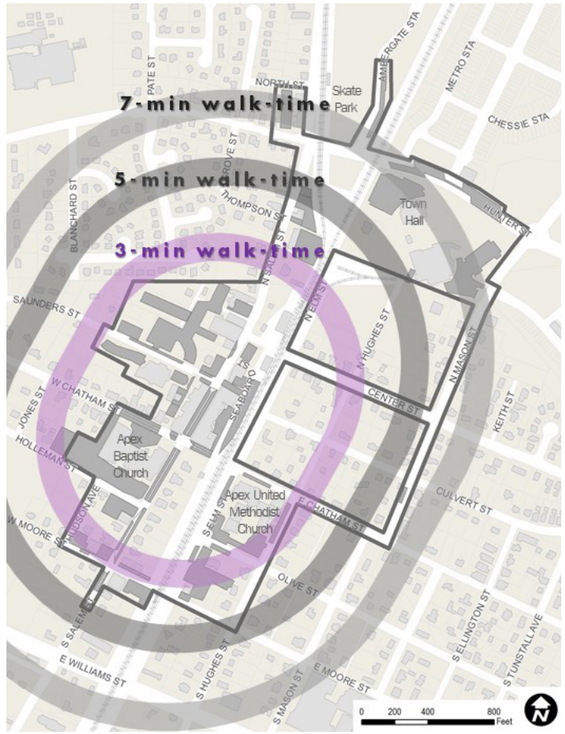
54%
peak usage occupancy of existing parking observed

6.1 Understanding the Current Parking Situation

6.1.1 Current Parking Supply

For the parking portion of this project, the study area was reduced in size to parking facilities within a 7-min walk of Salem Street, roughly NC-55/Williams Street to the south and Hunter Street (Town Hall) to the north. Town staff performed an audit of current parking supply for each parking facility (on-street or lot), including private parking areas, beginning in February 2019. This tabular parking inventory was joined within a geographic information system (GIS) platform to visualize parking spaces by location, and used to inform discussions and our project design process.

Although the total parking supply in Apex is just over 1,600 parking spaces, public parking spaces near Town Hall and Hunter Street are perceived by many as "too far" from Salem Street to be included in this analysis. As a result, the project team focused on a Downtown Core Area of parking facilities between Moore Street (south) and Templeton Street (north), roughly a 3-minute walk. The Core Area contains nearly 1,200 parking spaces, which are evenly split between public (51%) and private (49%) spaces, though their actual locations are not evenly balanced north or south of Chatham Street.

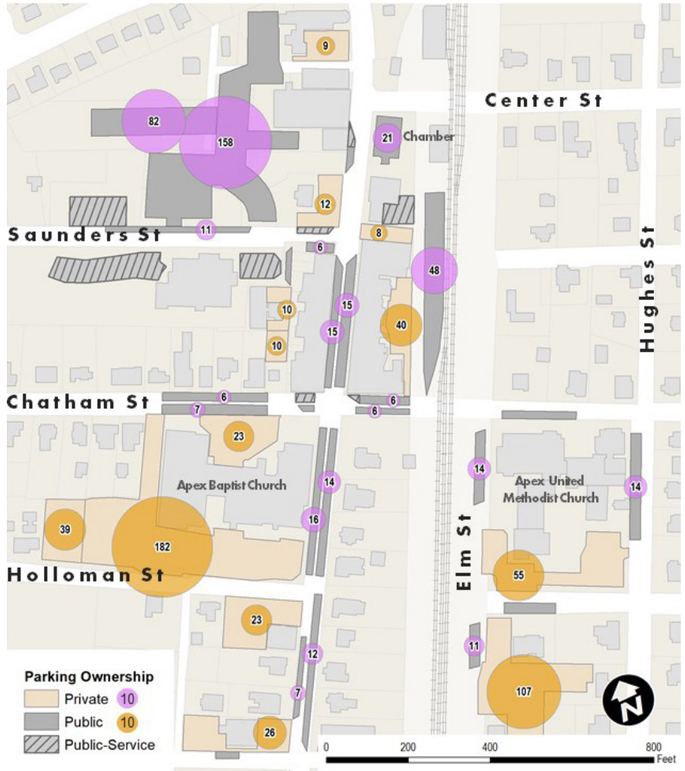


Parking study area map

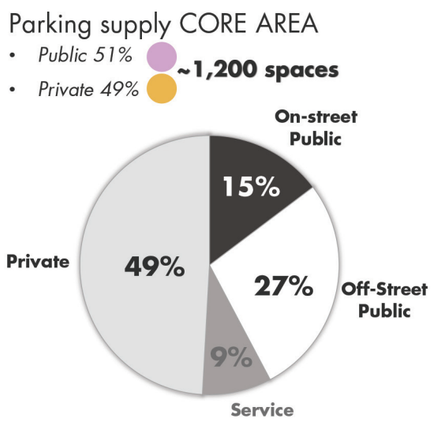


When it comes to parking, rational people quickly become emotional...

-Donald Shoup, Parking and the City (2018)



Existing parking supply (Note: Excludes more than 500 spaces near Town Hall and on-street parking along Hunter Street.)



Percentages of both public and private parking supply in the core

Existing Parking Supply for Downtown and Core Area

Parking by Type	Spaces	% Total
On-Street	305	18%
Public lot	648	39%
Private lot	712	43%
Downtown Total*	**1,665**	

Parking by Type	Spaces	% Total
On-Street	169	15%
Public lot	415	36%
Private lot	564	49%
Core Area Total**	**1,148**	

**Note: Total parking spaces in Downtown Apex includes parking as far north as Hunter Street.*
***Note: Core Area parking is a smaller area between Moore Street and Templeton Street.*

Notable Parking Facilities within Core Area

Parking Location	Type	ADA	Total Spaces	Time Limit	Enforcement Hours
Templeton Street Lot	Lot	6	158	--	No overnight parking
Templeton Street Gravel Lot	Lot	-	82	--	No overnight parking
Seaboard Street Lot	Lot	-	48	--	--
Chamber of Commerce	Lot	1	21	2-hour	8 am to 6 pm
N Salem Street – Chatham-Saunders	On-street	-	30	3-hour	8 am to 6 pm Mon-Sat
S Salem Street – Holleman-Chatham	On-street	4	30	--	--
Elm Street	On-street	2	14+11	--	--
Chatham Street – West of Salem	On-street	-	16	3-hour	8 am to 6 pm Mon-Sat
Chatham Street – East of Salem	On-street	-	13	3-hour	8 am to 6 pm Mon-Sat

The table above reinforces anecdotal information from regular downtown parkers, that the **Templeton Street lot (158+82 spaces) is the first location they look for parking**, as it represents more than half of the most-convenient public parking spaces within the Core Area.

It must be noted that the Apex Baptist Church (private) posts signs in front stating that public parking is allowed, and limited to two hours. Additional public parking is available in the rear lots with no time restrictions. Respectively these parking areas contain 23 and 221 parking spaces that may be shared by the public and are not reflected within parking supply tables or maps as "public".

6.1.2 Current Utilization Trend

To better understand current parking demand, that is, how parking is used during the day, parking utilization counts (i.e. parked cars) were collected at four periods throughout the day, over three different days. The weather on all days was clear and dry. The first collection occurred in February to provide early information for the study. A subsequent collection occurred in May to ensure that any seasonal variation was accounted for. A large event was held at a local church during the evening in May, which helps to measure the fluctuation of parking demand when there are activities downtown.



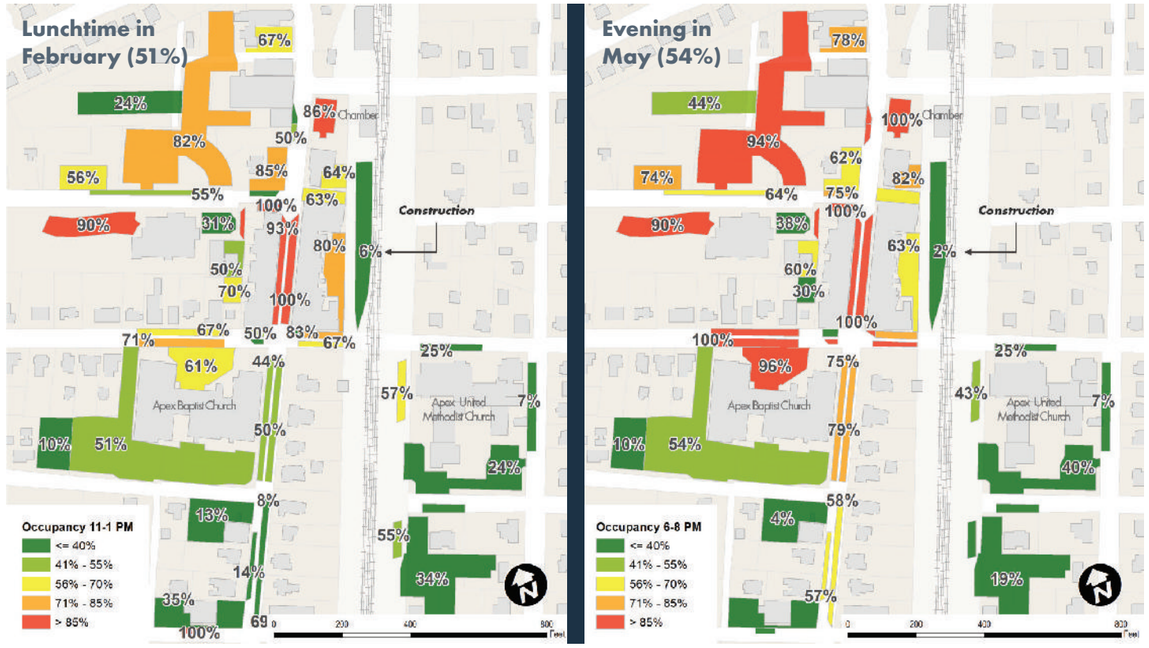


Parking signs at Apex Baptist Church

The data suggests that there are **two peak periods (lunch and dinner) within downtown Apex**, and this will vary between different months of the year, undoubtedly influenced by the weather. Tabular data does not tell the entire story of parking demand unfortunately. As expected, the pattern of parking utilization is higher in some areas and lower in others. Demand is therefore not evenly distributed among all public and private parking lots. The maps below illustrate the pattern of utilization for individual parking areas within the Core Area during the two busiest periods identified: lunchtime in February (51%), and dinner time in May (54%).

Note the **pattern of high-demand (orange and red)** parking lots along the northern portion of Salem Street, and contrast this against the **low-demand (green)** parking lots located further south. These patterns suggest high-demand parking areas may be reaching their capacity (>=85% full) during these peak periods; however, there are still underutilized parking areas further south. Several of these low-demand areas are private lots that allow public use, such as the Baptist and Methodist churches.

It is worth noting that the Seaboard Street lot was under construction during these utilization counts, which explains why this area is shown as <10% utilized. Since re-opening in June 2019, this parking area has been well-utilized and likely has relieved parking pressure from other high demand lots. Future data collection may include a length-of-stay analysis to measure the typical duration of time that vehicles are parked within high-demand areas, such as Salem Street or the Templeton Street lot. This information would be helpful to determine whether changes to 30-min and 3-hour time limited parking may be warranted.



Observed parking utilization maps during peak periods

6.2 Parking Deck Evaluation

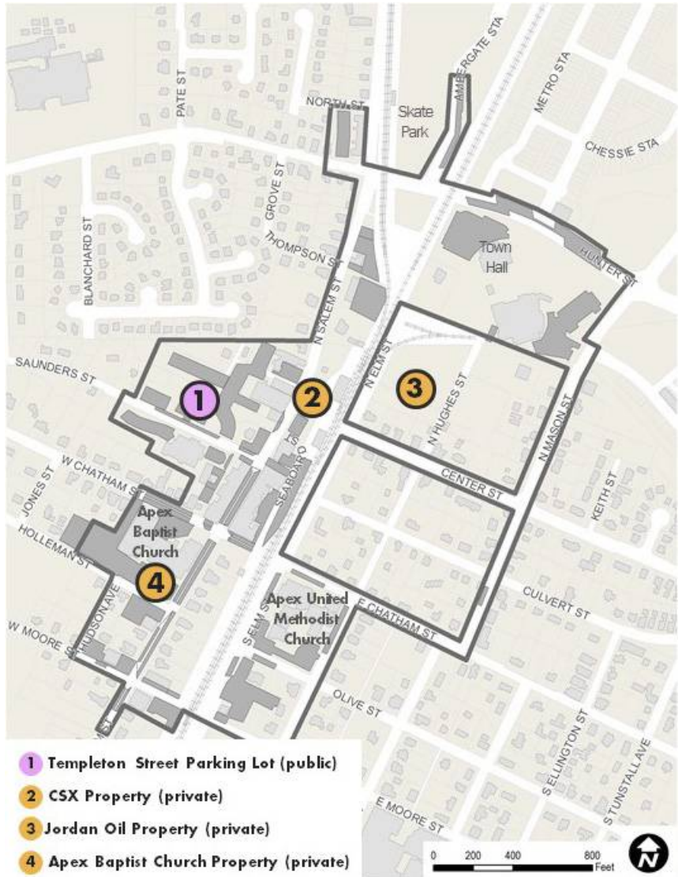
The project team was asked to investigate whether a parking deck is needed for downtown Apex, which has been a hotly debated topic for a number of years. Conversations with users revealed that most are split on this topic, some suggest that a parking deck is necessary while others suggest no/not yet. During the May public workshop event, the community was asked about parking availability, and findings suggested that **half the number of people who are challenged by parking are actually discouraged to visit Downtown because of parking**. Four locations within downtown Apex were identified where the footprint of a potential parking deck could be situated. Three locations are located entirely on private property, (locations #2-4):

Location 2: CSX property is constrained by width between the railroad tracks and N Salem Street, and would only be suitable for a two-bay parking deck. This constraint would limit the total number of spaces that could be constructed. The visibility of this location, however, is its greatest quality, situated on Salem Street at the intersection of the primary north and east gateways into Downtown.

Location 3: Jordan Oil property is less visible from Downtown, requiring visitors to walk along Hughes Street and Center Street before viewing their destination. Although this location could potentially yield the largest number of parking spaces, its location may be the least desirable from the users' perspective.

Location 4: Apex Baptist Church property was evaluated for a two-bay parking deck at the rear of the property, however, the necessary width of 120' feet was not possible without impacting the building. For this reason, this location was dropped from consideration.

Although future property ownership changes may allow the town to revisit these options, the three private property locations were tabled for further discussion at this time. The remaining location, the Templeton Street parking lot, is discussed further as the most viable possibility.



Parking deck potential locations ▲

6.2.1 Templeton Street Parking Lot – Potential Parking Reconfiguration

The current site supports 158 public parking spaces on property owned by the town, and an additional 82 gravel parking spaces on property that is leased by the town. This is a total of 240 parking spaces currently. Options A-B-C are presented below; each yield a different number of net change in parking, as well as different costs to construct.

Option A involves a two-bay parking deck that is three-levels high, and the footprint is intended to fit entirely within the Town-owned property so as to retain access to the leased (gravel) lot. Some existing parking will be permanently disrupted by the construction of this deck, and it is estimated that the final net change would be +180 spaces, at a cost of between $5.7M to $6.2M. This analysis suggests that the net parking added would cost an average of $33,000 per space to construct.

Option B involves a larger three-bay parking deck that is also three-levels high, and the footprint would require the purchase of the leased (gravel) parking lot from private owners. The cost of acquiring land is not included in this estimate. A larger amount of existing parking will be permanently disrupted by the construction of this deck, and it is estimated that the final net change would be +240 spaces, at a cost of between $8.5 million and $9.4 million. This analysis suggests that the net parking added would cost an average of $37,000 per space to construct.

Option C involves no parking deck. Rather, the town should consider acquiring the leased (gravel) parking lot and reconfiguring the entire property (both parcels) into a single parking lot. This effort would require land acquisition, clearing and grading of the site, engineering design, installation of stormwater infrastructure, paving, striping, and lighting. This effort could yield a net change of +126 spaces, at a cost between $600,000 and $630,000. This analysis suggests that the net parking added would cost an average of $4,900 per space to construct.

Templeton Option A Parking Deck

Parking Lot	Existing Spaces	Proposed Spaces	Net Change
Town Lot	158	77	-81
Leased (Gravel)	82	82	-
Structured Deck	-	261	+261
Subtotal	**240**	**420**	**+180**

$5.7 million to $6.2 million ($33,000 per space)

Templeton Option B Parking Deck

Parking Lot	Existing Spaces	Proposed Spaces	Net Change
Town Lot	158	90	-68
Leased (Gravel)	82	0	-82
Structured Deck	-	390	+390
Subtotal	**240**	**480**	**+240**

$8.5 million to $9.4 million ($37,000 per space)

Templeton Option C Reconfigure Surface Lots

Parking Lot	Existing Spaces	Proposed Spaces	Net Change
Town Lot	158	175	+17
Leased (Gravel)	82	191	+109
Structured Deck	-	-	-
Subtotal	**240**	**366**	**+126**

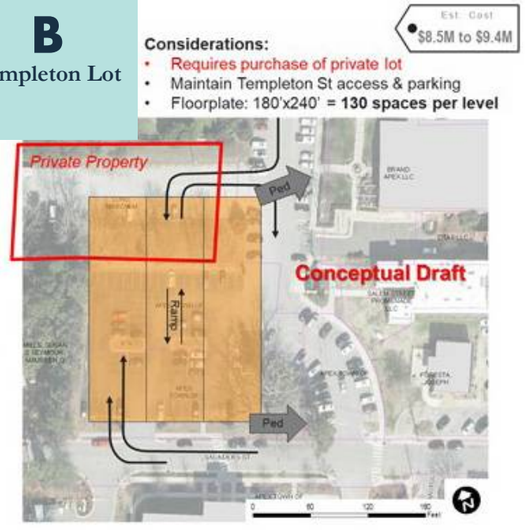
$600K to $630K ($4,900 per space)

A
Templeton Lot

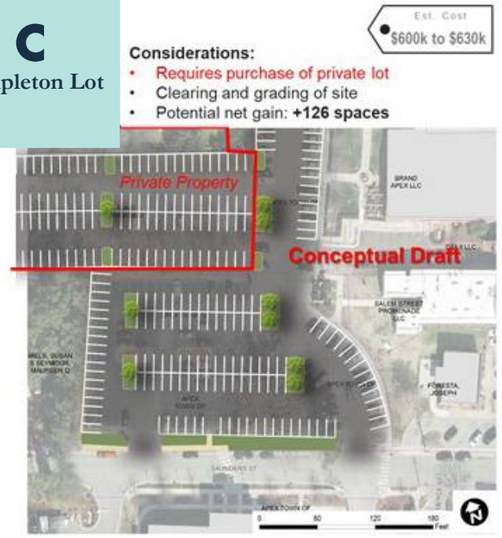


Templeton Lot investigation drawings

B
Templeton Lot



C
Templeton Lot

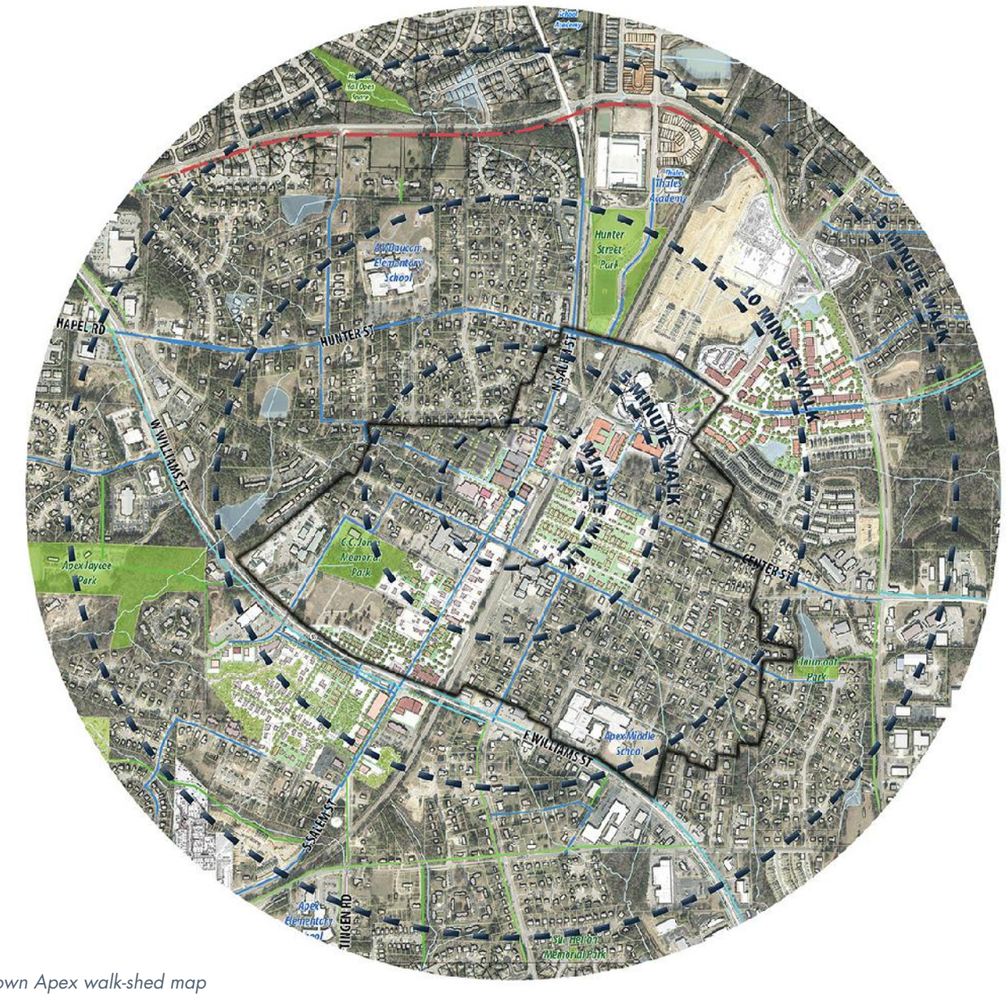


6.3 New Parking Locations

Adding new parking without a new parking deck was also investigated by the project team, including potential locations, strategies, and costs.

6.3.1 Walk-Sheds for Downtown

As referenced earlier in this chapter, several public parking spaces near Town Hall and Hunter Street are perceived by many as "too far" from Salem Street to be considered downtown parking. The map below displays the Core Area with approximated walk-times (assuming an average walking speed of <3 mph, or a quarter mile in 5-minutes).



Downtown Apex walk-shed map

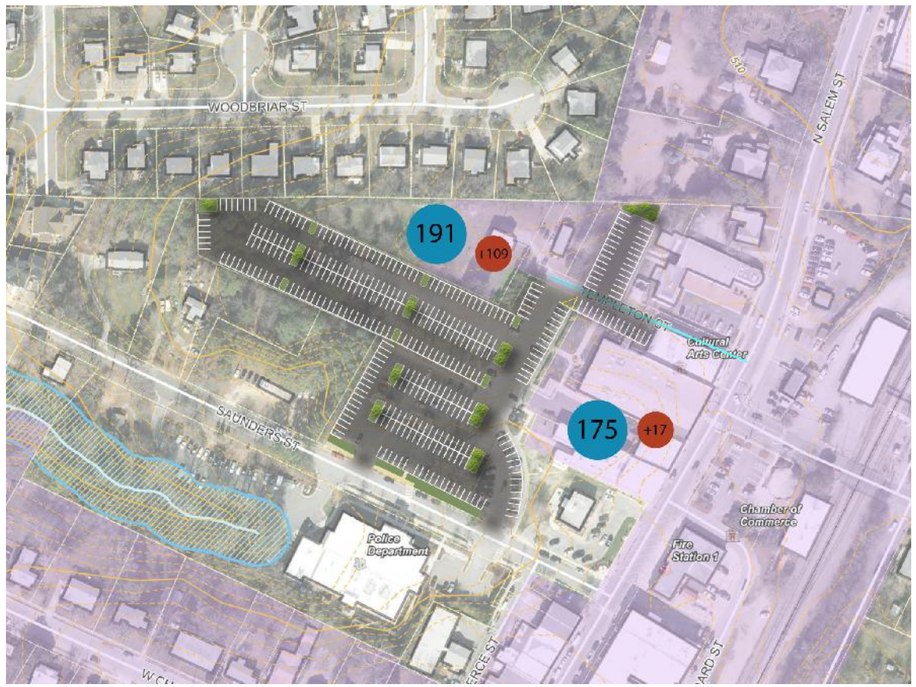
6.3.2 Surface Lots

The Templeton Street surface lot (Option C) has been incrementally changed over the years, one section at a time. The result is a **less-than optimal parking layout** with unnecessary 'dead space' that could be used for parking. Our designers looked into options for combining the public and private parcels of this area and estimating the number of parking spaces that could be gained by a new layout, while maintaining the town's engineering standards for size/shape of parking stalls (9' by 18') and driveway aisles (24' wide for two-way traffic).

A conceptual draft suggests that the town-owned portion could gain +17 parking spaces, while the leased (gravel) portion could gain as many as +109 parking spaces by maximizing the entire parcel. It must be noted that the Town of Apex does not currently own this property, and without geotechnical (underground) survey information, it is unknown whether the furthest portion of this lot would be suitable for parking. A feasibility-level analysis is warranted to advance this concept and confirm the potential parking gain.

6.3.3 On-Street Parking

On-street parking has the added benefit of reducing vehicle speed, which benefits the walkable/bikable character of downtown. Several streets within the Core Area are wider than the typical cross section width of 11' per travel lane described in the Advance Apex 2045 Comprehensive Transportation Plan. This presents a valuable opportunity to add parking supply that is proximate to downtown, while re-purposing existing pavement at a much lower cost than constructing new parking. Several potential locations where a lane diet could result in new on-street parking include (street sections can be found at https://www.apexnc.org/197/Engineering-Specifications):



Concept for Templeton Street parking lot redesign

- N. Salem Street (north of Center Street to Hunter Street): add 14 to 28 spaces [one- or two-sides]
- Center Street (Elm to Hughes): add 12 spaces
- W. Chatham Street (Salem to Jones): add 14 to 28 spaces [one- or two-sides]
- Saunders Street (Templeton Lot to Police Drive): add 12 spaces
- N. Mason Street (Chatham to Center): add 22 spaces

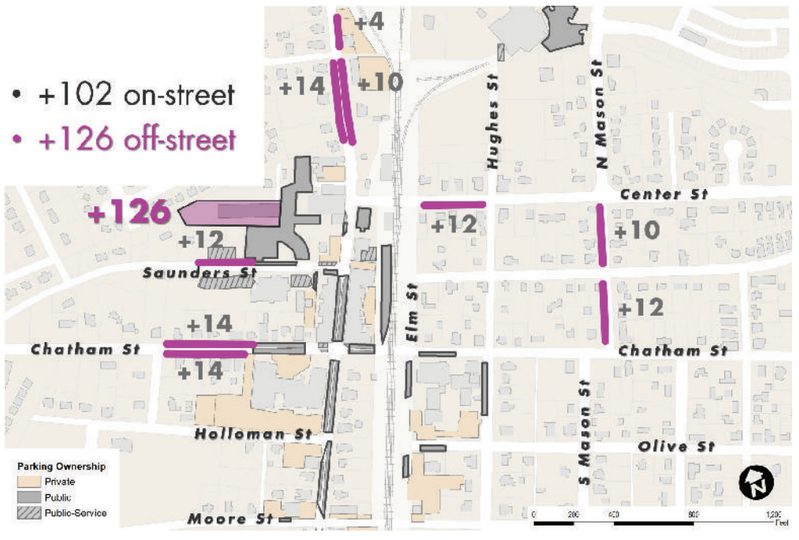
A gain of 102 parking spaces could be attained with on-street parking (see map below). The financial investment would be minimal (averaging less than $5,000 per net gained space) by comparison with the investment required for a structured parking deck (average nearly $40,000 per net gained space).

6.3.4 Shared Parking Agreements

Shared parking agreements are legal documents between two or more land owners that specify the days of the week and hours of the day that a parking lot is made available for public use. Typical terms of this agreement include lighting, maintenance, and insurance liability in the event of an injury or personal property claim. The length of the agreement (months or years) and cost, if any, are negotiated and renewed with each agreement. Downtown Apex features two substantially sized private parking lots that are under-utilized during the busiest time of a typical day (utilization data), and therefore, are potential candidates for a formalized shared parking agreement.

Downtown would benefit from shared parking agreements in a number of ways. First, excess or under-utilized parking lots detract from the walkability and character of downtown, which influences the perception of safety. Second, parking is an inefficient use of land that is valuable for redevelopment, and should be screened or otherwise located behind buildings. Third, the average construction cost of surface parking is between $4,500 and $6,000 per parking space, and this capital expense is significant for each and every land owner in downtown.

Consistently signing these leased parking areas and **communicating with the public** that they are available for public parking during the specified hours/days of the week is a necessary final step to executing shared parking agreements. Working through the Downtown Business Association, the town and business owners should develop a strategy to effectively share parking according to an overall Active Parking Management strategy.



Additional on-street and off-street parking identified



Signage is a critical component to shared parking success

6.4 Recommendations for Active Parking Management

No single approach will adequately "solve" parking challenges, many strategies are necessary. The combination of strategies is referred to as Active Parking Management, with the objective of continually modifying the parking system to be responsive to the changing needs of all users. **The ultimate goal is to achieve a better balance of supply and demand through a continual, iterative approach.** Strategies have been grouped into five categories below, and there is a nominal amount of overlap between each. During the public workshop, more than 130 attendees were presented with examples from each of these categories and asked to vote for their preferred first, second, and third strategies. Categories are presented in order of preference from these votes (indicated with percentages).

6.4.1 Placemaking (27%)

Improvements to the streetscape, wayfinding signage system, and pedestrian network all fall into the category of placemaking strategies. Some of these improvements may be infrastructure related (e.g., sidewalks, curb cuts, crosswalks), others may be psychological, such as street trees to provide shade and improve greenery, or benches, lighting, and improved signage to encourage people to park once and wander to downtown. These strategies are not necessarily parking-related; however they invite people to stay a little longer, or walk a little further, even if they park in low-demand parking lots.

6.4.2 Multi-modal (25%)

Strategies to improve multi-modal transportation relate to other ways of reaching downtown without a car. These strategies may include adding more bicycle racks in conspicuous (well-lit) locations, investigating the potential for a bikeshare program, designating an Uber/Lyft loading zone along Salem Street, or working with regional transit providers (GoTriangle and GoCary) to enhance service near/through Salem Street and utilizing the future GoApex Route 1 service along NC-55/Williams Street.

6.4.3 New Parking Locations (22%)

The category receiving the most first place votes was New Parking. Adding supply can be accomplished in many ways: striping additional on-street parking spaces along N. Salem Street, Center Street, Saunders Street, and/or Chatham Street; restriping existing parking lots to gain parking through a more efficient layout; purchasing a private parking lot and converting to public parking; or seeking potential sites for a structured parking deck. Cost will be a significant factor for each of these strategies.

6.4.4 Programs (20%)

Programs to actively manage parking involve non-physical improvements. Formalizing shared parking agreements between the town and private landowners to lease parking for public use is one possible strategy. Another option is a consolidated Downtown Valet Program for lunchtime or dinner peak periods, with a designated pick-up/drop-off location along Salem Street. This program can be managed through the Downtown Business Association as a cost-share among many businesses with similar interests.

No place is worth caring about that doesn't have a parking problem.

-Rollin Stanley



Apex citizens recognize that multi-modal solutions are a vital strategy to parking management

6.4.5 Enforcement (7%)

Naturally a more robust parking enforcement program is not a preferred strategy for most users. This may be due to the limited awareness of the variety of forms that enforcement can resemble. In many vibrant downtowns, there are a team of "Ambassadors" that interact with patrons to welcome them to their wonderful community with a smile! Ambassadors provide information related to shops or restaurant options, directions, upcoming events/programs, and occasionally offer parking-related suggestions. Maintaining the cleanliness of sidewalks and on-street parking is another role that Ambassadors may satisfy.

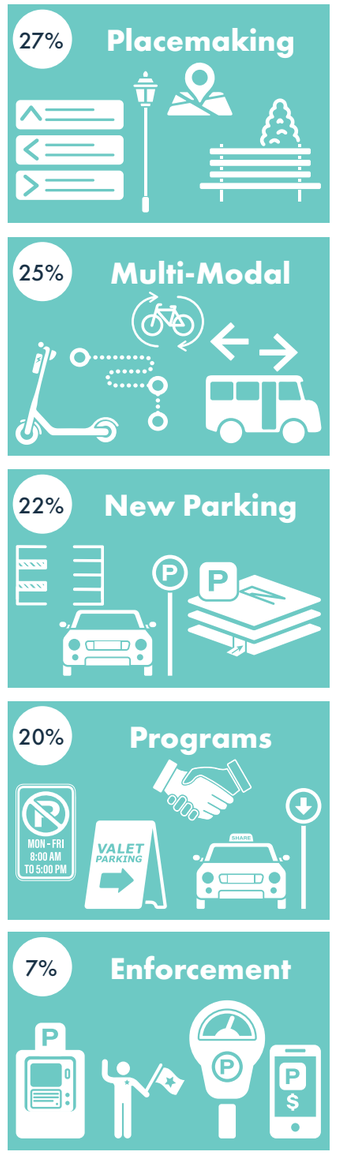
No cost warning tickets are a common enforcement strategy that balances the need to monitor time-limited parking areas while remaining business-friendly and offering patrons a congenial reminder. If turnover of high-demand on-street parking spaces is a common problem, then reducing the time limit from 2-hours to 1-hour, or the installation of parking meters/pay stations, are strategies that can be considered. Charging an hourly rate to park in the most convenient parking spaces may seem unpopular at first; however, the revenue generated may be used to improve the downtown streetscape and reinforce the efforts made under the placemaking category.

The plan includes a wide range of strategies related to the addition of public space in downtown; some of these areas include existing parking spaces (public and private). Those potential losses are listed below:

PUBLIC PARKING SPACES
-30 Salem Street for expanded sidewalks (This is the most you would potentially lose; some options allow a number of parking spaces to remain.)
-21 spaces at the Chamber/Depot lot for the creation of Depot Plaza
-6 Saunders Street/Salem Street corner for public space
-57 spaces—easily absorbed with nearby on-street parking opportunities identified in Section 6.3

PRIVATE PARKING SPACES *(all contingent on private cooperation/development)*
-13 spaces at Cigar Shop
-8 spaces on fire station alley
-9 spaces at Salem Heritage Plaza
-40 spaces behind Salem buildings on Seaboard Street
-70 private spaces—easily absorbed with reconfiguration of Templeton Street lot identified in Section 6.3

Note: The newly constructed public parking on Seaboard is 48 spaces which lessens the impact of the 40 "private" spaces lost if the Seaboard alley design found in Section 8.3.2 is implemented. The town should continually evaluate parking utilization (semi-annually), and strive to provide new parking before removing any spaces. Parking, however, should not dictate development.



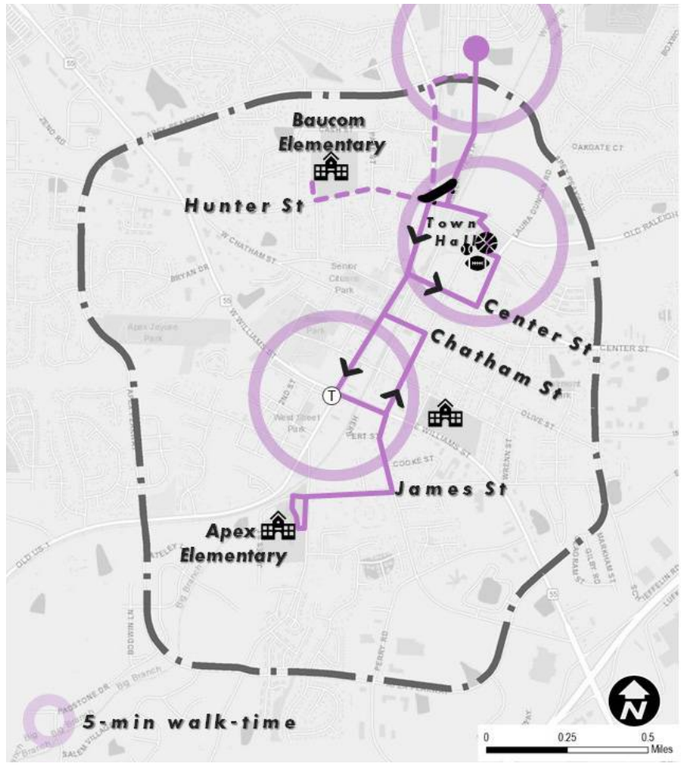
Preference for active parking management strategies from public open house attendees

6.5 Trolley Considerations

The potential for a Downtown Trolley was also discussed by many participants during this planning process. Extremely preliminary discussions were held to flesh out the guiding principles for a potential future trolley, which may include:

- Direct connection with GoTriangle enhanced transfer point along NC-55/Williams Street at Salem Street;
- Service into large residential neighborhoods that are immediately adjacent to downtown (north and south);
- Connection with low-demand parking areas along Hunter Street or Town Hall that are perceived as "too far" to park and walk;
- Potential park-&-ride options to downtown from nearby public parking areas, such as schools, Town Hall/Recreation Center, or shopping centers;
- Front-door service along Salem Street, with drop-off locations at or near Saunders Street to the north end, and Chatham Street to the south end.

At this point in time, the potential for a downtown trolley has been tabled in favor of other strategies and priorities for managing parking.



Logical future trolley route

Case Study: Altamonte Springs Subsidized Ride Share

A few towns in the U.S. have begun to look to shared ride service providers like Uber and Lyft to enhance their public transit systems. The city of Altamonte Springs, in central Florida, has a population of 42,000 and is likely the first town in the nation to enter into an agreement with Uber as a public transit provider. The city had issues landing state or federal funding for public transit, so they reached out to the private market. The city had a plan for an on-demand bus service that would cost approximately $1.5 million for one year, but they've budgeted 1/3 of that to subsidize ride sharing in the city through Uber. The city would pay 20% of the cost of the ride if it begins and ends within the city limits and 25% if it begins and ends at the local light rail station.

6.6 Implementation Phasing

Does the Town of Apex need a parking deck? NO, the data does not support the need for a parking deck at this time. Public outreach, as a majority of opinion, also does not support this need.

Should the Town of Apex plan for the possibility of a parking deck? YES, absolutely, planning for current and future needs is an essential role of government. A parking deck feasibility study is the next logical step towards fully understanding the potential constraints toward constructibility, traffic access and circulation, geotechnical (underground), and more refined cost estimates.

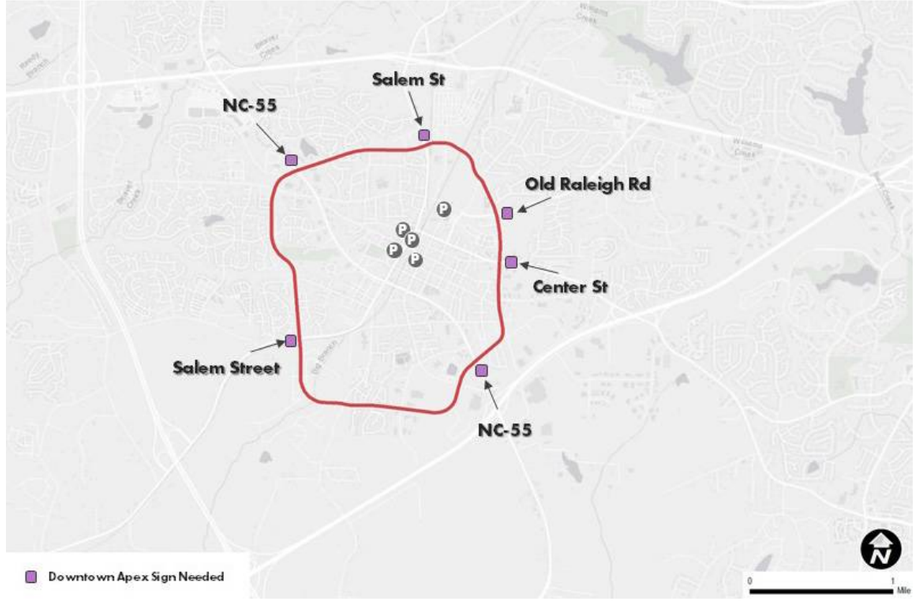
To this end, the potential for a future parking deck is included within the first phase of a five-year implementation plan, discussed below.

6.6.1 Short Term Implementation of Parking Management Strategies (1-3 years)

Salem Street should be the focus of streetscape investments; however, side streets such as Center Street, Saunders Street, Seaboard Street, Commerce Street and Chatham Street should all be improved, particularly if they lead to/from an existing low-demand parking area. The intended **goal of this effort is to encourage patrons to park further and enjoy the walk.** Additional recommendations related to streetscape conditions include:

Key Recommendations

- *6A-Prioritize and invest in consistency and character of the Apex streetscapes.*
- *6B-Improve sidewalk and crosswalk conditions within the core of downtown.*
- *6C-Improve consistency of parking signage and wayfinding in and around downtown. (three tiers: Highways, Peakway, Downtown Edges)*



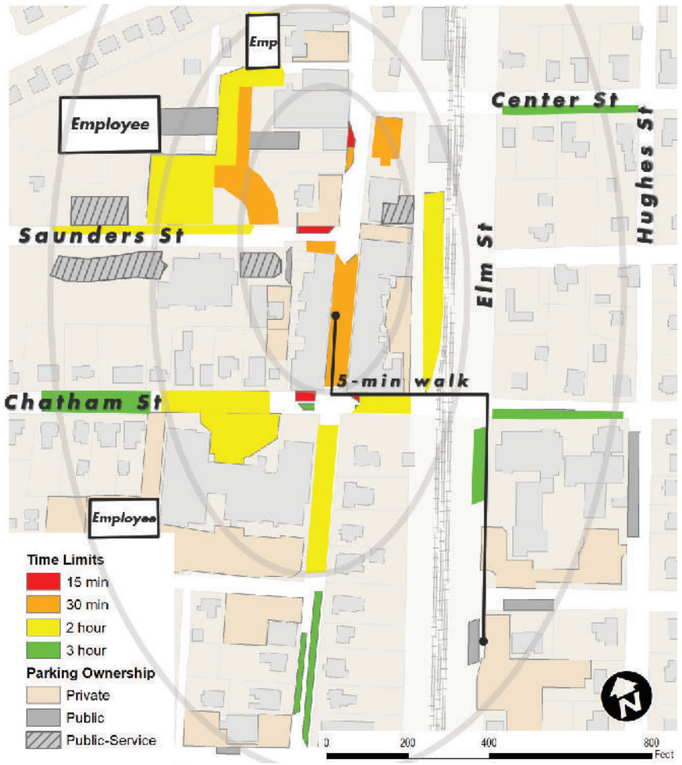
Wayfinding signage locations on Apex Peakway and directional parking signs within the core

The Town should consider the role that it would like to play in enforcing the time-limited parking areas along Salem Street and within public lots. Not all public parking areas have a 30-minute or 3-hour time limit, and perhaps minor adjustments may be necessary to encourage turnover (voluntarily) in high-demand areas, in conjunction with promoting the use of low-demand areas for longer-term parking by employees or downtown visitors who wish to stay for a while. Specific recommendations under this category include:

Key Recommendations

- *6D-Review current parking enforcement program including current time-limited locations and compare with high-demand parking utilization counts.*
- *6E-Conduct data collection for a parking turnover analysis (length of stay) for high-demand parking areas.*
- *6F-Allow overnight parking in the downtown core to make downtown residential viable and support safe travel of patrons who choose to ride-share home.*
- *6G-Work with the new Downtown Development Coordinator and Downtown Business Association on a strategy to increase turnover for on-street locations.*
- *6H-Create a Downtown Ambassador's program for (polite) enforcement efforts. (see case study on next page)*
- *6I-Initiate a no cost warning ticket for first-time 'violators'.*
- *6J-Add a net gain of 200 public parking spaces within a 5-minute walk, with a minimum of 100 within a 3-minute walk.*

Top 10
Recommendation



Turnover Strategy Legend

ENCOURAGE TURNOVER
High Demand

ALLOW LONGER STAY
Low Demand Lots

Employee Parking

On-street turnover strategy with time limits as a phased implementation (i.e. make one change; wait; evaluate; make second change; wait; evaluate; etc.)

Case Study: Downtown Ambassador Program in Chapel Hill, NC

Downtown Chapel Hill instituted a new Downtown Ambassador Program in 2018. The program aims to welcome visitors into their community and provide personal assistance that enriches the experience for people exploring downtown. Ambassadors are intensely trained to have knowledge of all downtown stores, restaurants, cultural venues, and special events. They are also encouraged to share advice and directional assistance.

The program launched, in part, because of a new fully-automated parking system that includes new parking meters and a ParkMobile smartphone app. Downtown Ambassadors assist visitors in public parking decks and surface lots. The friendly, approachable ambassadors wear bright blue shirts that say, "Ask me a question!".



Chapel Hill's Downtown Ambassadors assisting visitors with the new automated parking meters (Image Credit: Town of Chapel Hill)

6.6.2 Near Term Implementation of Parking Management Strategies (3-5 years)

Influenced by the success (or lack of success) of short term strategies discussed above, the Town of Apex should also be preparing for the following **Active Parking Management Strategies**, which may require additional time or coordination to execute. Lease agreements with private parking land owners should be the focus, because shared use of an existing parking facility is far more cost-effective than constructing new parking, particularly since the town owns very few properties within downtown that would be sufficiently sized for a new parking lot. **The intended goal of these strategies is to prepare for future conditions while retaining flexibility** to adapt to unknown technology of cultural shifts (disruption). Specific recommendations under this category include:

Key Recommendations

- *6K-Establish leased parking agreements with private parking owners.*
- *6L-Create a valet program for evenings and weekends.*
- *6M-Conduct a preliminary engineering feasibility study for a potential parking deck.*
- *6N-Consider establishing hourly paid parking along Salem Street.*
- *6O-Incorporate a bike-share program with stations around key destinations in downtown.*

6.6.3 Parking Management Basics

Parking that is "free-for-all" generates conditions that are unregulated, disorganized, and generally "bad-for-all." Many of us can identify the characteristics of a poorly managed system, one that generates unnecessary traffic circulation, which causes additional delay in a small downtown such as Apex. These are the symptoms that lead people towards discussion of "a parking problem" in their downtown. This is a common and repeated process all across North Carolina.

Why don't they park on _____ Street or behind _____?, there are always empty spaces there.

This is a common sentiment for local residents who are intricately familiar with all parking areas in their town, but visitors (customers) lack this knowledge and rely on common visual cues such as public parking signs ("P"). Fear of being towed can influence drivers to continually search for a safe, convenient, well-signed, and well-lit parking space.

Characteristics of a poorly managed parking system:

- cars parked in the same on-street space for 4+ hours per day;
- cars circling around the block "hunting" for the one ideal parking space in front of their destination;
- cars slowly moving through a full parking lot looking for an empty space; or
- cars slowly moving through a full parking lot looking for visitors returning to their cars on foot, hoping that they can park in that space.

How can we avoid unnecessary 'hunting' for parking?

Parking that is more than 85-90% full has reached its effective capacity, and will generate "hunting" behavior. This threshold has been chosen by researchers as the point at which drivers will see one empty space for every seven parking spaces (85%) and be satisfied, where as one empty space for every 10 spaces (90%) is viewed as "too full" and frustration takes over. You may also think of this as a glass of water that is filled all the way to the top. Would you be able to carry this glass of water around without spilling? Probably not, so you typically fill the glass to 85-90% full and its no longer a problem.

Managing parking lots to reach 85-90% occupancy begins with data collection to identify these high-demand areas during the busiest time of a typical day, and this planning process has completed this step already! With this information, the next step is to balance demand more evenly by (a) encouraging turnover in lots that reach 85% occupancy, and (b) allowing longer-term parking in lots that were below 60% occupied.



Templeton parking lot presents opportunities for applying management basics

Strategies to encourage turnover in lots that reach 85% occupancy may include any combination of the following, since some strategies will work for some drivers but not others:

- Reduce time limits (from 2-hours to 1-hour; or 1-hour to 30-minutes)
- Perform more frequent parking enforcement 'tours'
- Collect license plate data in public parking areas to perform an (hourly) turnover analysis to identify the "length of stay" of a vehicle – share this information with downtown business owners who's employees may be among those license plates identified
- Issue no-fee warning tickets for a first offense
- Institute escalating parking fines for repeat offenders
- Charge an hourly rate for on-street parking (meters, paystations, or smartphone payments)

Strategies to encourage use of (low-demand) longer-term parking lots that were below 60% occupied may include any combination of the following, since some strategies will work for some drivers but not others:

- Increase time limits (from 3-hours to 8-hours) for low-demand parking lots
- Designate a portion of the lot as employee parking, and issue employee permit decals (if needed)
- Coordinate an employee shuttle/safety service for late night service workers (if needed) or those handling cash deposits
- Coordinate an improved signage and wayfinding program to improve the visibility of these lots
- Improve sidewalk conditions, lighting, and other streetscape amenities

Key Recommendations

- *6P-Balance demand more evenly by (a) encouraging turnover in lots that reach 85% occupancy, and (b) allowing longer-term parking in lots that were below 60% occupied.*

Where can I learn more about parking management strategies?

Research on the management of parking leads to two basic themes, and these two themes work together, not against one another:

(1) Travel Demand Management (TDM) strategies that reduce single-occupancy vehicle trips; and
(2) Hourly parking rates that promote vehicle turnover in high-demand areas and generate revenue to be reinvested to improve the district.

TDM strategies that reduce vehicle trips through carpooling, riding transit, bicycling, walking or other incentives have the potential to reduce parking demand by 5-30% and are used as future-proofing strategies. Cities that are constrained by land are among the leaders of TDM strategies, and Todd Litman of the Victoria Transport Policy Institute (Victoria, British Columbia) is an internationally renowned research expert.

Cities or entertainment districts that seek to capitalize on the free market are gravitating towards the Donald Shoup model, author of The High Cost of Free Parking, and professor at UCLA. Hourly parking rates may not reduce parking demand, but rather help to balance demand. Convenient parking is viewed as a commodity and spaces are rented per hour based on the market rate. If parking is regularly above 85% occupied, then the hourly rate for that district should be increased next week or next month. If parking is regularly below 60% occupied, then the hourly rate should be reduced until an equilibrium is reached. This process is continually repeated throughout the year with minor adjustments to price made monthly or annually.

Valuable parking resources:
(1) Todd Litman, author and researcher, Victoria Transport Policy Institute https://www.vtpi.org/approach/index.php
(2) Donald Shoup, author, researcher and professor of urban planning at UCLA, https://www.shoupdogg.com/parking-links/

6.7 Smart Mobility of the Future

Parking challenges are not new to American towns and cities, yet the methods used to manage parking demand are continually evolving. Some of the most promising national trends that the Town of Apex should be aware of, while simultaneously retaining flexibility, may include the following:

- Increased use of Transportation Network Companies (TNCs) such as Uber or Lyft
- Bikeshare or Scooter-share companies
- Shared Autonomous Vehicles/Shuttles
- Intelligent Transportation Systems (ITS) and connected vehicles
- App-based Parking Occupancy Systems

Key Recommendation

- *6Q-Prepare for national smart mobility trends by reaching out to peer communities, attending national or regional conference sessions, planning studies aimed at feasibility-level analysis, and continually reaching out to the citizens of Apex for involvement and guidance.*
- *6R-Evaluate all emerging technology packages and select an app-based parking occupancy system for the Town of Apex's public parking areas.*

New Mobility Technologies

Access to a wide variety of mobility options provides convenience and choices to make short or long trips without a car. New mobility technologies are rapidly providing us with more choices and communities are taking advantage of these tools to support retail and attract employers and residents. Private companies are rapidly developing new mobility products that are drastically altering how people move around towns and cities.



Dockless Electric Bicycles



Docked Bikeshare Station



Dockless Electric Scooters



Ride-hailing & "MaaS" (Mobility as a Service)



Autonomous Vehicles (AVs)



Shared Autonomous Vehicles (SAVs)

App-Based Parking Occupancy



Case Study: Chamblee, Georgia

Chamblee, GA is a rapidly growing suburb of Atlanta with a population of 30,000. They're currently testing and implementing SAVs as an innovative mobility option.

Proposed Shared Autonomous Vehicle Stop





Route And Stops



The route connects downtown with major destinations and MARTA rail stops. Service during rush hour, lunch and after hours caters to a variety of user groups.

SAV Electric Shuttle Details

- Holds 8-16 passengers
- Travels up to 25 mph
- Runs up to 10 hours per charge
- Travels up to 3 miles round trip with a maximum wait time of only 10 minutes

07
DEVELOPMENT OPPORTUNITIES & STRATEGIES

07 DEVELOPMENT OPPORTUNITIES & STRATEGIES

The plan's focus within the Apex Peakway needed further refinement before detailed design work began. The design team worked with town staff and the Steering Committee to identify key areas where parcel level investigations could occur. The goal was to create plans which would illustrate best practices in various contexts within the Peakway while focusing on Salem Street.

Development typologies considered for illustration included mixed use, housing, employment areas, and civic investments. The overriding goal was for the plans to generate opportunities where people can live, work, and play in and around downtown Apex. Most of the plans drawn in this chapter are located on private property; however, they are provided in concept only as **ONE** possible approach to the highest and best use of the site. Together, they form a vision for the study area that promotes walkability, bikability, and ultimately...livability. Enhancing the quality of life for Apex residents and future residents through sustainable development patterns will be vital to its resiliency and competitiveness moving into the next twenty years.

850
housing units within a 15-20 minute walk of downtown identified

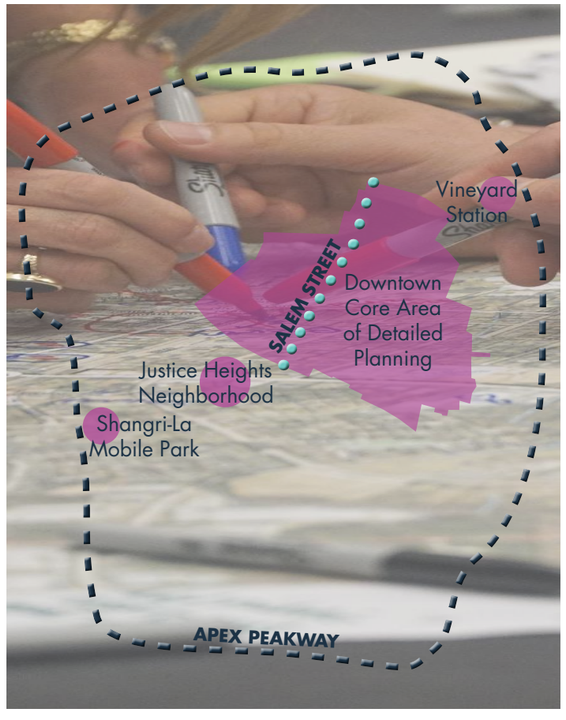
340
housing units within a 5-minute walk of downtown identified

153,500
potential square feet of total active ground floor space in the heart of downtown

7.1 Development Opportunity Analysis

By using regulatory structures in place along with input from both staff and Steering Committee members, the design team formed a development opportunity analysis. This analysis would form the charrette work plan strategy and provide focus for the designers. Through the guiding principles and key goals, the team landed on four key areas of investigation. (see map below)

- **Shangri-La Mobile Park** located near the intersection of S. Salem Street and the Apex Peakway
- **Justice Heights Neighborhood** near the intersection of S. Salem Street and Highway 55
- **Downtown Core Area** located along and around Salem Street from Highway 55 to Hunter Street
- **Vineyard Station Shopping Center** located between Laura Duncan Road, the Apex Peakway, and Hunter Street



Development Opportunity Analysis



7.2 Development Data Overview

Armed with the development opportunity analysis and the market analyses, the designers had a clear program to work towards related to the type and scale of development. As a reminder from Chapter 4, the retail analysis encouraged growing the core blocks of Salem Street by 60,000-70,000 square feet to add to the existing 95,000 square feet. The ultimate goal in the heart of downtown was to grow strategically in current retail gaps to solidify the district as a "Theme/Festival" destination area in the 150,000 square foot range. The information below outlines the overall development data for the study area, and an illustration of the master plan is located on the next spread of the document.

Proposed Ground Floor Space in Downtown Core
- Option 1 With Deck/Liner Buildings:
  - » 66,600 sf proposed + 95,000 sf (existing)=161,600 sf
- Option 2 With Surface Parking Only:
  - » 58,500 sf proposed + 95,000 sf (existing)=153,500 sf

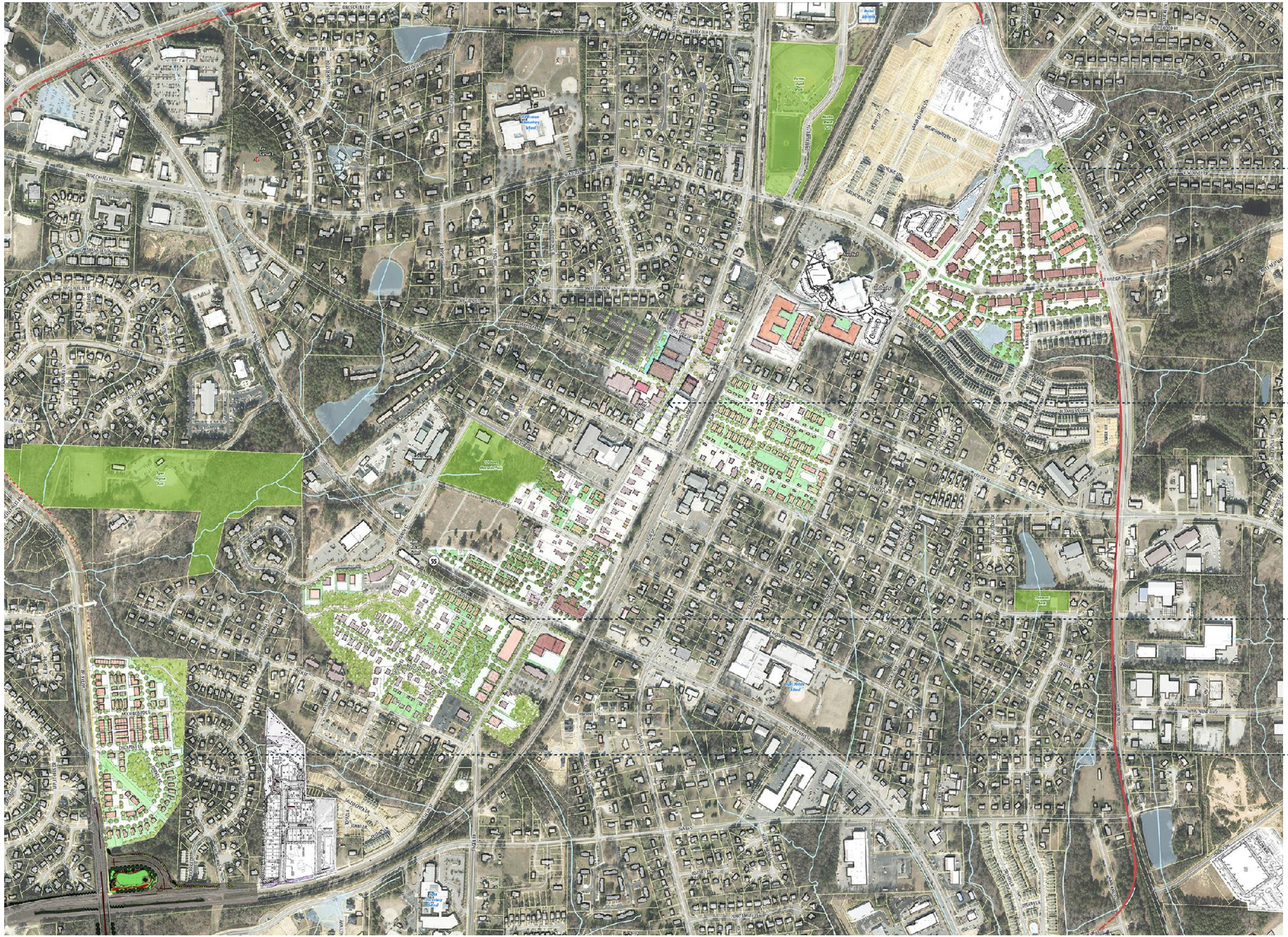
Proposed Ground Floor Space in Justice Heights
- 65,000 square feet of neighborhood commercial

Proposed Ground Floor Space at Vineyard Station Shopping Center
- 165,000 square feet proposed ground floor commercial space

Proposed Housing Units within a 5-Minute Walk of the Core
- 340 units (potential to be absorbed in under 5 years according to ZVA recommendations in Chapter 5)

Total New Housing Units Illustrated on Master Plan (all within a 15-20 minute walk)
- 850 units (6-8 years of projected absorption rate by ZVA recommendations in Chapter 5)

"There is no logic that can be superimposed on the city; people make it, and it is to them, not buildings, that we must fit our plans."
-Jane Jacobs
American journalist and author



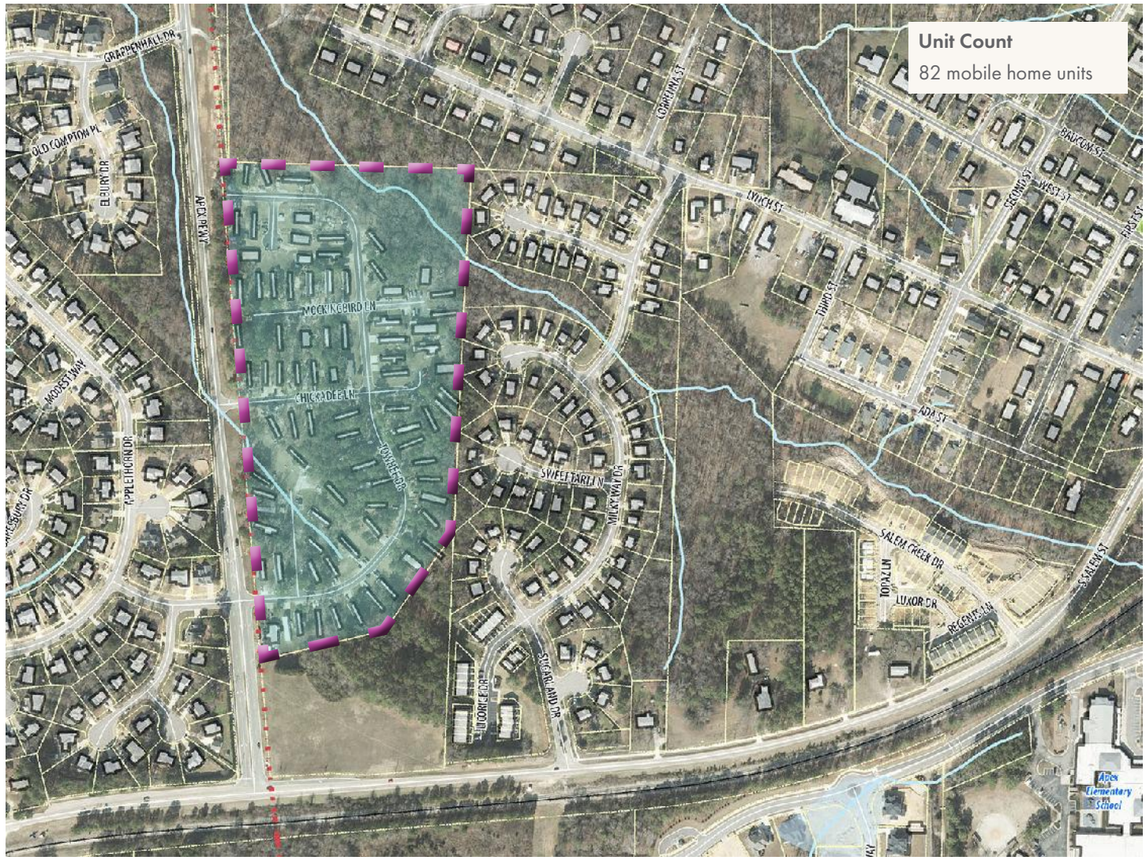
Conceptual Development Master Plan

7.3 Opportunity Areas

The four distinct opportunity areas aim to illustrate national best practices in planning and urban design across a variety of contexts.

7.3.1 Shangri-La Mobile Park | A Mixed Income Neighborhood Study

One of the areas we examined related to housing was the Shangri-La Mobile Home Park at South Salem and the Peakway. The neighborhood is characterized by beautiful shade trees and mobile homes that currently provide an affordable housing option in Apex. Surrounding the site are planned public and private investments including the continuation of the Apex Peakway to the south which includes a community green space. The Shangri-La property is one parcel with one owner, so the team felt it was not unreasonable to imagine that change might occur in the future. The plan proposes a mixed income neighborhood with varying housing typologies of both for sale and rental options with the ultimate goal of not displacing current residents. The development has common open spaces that protect the beautiful trees and greenway connections to the larger community. The unit count has essentially doubled while providing common amenity opportunities.



▲ **Existing**

The objective of examining this location is to ensure that, if this area is redeveloped, it is done so in a way that not only preserves but adds to affordable housing opportunities within a desirable, walking distance of downtown. The "opportunity" here is not to spur redevelopment, but to take a proactive look at an area likely to change and prepare for the opportunity to provide affordable housing.

Key Recommendations

- *7A-Work with developers to create neighborhoods that mix housing typologies in a range of price points and also provide common open space.*
- *7B-Adopt an affordable housing action plan and seek guidance from peer communities in North Carolina, such as Davidson, to understand their approach to affordable/workforce housing.*



▲ **Conceptual Opportunity**

7.3.2 Justice Heights & South Salem | Piecing Back Together the History

Justice Heights is a historically African American neighborhood of homes and churches that has seen recent public investments in streets and in West Street Park. The team explored sensitive neighborhood infill and the addition of neighborhood commercial/ employment opportunities in this area. The intent is not to displace current residents and remove/ rebuild homes but to fill the interior of blocks with historically scaled housing as appropriate.

The addition of units in this area is relatively low (15 units), but the key addition is new commercial opportunities along S. Salem in the neighborhood. Highway 55 can feel like a barrier for walking into town, so providing neighborhood convenience commercial space and areas where entrepreneurs can open small businesses or professional offices is key. North of Highway 55 on S. Salem Street, the team explored knitting back together the grand residential street that leads to the core of downtown. By keeping the scale of infill structures similar to the large historic homes, we can add two-packs, three-packs, and even 4-6 packs while still maintaining the character of the experience. With additional infill housing in the area, the plan creates 60 new units within two blocks of the heart of downtown without displacing current structures.

The intersection of Highway 55 and Salem Street is one of the major gateways into downtown. The plan illustrates four corners of investment that include:

- Northwest Corner: Active Reuse of Holt & Sons Gas Station as Brewpub
- Southwest Corner: Multi-modal Transit Center as Iconic Building
- Northeast Corner: Boutique Hotel as Downtown Hospitality Opportunity
- Southeast Corner: Mixed Use Building as Justice Heights Commercial Anchor

Key Recommendations

- *7C-Encourage the active reuse of historic structures with businesses that add vibrancy to Salem Street.*
- *7D-Attract a boutique hotel to downtown Apex to provide an alternative hospitality option within walking distance of the core.*
- *7E-Promote sensitive infill of housing and commercial in the Justice Heights neighborhood.*

Precedent boutique hotel, Salana Boutique Hotel, Vientiane, Laos (Image credit: agoda.com)





▲ **Existing**



▲ **Conceptual Opportunity**

7.3.3 Downtown Core | Growing Downtown Towards Increased Vibrancy

The blocks between Chatham and the civic campus along Hunter Street were examined in detail to identify new mixed use buildings, downtown housing, parking solutions, public spaces, streetscape improvements, public art locations, and general opportunities for vibrancy.

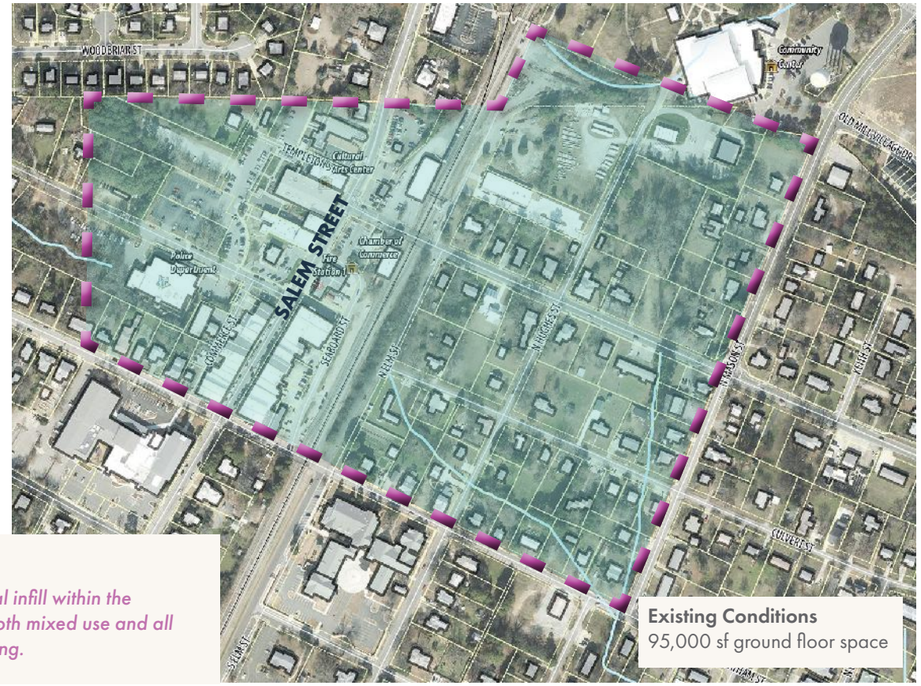
As mentioned in Chapter 6, extensive studies of potential parking deck locations yielded a preferred option on the Templeton Street lot site. Therefore, the team illustrated the downtown core plan two ways—one plan with a reconfigured surface parking lot and one plan with the proposed deck.

Three opportunities for new mixed use buildings are illustrated within the core:

- Parcels north of Center Street which include a car dealership and CSX facilities envisioned as two to three story mixed use buildings with active ground floors and upper story living
- Parcels (north and south) at the intersection of Saunders and Salem Streets
  - North: two to three story mixed use building with rooftop dining and penthouse apartment
  - South: two story mixed use building with active ground floor and upper story living
- Parcel at Salem and Seaboard Streets and current home of the fire department building envisioned as a public-private partnership mixed use building that would have two bays for the fire department and active ground floors along Salem with upper story office

Note: In the parking deck scenario, the plan does illustrate the deck wrapped in mixed use buildings.

The design team also examined a set of blocks closest to Salem Street's heart within the historic overlay district for infill housing opportunities. Parcels closest to the civic campus were also investigated as higher density housing due to the increased development investment likely required of these brownfield properties which are the current home of Jordan Oil.



Existing Conditions
95,000 sf ground floor space

Key Recommendation

7F-Direct incremental infill within the downtown core of both mixed use and all forms of urban housing.

▲ **Existing**



Proposed Conditions
With Surface Parking: 58,500 sf proposed + 95,000 sf (existing)=153,500 sf active ground floor retail/restaurants
Additional 340 units

The area highlighted in blue is simply an alternative that explores the potential relocation of the historic structures in this area, which would add 116 parking spaces to the Templeton Street lot. Community feedback indicates that this is not a preferred scenario, and therefore, is not reflected in the overall master plan found in Section 7.2.

Proposed Conditions
With Deck/Liner Buildings: 66,600 sf proposed + 95,000 sf (existing)=161,600 sf active ground floor retail/restaurants
Additional 360 units

▲ **Conceptual Opportunity**

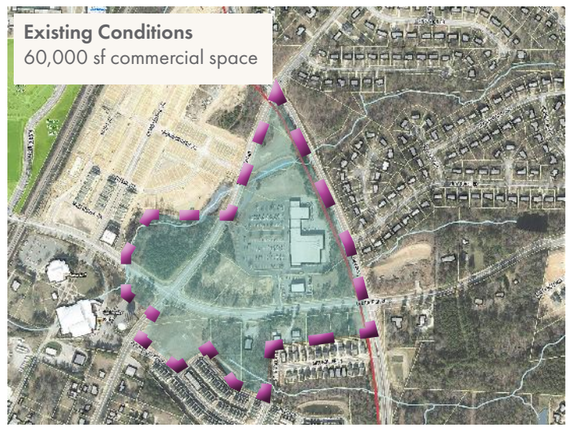
This alternative explores the idea of a parking deck in downtown, which is not currently the preferred option. Again, the historic buildings were relocated in this scenario.

7.3.4 Vineyard Station Shopping Center | Retrofitting Suburbia into a Walkable Place

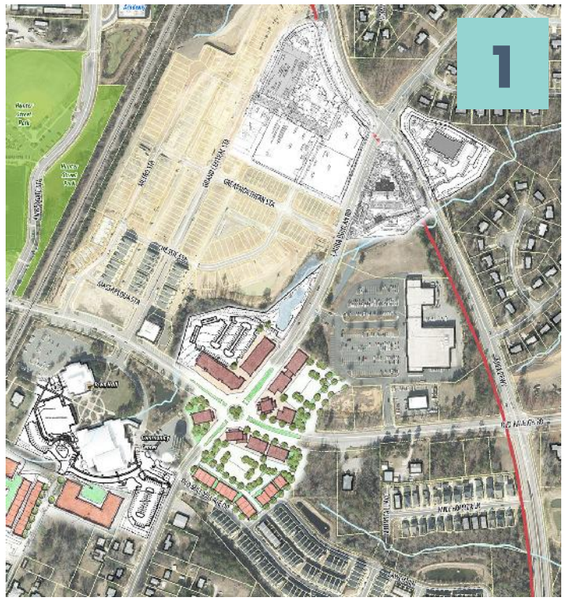
Vineyard Station is the current home of Food Lion and other commercial offerings. The property is characterized by a big box structure with an oversized parking area. The team illustrated how the site could be retrofitted into a walkable environment despite its current sprawling suburban layout completely dependent on automobile access. The vision details a phased implementation using outparcel development and thoughtful street connections to surrounding neighborhoods. These streets would not simply be parking lot lanes, but instead, true town streets with sidewalks and street trees. The final build-out also includes additional infill housing that builds on the existing patterns of the area. As Phase 4 reveals, the big box is the last piece of the puzzle to disappear and fill in as smaller scale mixed use development.

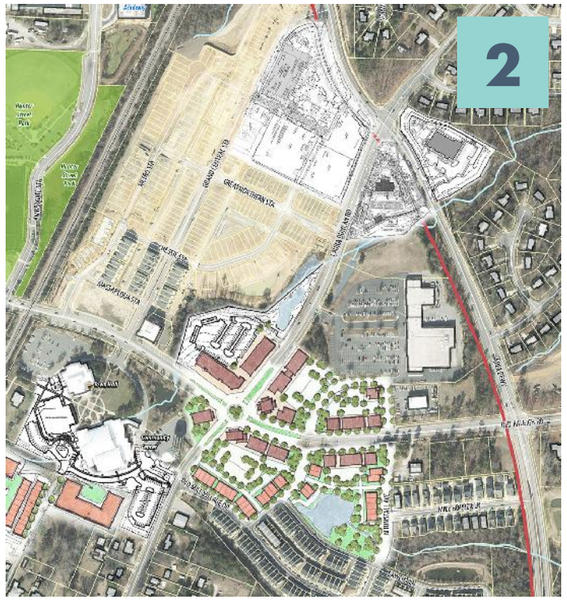
Key Recommendations

- *7G-Require new development to build quality street network connections based on an overall connectivity vision.*
- *7H-Discourage outparcel development that functions independently and encourage phased infill that shares parking and access while addressing the streets.*



▲ **Existing**





▲ **Conceptual Opportunity**





▲ **Conceptual Opportunity**









▲ *Phased birdseye illustrations*


WHAT GOES WELL WITH A BREWERY?
RESTAURANT
OUTSIDE SEATING
What's Missing DOWNTOWN?
PARKING

08
KEY GOALS

08 KEY GOALS

The nine key goals build on the guiding principles by creating measurable objectives. The design plans illustrate the key goals in action with highly detailed visions for specific areas in and around downtown.

- **Manage Parking Efficiently & Effectively**
- **Make Salem Street the Best Public Space in the Region**
- **Create Vibrant Spaces for People to Gather**
- **Expand Housing Options that Promote Equity**
- **Create Connections to Downtown**
- **Encourage a Diversity of Activities and Programming**
- **Roll Out the Welcome Mat with Small Town Charm**
- **Honor the History of Downtown**
- **Re-imagine Spaces through Art, Innovation, and Creativity!**

Tangible examples on both public and private property are shown as conceptual opportunities. While the details and locations of various improvements may vary slightly from the plan, the overriding point is that downtown vibrancy relies on the accomplishment of these key goals. They serve as a checklist when evaulating the value added through both public and private investment.

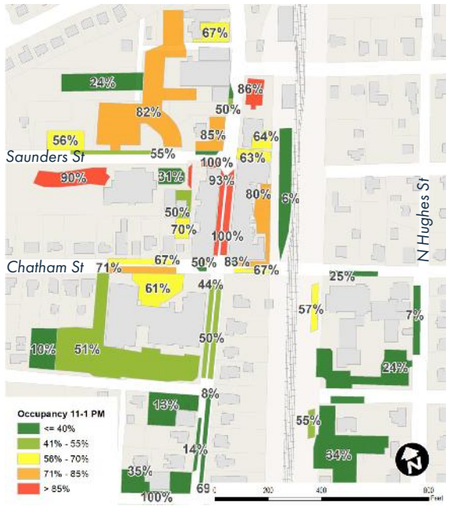
3
Guiding Principles

9
Key Goals

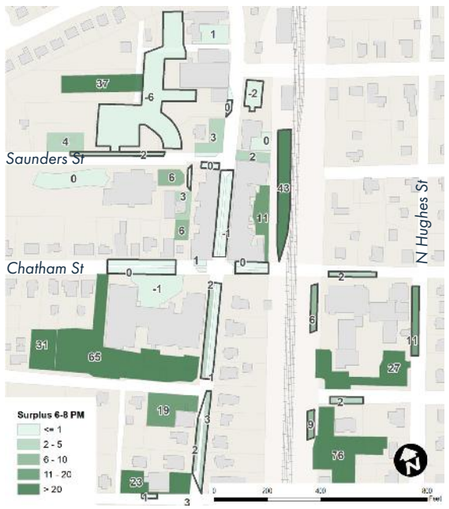
100%
of vision was driven by the community

8.1 Manage Parking Efficiently & Effectively

For complete details related to the parking analysis and recommendations, please refer to Chapter 6 which is dedicated entirely to those findings. The goal of **managing parking efficiently and effectively** aims to achieve a better balance of supply and demand through a continual, iterative approach. Public perception and numerous anecdotes indicated that there was a shortage of parking available in downtown Apex. Occupancy data suggested that some areas were over-capacity during peak lunchtime and dinnertime hours; however, surplus spaces were available nearby (<4 min walk). At the busiest time observed (lunchtime in February), 52% of the parking supply was occupied. Ideal occupancy for parking is 85-90%.



Parking Occupancy by Lot, Lunch in February



Surplus Parking Spaces, Evening in May

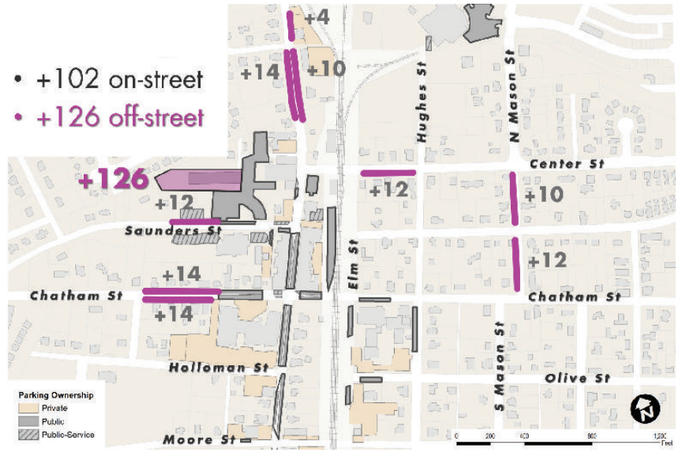


Be stubborn about your goals, and flexible about your methods.

-Unknown

8.1.1 Additional Parking Identified

Through a variety of on-street and off-street design studies, the team identified nearly 230 additional parking spaces within the immediate core of downtown. As detailed in Chapter 6, the Templeton Street lot and adjacent parcels were consolidated and redesigned in a more optimal configuration. The on-street opportunities include the simple reallocation of existing asphalt on neighborhood streets.



8.1.2 Parking Management Strategies

Strategies for Years 1-3

- Walkability/Streetscape Enhancements
- New Parking Supply
  - On-street locations
  - Off-street lot reconfiguration
  - Preliminary engineering assessment for potential parking deck
- Leased or shared parking agreements
  - Private businesses, evenings
- Enforcement
  - Time limit modification
  - Downtown Ambassador's Program
- Collect occupancy data annually

Strategies for Years 3-5

- Valet Program (evenings)
- Parking deck considerations
  - Templeton Lot
- Evaluation/Assessment
  - Parking occupancy data - annual trends
  - Effectiveness of time limit modification(s)
  - Effectiveness of Ambassador's Program

8.2 Make Salem Street the Best Public Space in the Region

Salem is the **HEART** of downtown, and today, there are spatial and safety issues that this vision needed to address in order to **make Salem Street the best public space in the region**. At a minimum, the 30 current parallel parking spaces should be restriped to 22' in length (standard). However, Apex is not a community that does the minimum when presented with any challenge. Together, the team and the community explored several alternatives focused on the blocks between Saunders and Chatham streets including:

- On-street parking on the east side and a wide sidewalk with street trees on the west side;
- Alternating long sections of wider sidewalk with street trees and parallel parking;
- Alternating short sections of wider sidewalk with street trees and parallel parking; and
- No parallel parking with wide sidewalks and street trees on both sides

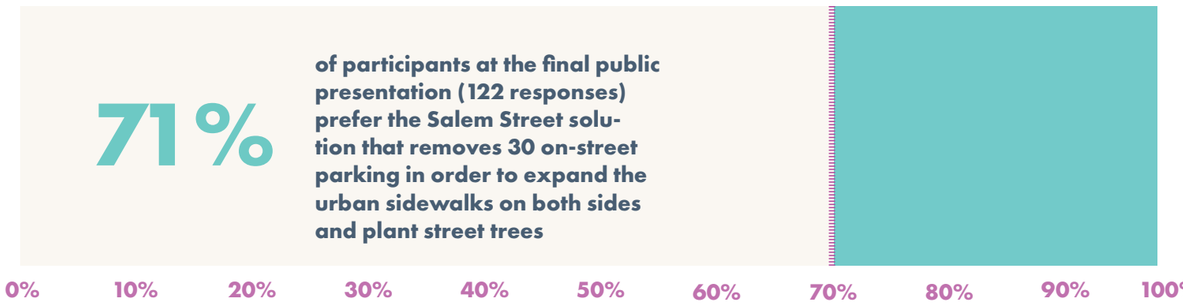
The ultimate goal for the solution was to increase usable sidewalk space wherever possible and introduce street trees!! The team wanted to explore the alternatives as a human being would experience them so a 3D model was created. The pros and cons of each option were presented to the public during the September 12th presentation while asking them to imagine themselves on Salem Street in the proposed conditions. A poll was taken and the **no on-street parking option was selected with over 70% of the votes.**

All four options are presented in this section for consideration along with the pros and cons for each.

Key Recommendation

8A-Transform the Salem streetscape.

Top 10 Recommendation

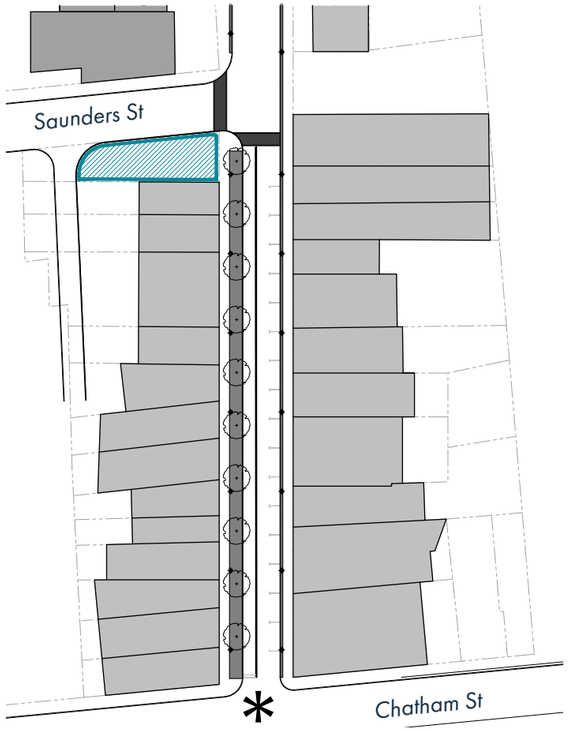


Existing view looking north on Salem Street characterized by narrow sidewalks, no street trees, and relatively tight parking conditions



Existing view looking north along the sidewalk of Salem Street characterized by a wall of cars





8.2.1 On-Street Parking One Side

Pros:

- Creates wider urban sidewalk on west side with street trees
- Restripes parallel parking on east side to code (8'x22')
- Retains convenience parking for shoppers/diners
- Provides the potential to plant a few trees on east side in bulb-out extensions by forfeiting a few parking spaces

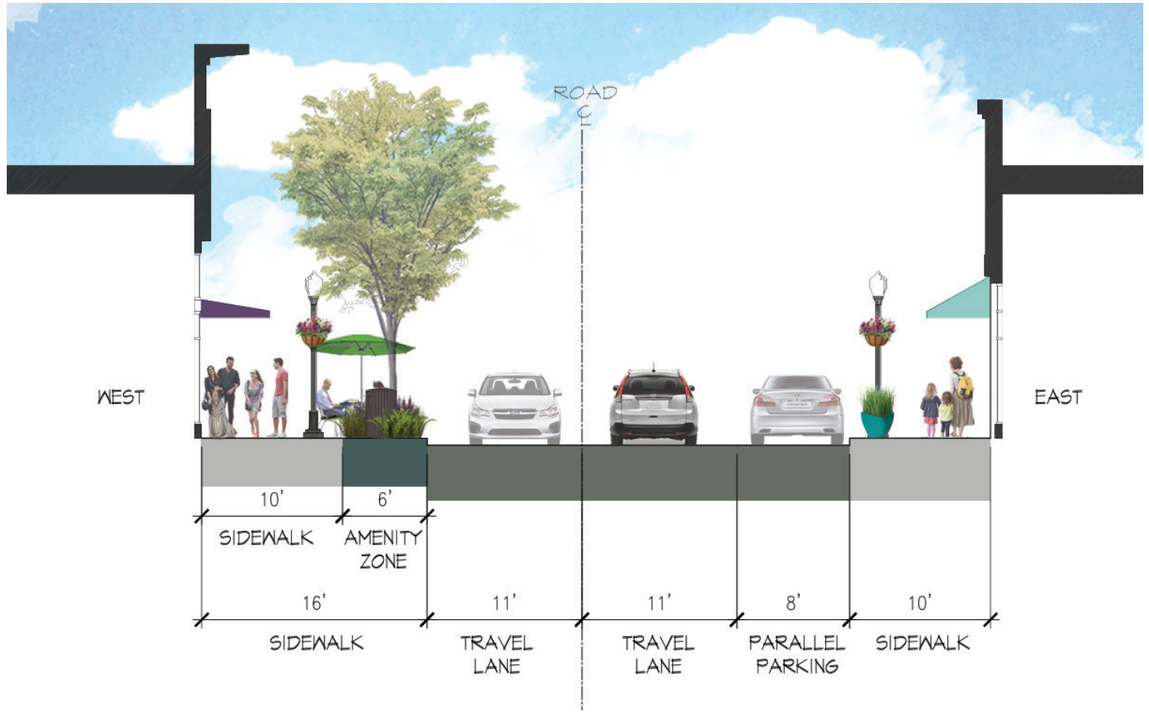
Cons:

- Maintains narrow sidewalk on entire east side with limited street trees
- Creates "winners and losers" for the current businesses depending on the locations of wide sidewalk and parking areas

On-street parking one side plan view



On-street parking one side perspective model view

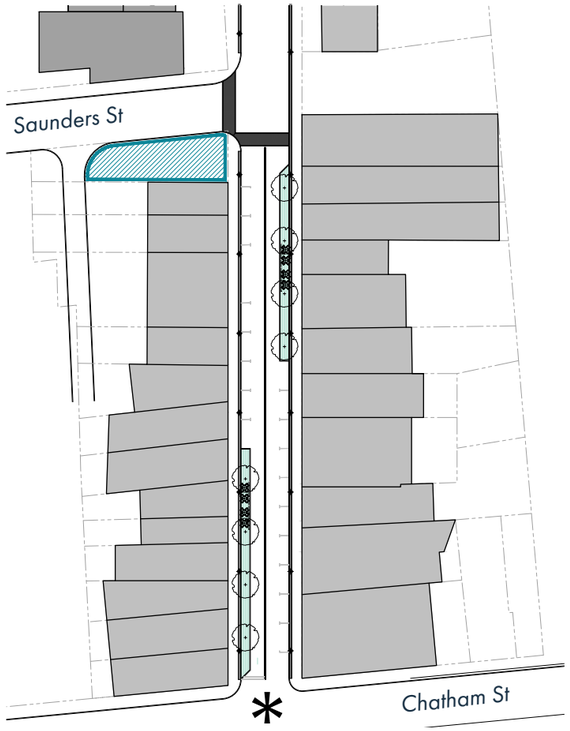


On-street parking one side street section

Salem Streetscape Design Considerations

Regardless of which streetscape solution the town chooses to move forward with, the plan recommends the following design considerations as critical to Salem's success:

- Create wide sidewalks (15' minimum) to enhance pedestrian flow and provide opportunities for outdoor dining and street activation
- Install canopy street trees with a root zone system that yield specimens which provide shade and a sense of enclosure
- Consider pavers (budget permitting) as a potential street surfacing in the heart of downtown
- Install string lighting across Salem Street for increased ambiance
- Enhance pedestrian crosswalks, lighting, and signage which promotes safety and ease of navigation
- Provide bicycle racks to promote cycling as an alternative form of travel to and from downtown
- Incorporate public art in all aspects of the design to tell the unique story of Apex
- Furnish the street with benches, rocking chairs, and movable tables/chairs to enhance the comfort and image of Salem Street
- Provide opportunities for seasonal flower color in the planting strategy to create interest and seasonal indicators
- Facilitate facade grants to improve canopies along the street



8.2.2 Alternating On-Street Parking (Long)

Pros:

- Provides street trees for half the block on each side
- Creates wide sidewalks for half the block on each side
- Retains convenience parking for shoppers/diners

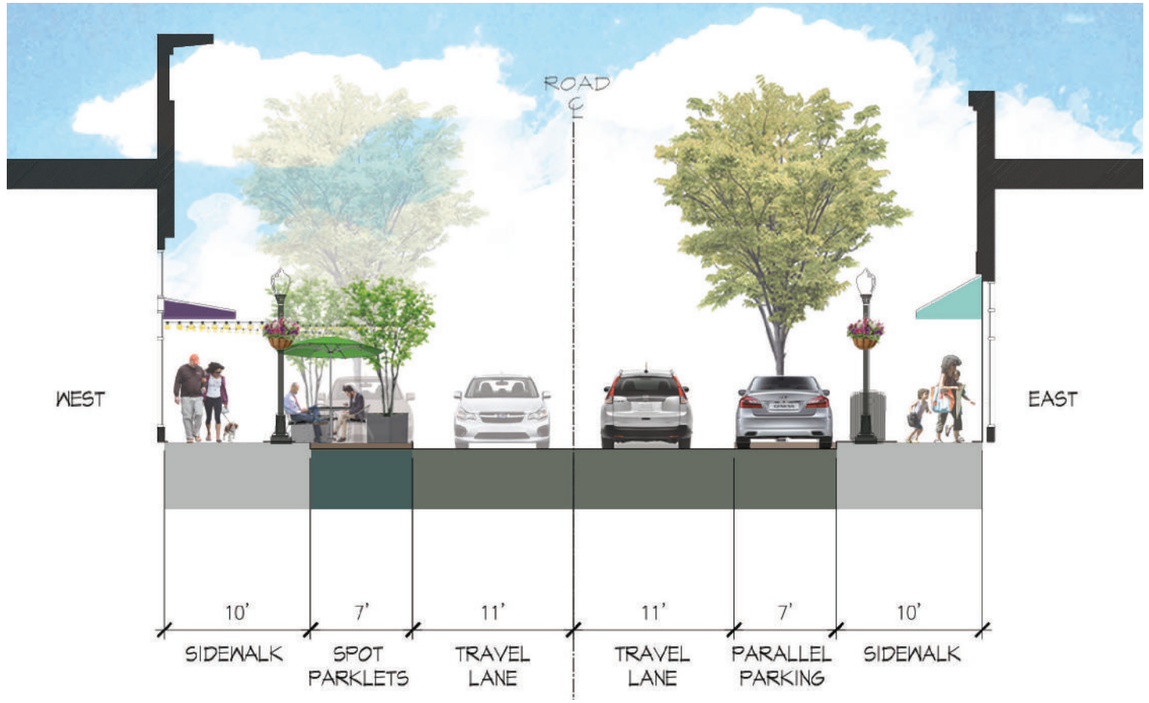
Cons:

- Maintains existing parallel parking width of 7'
- Maintains narrow sidewalk for half the block on each side with no street trees in those areas
- Creates "winners and losers" for the current businesses depending on the locations of wide sidewalk and parking areas

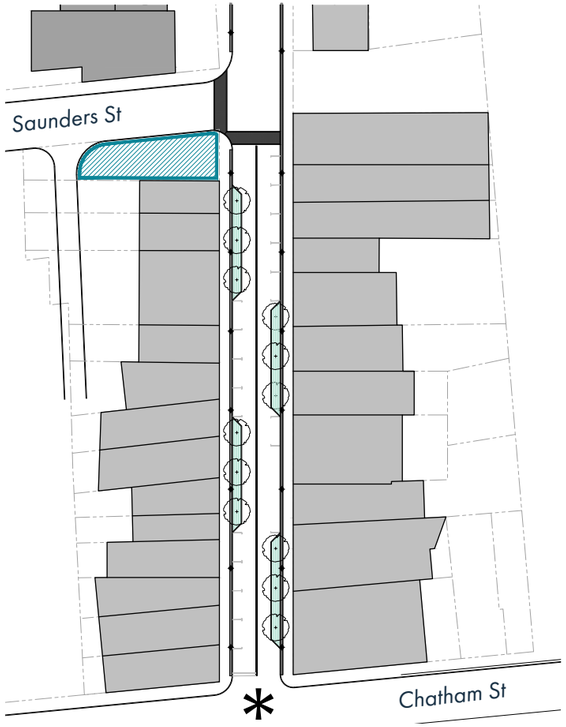
Alternating on-street parking (long) plan view



Alternating on-street parking (long) perspective model view



Alternating on-street parking (long) street section



8.2.3 Alternating On-Street Parking (Short)

Pros:

- Provides street trees for half the block on each side in a pattern that creates the visual appearance of trees along both sides of Salem Street
- Creates wide sidewalks for half the block on each side
- Retains convenience parking for shoppers/diners

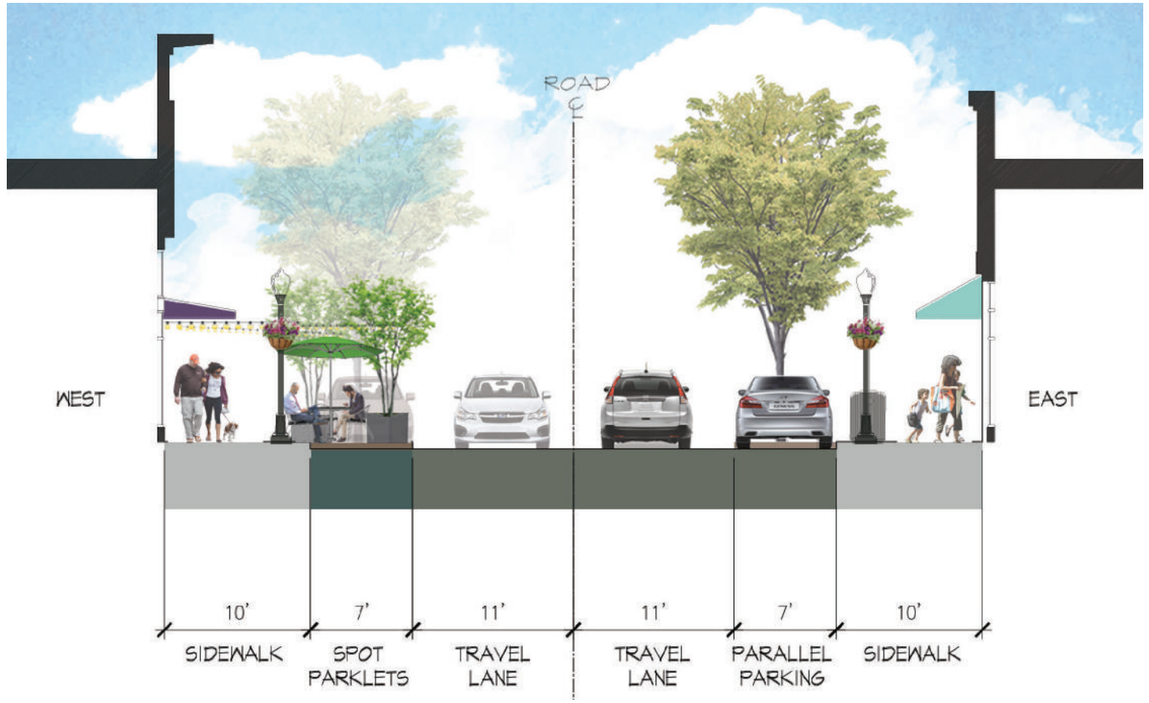
Cons:

- Maintains existing parallel parking width of 7'
- Maintains narrow sidewalk for half the block on each side with no street trees in those areas
- Creates "winners and losers" for the current businesses depending on the locations of wide sidewalk and parking areas

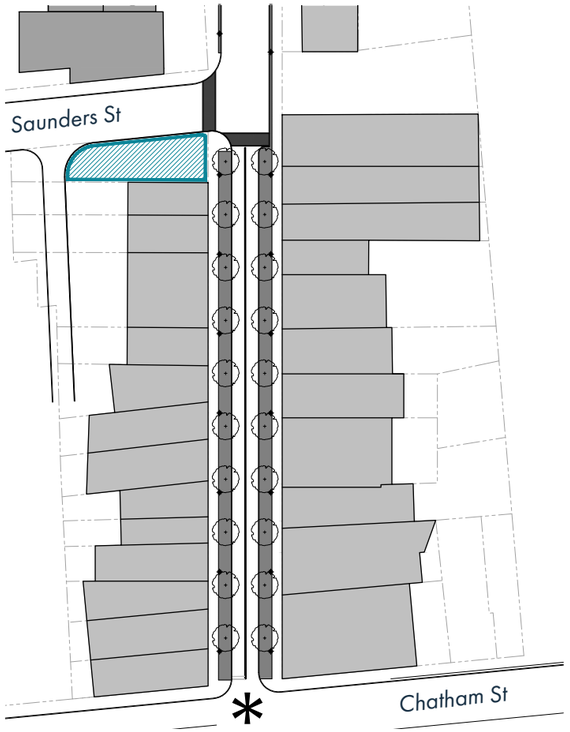
Alternating on-street parking (short) perspective plan view



Alternating on-street parking (short) perspective model view



Alternating on-street parking (short) street section



8.2.4 No On-Street Parking

Pros:

- Provides wide urban sidewalks for the entire length of Salem Street for both sides
- Provides consistent and regular street trees on both sides of Salem Street
- Provides sidewalk room for additional furnishings and amenities

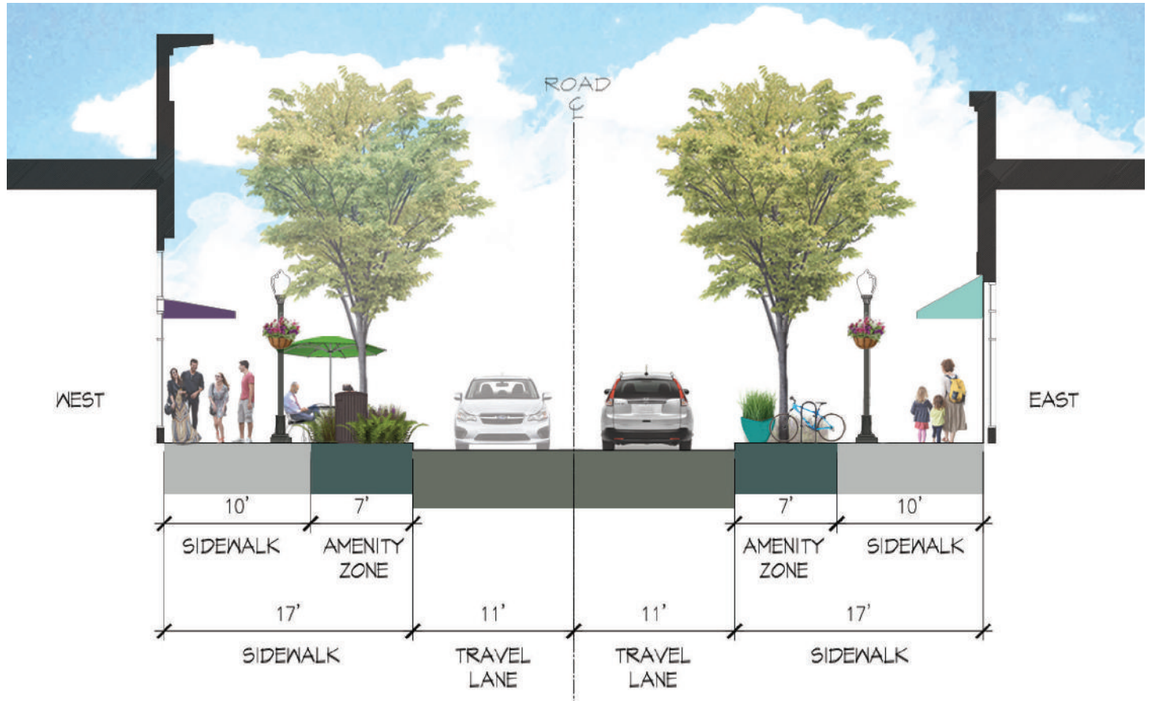
Cons:

- Retains existing width of 7' for pull off areas
- Removes all on-street parking directly outside of businesses

No on-street parking plan view



No on-street parking perspective model view



No on-street parking street section

8.3 Create Vibrant Spaces for People to Gather

We examined several "leftover spaces"—places that needed a little love but were amazing opportunities to **create vibrant spaces for people to gather**. The team first examined the major alleyways of Commerce and Seaboard.

8.3.1 Commerce Street

The team wanted to create a vibrant people place on Commerce Street. Planners and urban designers discuss mixed use in buildings quite often, but public spaces need to be mixed use as well—a place where cars, cyclists, moms with strollers picking up their kids from preschool, and young entrepreneurs trying to change the world with their ideas all live harmoniously together in a beautiful/dynamic space.



◀ Existing
Commerce Street is an auto-dominated alley with no clear space which invites people to stay



◀ Conceptual Opportunity
Commerce Street envisioned as a unique alley with art, seating, shade, and PEOPLE!

8.3.2 Seaboard Street

Seaboard Street recently received a critical public investment in the form of new public parking along the rail line. The current conditions behind the downtown buildings in this area can be described as a wasteland of unconsolidated dumpsters, the occasional convenient employee parking space, and overgrown shrubs. The team put forth a vision for vibrancy with lighting, plantings, and most importantly **PEOPLE!!**

Key Recommendation
▧ *8B-Energize the alleys...Seaboard, Commerce, and Fire Station.*

Top 10 Recommendation



◀ Existing
Seaboard Street is a gravel area behind the businesses of Salem Street



◀ Conceptual Opportunity
Seaboard Street envisioned as a unique alley with planters, shade trees, string lighting, beer garden style seating, and PEOPLE!

8.3.3 Kitchen & Bath Renovations

The team looked at buildings that have perfectly fine businesses in them today, but envisioned a future where they convert into people places. The area of N. Salem in front of the current Kitchen and Bath Renovations store is slated to receive a new public sidewalk as well as a new Holly Springs Express bus stop. The desire is to leverage that public investment to encourage private investment and a vision for vibrancy. The Hang Out is one concept for a local eatery with unique public art and cool outdoor dining spaces under the old gas canopy. The Town of Apex would not force this type of change, but rather, encourage future development to focus on vitality.



▲ **Existing**
Former gas station building adaptively reused currently as a kitchen and bath renovation business



Conceptual Opportunity Phase 1 ▶
Public investments include new crosswalks, sidewalks, lighting, and on-street parking



▲ **Conceptual Opportunity Phase 2**
Public investment meets private investment and a vision for vibrancy in the form of a unique eatery and bottle shop designed with great spaces enhanced with plants, lighting, and PEOPLE!

8.3.4 Holland's Jewelers

Holland's Jewelers is a fantastic local business that the town is lucky to have on the tax rolls. The team wanted to illustrate shifting the jeweler to the rear of the existing building which still maintains a side entrance just a short distance from their current main door. The business owner could partner with a local entrepreneur or restaurateur to activate the Salem frontage with a café serving breakfast, lunch, and dinner—even brunch on Saturdays! The intent is to provide an eatery for the S. Salem neighborhoods while also creating synergy with the new development at NC 55 and S. Salem.

Top 10
Recommendation

Key Recommendation

▨ *8C-Attract five new restaurants/bars/breweries to Salem Street through new development and the active reuse of existing buildings.*

▼ **Existing**
Holland's Jewelers is currently an auto-oriented destination shop.





◀ **Conceptual Opportunity**
In this vision, the jeweler shifts to the back space and maintains a side facing front door while a cafe occupies the Salem frontage. The outdoor spaces are enhanced with shade, plantings, trees, outdoor dining areas, art, and PEOPLE!

8.3.5 Cigar Shop

The vacant building formerly occupied by the cigar shop is one of the key "gaps" in the retail experience as Chapter 4 highlights. The parking area of the site also fronts onto Salem Street which detracts from the continuous frontage created by the buildings in the heart of downtown. The site is envisioned as a two or three story building with active ground floor uses, a wide urban sidewalk for outdoor dining, and rooftop dining along with a penthouse apartment.



▲ **Existing**

The site of the former cigar shop is a clear "gap" in the downtown retail environment with an abnormal urban setback and parking facing the street.



▲ **Conceptual Opportunity A**

Option A illustrates a two-story mixed use building with active ground floor tenants that wrap the corner of Salem and Saunders Street; upper story living including a third story penthouse apartment; rooftop dining with views of the town; a wide urban sidewalk with movable chairs and tables along with shade trees; the addition of public art on the side of the adjacent coffee shop building



▲ **Conceptual Opportunity B**

Option B (not currently allowed by existing regulations) illustrates a three-story mixed use building with active ground floor tenants that wrap the corner of Salem and Saunders Street; upper story living including a fourth story penthouse apartment; rooftop dining with views of the town; a wide urban sidewalk with movable chairs and tables along with shade trees; the addition of public art on the side of the adjacent coffee shop building

8.3.6 Southern Corner of Saunders and Salem Street

The space at the southern corner of Saunders and Salem Streets is currently a vital public space for downtown; the area is literally the only respite from the hot summer sun. This plan clearly illustrates the addition of key public spaces along Salem Street including the transformation of the streetscape to include canopy trees. The successful implementation of those ideas, paired with parking solutions that make the current six spaces a non-issue, will shift this corner to a new category of opportunity. By developing a building that connects the shopping microclimates and provides the necessary square footage downtown needs to shift to a destination, this corner becomes a critical piece of Salem Street's evolution. Ground floor retail and restaurant space along with upper story living create vibrancy on this corner and a synergy between the new development previously discussed on the cigar shop site.



▲ **Existing**

This corner is often occupied by people because it is currently the only area of true shade in the summer months.



▲ **Conceptual Opportunity**

With the addition of well-designed public spaces along Salem Street, including street trees for shade and parking solutions nearby, this vacant corner could transform into needed square footage of both retail/restaurants and upper story living.

8.4 Expand Housing Options that Promote Equity

A thorough review of the team's housing analysis can be found in Chapter 5 of this document. The goal is to take the market realities and find opportunities to **expand housing options that promote equity**.

The housing recommendations suggest approximately 100 units per year can be absorbed over the next five years with various housing typologies of multi-family and single-family units—both for-sale and for-rent.

All four of the key focus areas described in the plan explore equitable housing solutions in and around downtown.

- Shangri La Mobile Park illustrated as a mixed income neighborhood of for sale and for rent options
- Justice Heights Neighborhood illustrated with strategic narrow lot single family homes and S. Salem integrating workforce cottage courts along with two-pack and four-pack units in what appear to be large historic style homes
- Vineyard Station illustrated as an extension of the surrounding neighborhoods offering rowhouses, upper story lofts, and live/work units.

One area the team would like to highlight to promote this goal is the fourth area of plan focus—the downtown core's historic blocks. The blocks bound by Chatham, Center, Elm, and Mason are located just a stone's throw away from the heart of Salem Street. Approximately forty units occupy this area today and some are part of the historic overlay district within the town. The historic designation provided an additional layer of information to the designers related to structures being categorized as "contributing" or "non-contributing" to the historic nature of the area.

A sensitive infill approach was taken with the first phase being the simple addition of accessory dwelling units (ADUs) on lots that could accommodate them and providing access through the development with alleyways. This added 22 units to the area that would be affordable options for the two demographic groups which make up 65% of the potential buyers in town—young singles and childless couples plus empty nesters and retirees.

The next phase of potential development examined the lots with non-contributing structures as areas for future densification of the block. A staggering 100 units were added to this area which is less than a five minute walk to Salem Street. The intention is for the infill units to fit into the existing character where appropriate while introducing new typologies such as two and four packs, rowhouses, and cottage courts. The illustrations at the right show the progression of development and how these simple adjustments could add appropriate levels of density to this historic neighborhood block and yield more **PEOPLE** living near downtown.

Key Recommendations

- *8D-Recruit developers familiar with towns like Apex to implement urban housing in downtown.*
- *8E-Work to meet demand for downtown housing and improve the housing stock through institutional partnerships. (as discussed in case study found in Chapter 5)*

Key Recommendation

- *8F-Construct 100 new housing units within a 10-minute walk (1/2 mile) of Downtown.*

Top 10 Recommendation



40 existing units

Existing conditions of the block



40+22=65 units

Insertion of alleys and accessory dwelling units (ADUs)



40+100=140 units

Sensitive densification of the block over time

8.5 Create Connections to Downtown

Much of the connectivity desired in and around downtown will be addressed through the Advance Apex Transportation Plan's recommendations; however, this plan identifies streets which improve the overall walkability of the community. The streets that impact the five and ten minute walk will be most critical to **create connections to downtown**.

The walk-shed map to the right places the center of the circles on the core of Salem Street at Saunders Street. Noteworthy are all the new housing opportunities within a quick walk or bike of what is shown as a true "theme/festival" destination district. Connecting these existing and future residents to the core will be vitally important to the community's success.

As discussed in both Chapter 6 and in Section 8.1, the identification of on-street parking for various connecting streets creates a two-fold positive impact for Apex. Obviously, the addition of these spaces addresses current parking concerns, but the reallocation of excess pavement also slows vehicles down. Slower neighborhood streets create a less hostile environment for walking and cycling. Streets with the potential for transformation include: Center Street, Chatham Street, Saunders Street, Mason Street, and N. Salem Street. Sharrow markings for downtown streets have also been identified in the Bike Apex plan.

The Town's Capital Improvement Plan includes planned pedestrian investments to complete sidewalk gaps over the railroad at Chatham and Center. This project would continue to make the walk to downtown safer and should be prioritized for funding along with pedestrian scale wayfinding.

N. Salem has presented public safety with speed issues in the past, so again, restriping will go a long way in slowing those cars down and making the area for pedestrians and cyclists much safer. Along N. Salem, a bus stop is anticipated in the vicinity of Hunter Street Park which provides connections to downtown Cary and Holly Springs with service beginning in January. A bus stop along the GoApex Route 1 is also planned at S. Salem Street and Moore Street which coincides nicely with the reimagination of the Holland's Jeweler property found in Section 8.3.4.

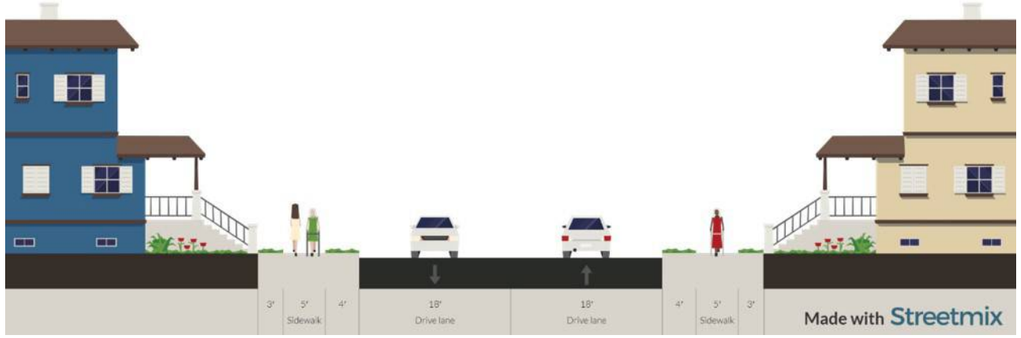
Speaking of regional connectivity, the planned "enhanced transfer station" by GoTriangle is coming to the intersection of NC 55 and S. Salem Street. This plan promotes the idea of leveraging that planned investment in regional transit to create a true multi-modal center for Apex. This would be a facility where residents and visitors could pick up not just a regional connector bus, but the local GoApex transit circulator (perhaps an autonomous shuttle one day) or jump on a community bicycle or scooter. Section 8.7 shares the vision for this iconic civic investment.



Bike Apex map showing existing and proposed facilities connecting to downtown

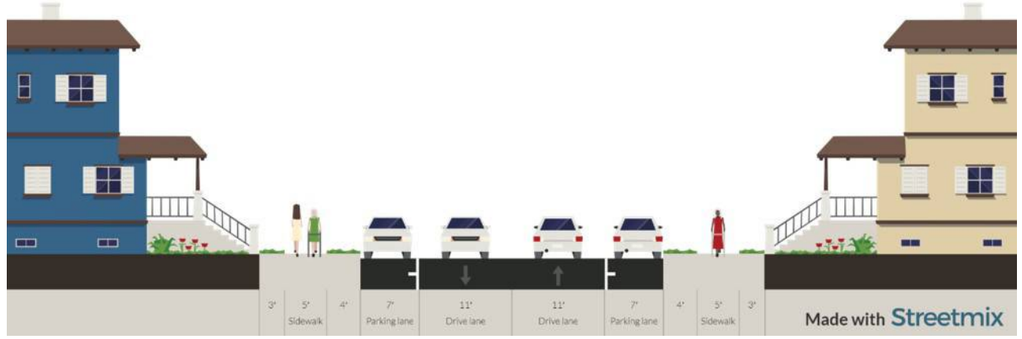
Existing

North Salem currently has two 18' travel lanes which encourages speeding and creates a dangerous walking and cycling environment



Conceptual Opportunity

Reallocating the existing pavement of N. Salem Street between Hunter & Center streets to two 11' travel lanes and on-street parking yields 28 new spaces within an easy walk of downtown. This is the same roadway cross-section as the existing S. Salem Street through the center of downtown.



8.6 Encourage a Diversity of Activities & Programming

Apex and its citizens have proven their ability to pull off large-scale events—ones that attract thousands of people to downtown on a given day of the year. However, it's the smaller scale, more frequent events that create vibrancy. The plan strives to **encourage a diversity of activities and programming**. The overriding issue related to this goal is the current lack of public space in downtown.

With parking issues mitigated through a number of management strategies, as outlined in Chapter 6, the twenty spaces in front of the beautiful, historic depot building present a major opportunity to create a flexible public space. This would be the **"place"** in downtown Apex.

Depot Plaza is envisioned as a simply designed, curbless plaza utilizing permeable pavers, majestic shade trees, public art, movable tables/chairs/umbrellas, an interactive splash pad, and even a cascading wall of water on the plaza side of the accessible ramp leading to the depot. The space would have self directed games and fun movable seating on most days, host the Farmer's Market on Saturdays, and even be an ice rink during the holidays!

Key Recommendation

- *8G-Re-purpose the parking area at the Depot into the premier public space downtown.*

Top 10 Recommendation



▲ *The interactive splash pad is a space with fountain nozzles below grade that can be utilized during warm times of the year; the space would simply be a plaza during the colder seasons.*



▲ **Existing**
Parking area in front of the historic depot building



◀ *Cascading water adds ambient noise that makes public space inviting*







▲ **Conceptual Opportunity**
Depot Plaza envisioned as a flexible public spaces that changes with the seasons and based on programming needs

8.7 Roll Out the Welcome Mat with Small Town Charm

8.7.1 Front Porches & Hospitality

Great programming is lost if people don't know how to get to it or don't feel welcome, so the plan encourages the community to **roll out the welcome mat with small town charm.** To that point, the gateways into downtown should be treated as the front porches of the community. The existing conditions of the intersection of NC 55 and S. Salem are not necessarily exuding front porch charm. The intersection enhancements, including high visibility crosswalks with pedestrian-scaled lighting and wayfinding signage, are critical to connecting the Justice Heights Neighborhood across Highway 55. The plan illustrates new businesses and developments on all four corners along with new wayfinding signage. At this one gateway, the community has the potential for a new mixed use neighborhood building, a boutique hotel, a multi-modal transit center, and an active reuse of a historic building as a restaurant with a rooftop bar. Now that's a front porch that says come on in and stay a while!

Hospitality should include downtown lodging. At this time, there are no downtown options of any real scale for out-of-town visitors. A few AirBNBs are popping up around downtown including one just a block away from the heart of Salem Street. Apex has the advantage of being close to state parks, including Jordan Lake, outdoor recreation facilities, wineries and historic sites that attract visitors to the region. These attractions and those located in downtown are bringing in visitors in the form of families, millennials and young professionals, and empty nesters. A downtown lodging option would likely attract many of these visitors, thereby, keeping much of their spending during visits in downtown versus in surrounding competing areas. Lodging could take the form of a boutique hotel as this concept illustrates and/or several bed and breakfasts around downtown.

Key Recommendation

- *8H-Make the transit station at NC 55 and Salem Street a multi-modal, iconic, gateway feature.*

Top 10
Recommendation

Current conditions of major downtown gateway at NC 55 and S. Salem Street



8.7.2 Branding/Marketing

Concurrent with this process, a branding campaign is ongoing for the town. In addition to overall town branding, the package should include marketing themes for sub-areas, including (and most importantly) downtown. Fonts and colors should be reflective of a contemporary community, and any associated logo/graphic should be clean and simple in nature. The community should also play a major role in the final selection based on a series of options.

Top 10
Recommendation

Key Recommendation

- *8I-Install wayfinding and gateway signage in and around downtown based on a new branding campaign.*

Existing
View looking west across S. Salem Street toward NC 55



Conceptual Opportunity
Concept illustrating active reuse of the historic Holt & Sons structure as a brewpub; enhanced crosswalks, wayfinding signage, a new multimodal transit center, shade trees and seasonal plantings, bike share program and sharrow markings, GoApex shuttle

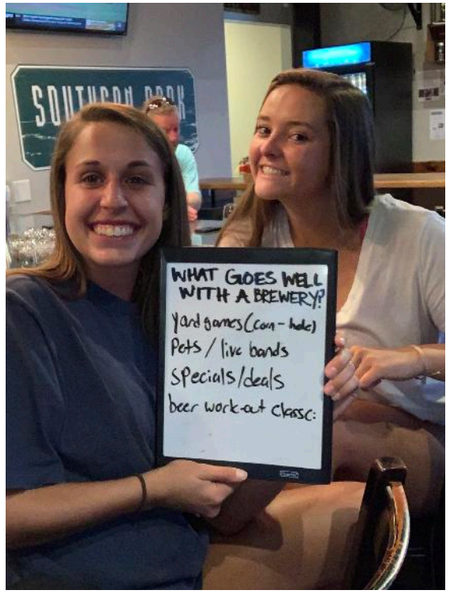


8.7.3 Finding a Home for Craft Beer Downtown

Small towns mean **unique** offerings—one of a kind shops and restaurants. Salem Heritage Plaza (the current home of Pizza Hut) is envisioned as a local brewery that celebrates the craft beer industry with taps from local breweries like Southern Peak, Brueprint, and Vicious Fishes available. The development's configuration as an L-shaped building would create a unique outdoor experience for patrons if the parking was converted into food truck areas and outdoor dining. The space may even evolve over time to include unique restaurant offerings, or perhaps, the food trucks become so popular they can afford to open brick/mortar establishments!

Key Recommendation

▧ *8J-Attract local breweries downtown and encourage co-location.*



▲ *Locals helping the design team understand what goes well with breweries*

Existing ▶
Salem Heritage Plaza



▼ Conceptual Opportunity ▶
Concept illustrating the curation of local, craft beer offerings in downtown along with welcoming outdoor spaces





8.7.4 The Place to Be

Part of people feeling welcome in a community goes back to how public spaces are detailed and what activities occur in those spaces. From giant jenga to corn hole, to buying fresh produce and local products, to lighting the town Christmas tree as a community and children lacing up ice skates for the first time—these are memories tied to place and ones that will last a lifetime. As a major capital investment, Depot Plaza would be a fantastic candidate to be **TESTED USING TACTICAL URBANISM** (As discussed in Chapter 3, the Steering Committee's creation of a parklet on Salem Street was a form of tactical urbanism). This spread outlines ways to begin thinking about the space differently and building community in the process.



Conceptual Opportunity ▲
Depot Plaza on a typical Friday night



◀ Existing
Parking lot in front of the historic depot building on Salem Street



◀ Proposed
Depot Plaza on Saturday morning during the Farmers Market



◀ Conceptual Opportunity
Depot Plaza on a winter evening in December

Tactical Approach to Testing the Idea of Depot Plaza in the Interim

- Conduct a vegetation edit by removing the overgrown shrubs. (FYI: Chainsaw required!)
- Indicate public restrooms are available inside the Depot with signage.
- Add movable seating in the space. Place some in the shade and some in the sun, but expect them to move around (but hopefully not walk off)!
- Add small bistro style tables/chairs.
- Add corn hole boards and maybe giant Jenga.
- Put a small galvanized can (with lid) of sidewalk chalk in the space and a sign that says BE CREATIVE!.
- Add additional potted plants for color and life! Greenery that drapes over those brick walls would be fantastic!
- Add string lights in the bigger trees.
- Install a temporary paint design on the concrete areas.
- Program the space with random activities; ask a yoga class or cross-fit group to do a session in the space.
- Encourage daycares and after-school programs to use the space!
- Host a movie on the "porch" with a large screen and let people bring their chairs to occupy the parking lot!
- Ask food trucks to park in the parking lot one night a week or even at lunch time one day a week!
- Allow a pumpkin vendor to occupy an area of the porch during the month of October.
- Encourage busking in the space!
- Put an intriguing temporary sign out on Salem…Check Out Our Front Porch!!
- Allow Grow Preschool to set up a sprinkler one (hot) day for kids.

8.8 Honor the History of Downtown

The plan encourages the Town of Apex to not live in the past but to celebrate and **honor the history of downtown**. As mentioned in Chapter 3, the design team had a meal with many of the community's wisest generation—people who remember the very best of Apex and graciously shared their memories of a small railroad town enjoyed on front porch rocking chairs. The Wall Street Journal recently coined Apex as the Millennial Mayberry, but it would seem that Apex has long been the Mayberry of the Triangle region according to these residents.

8.8.1 Telling the Story Through Art

The conversation spurred design ideas and a desire to intentionally share the story of downtown. Apex is unique and has a history full of whimsical elements easily portrayed through art and signage. The design team embraced the "Frogs, Logs, and Beavers… OH MY!". Stories have been written of the original log pond downtown and the sound of frogs echoing all around, and there is even a story about a beaver walking down Salem Street many years after the log pond was removed searching for his old stomping grounds.

One of the most touching moments of the Legacy Lunch was the reading of a letter from Jean Hack. Jean is 90 years old and loves Apex, and her account of days gone by left the team wanting to create a downtown where a new generation of citizens can appreciate its history and build upon it. Excerpts from her letter are found on the following page.

Key Recommendations

- *8K-Work with local and regional artists to implement public art projects along Salem Street that honor its history and vision for the future.*
- *8L-Host a mural competition to generate excitement for public art downtown.*





Salem Street Then & Now

Excerpts from a letter Jean Hack wrote to the participants of the Legacy Lunch

I was delighted to be asked to talk about growing up in Apex. The first thing you need to know is I love Apex. I feel so blessed to be born in the town I love—the only place on earth I want to be. To grow up here and live here for ninety years, I have loved every minute. Apex had very few paved streets when I was young. There were no sidewalks except for downtown. Growing up here, back then, I knew everybody. I always felt safe and secure. We always had a big meal at noon with cornbread and biscuits and whoever came to eat at our house left with lunch bags to go. When I was about eleven years old, I would skate on roller-skates on Highway 55. We rode our bikes everywhere. Once or twice a month there would be a movie downtown projected onto the side of the building which is now the Peak Restaurant. We would get inside big cardboard boxes and watch the movie outdoors. We would bring our nickels to play the jukebox and dance. Most teenagers learned to dance there! I hope everyone who lives here can enjoy the good life and be as happy as I have been.

–Jean Hack

Public art, educational signage, and furnishings should help honor the history of downtown



Image credits (left to right): Matt Barrett (train and caboose in Apex), James Simon/PGH Murals (frog in Pittsburgh, PA), Halvorson Design (log play set in Boston, MA), Oregon Translation (beavers in Portland, OR), Stantec design team (rocking chairs in Apex)

8.8.2 Fire Station Alley

Utilizing another "leftover" space, the plan illustrates a renewed sense of place for the fire station alleyway with the story about the fact that the log pond was right here (we think!). Murals depicting the log pond and clever little bronze beavers hidden among the scene tell the story in a whimsical way. The beavers can be part of a walking scavenger hunt for kids! Ambient lighting and tensile shade canopies make the space even more inviting along with opening up the brick walls in the outdoor dining area. Reclaiming this alley as a space for pedestrians not only creates a dynamic **PEOPLE** place, this design move also honors the history of downtown Apex.



Existing ▶
Vehicular alley between the existing fire station and a downtown restaurant



Conceptual Opportunity ▲
Fire Station Alley envisioned as a pedestrian only space with lighting, art, dining, and PEOPLE!

8.8.3 The Tunstall House & Grounds

This plan encourages the town to tell the story of the "Peak of the Peak"—the Tunstall House and grounds. The history of the home and its donation to the town needs to be celebrated and honored by creating a place for the community to enjoy it. The plan even includes the possibility of creating a revenue generating venue that can be enjoyed by residents and visitors alike. The grounds should be celebrated as well with community gardens and pergola covered swings along the strollway. The Bee City Committee could even utilize the area for a pollinator garden with educational signage.

Key Recommendation

▧ *8M-Revitalize the Tunstall House, grounds, and strollway as a pastoral treasure and link between Salem Street and the civic center.*

Top 10
Recommendation

▼ Existing
Aerial view of the Tunstall House and strollway connection across the rail-line to downtown





Conceptual Opportunity ▲
Tunstall House and grounds during a wedding; community gardens and pergola covered swings create a pastoral scene

8.8.4 The Fire Station on Salem

The fire station is a long-standing civic feature of Salem Street signifying safety and protection for the citizens of Apex. A recent study conducted by the fire department revealed that a two-bay configuration would be better for Station One on Salem Street which opened up a plethora of new and exciting possibilities. The plan promotes its conversion into a public/private partnership that yields an iconic civic presence while also providing more ground floor activation. The existing apron width and setback is actually perfect for a wide urban sidewalk in the mixed use half of the block.

Upon further study of their property, the fire station may decide logistically they would prefer to exit on Seaboard instead of Salem, but the fire house is still part of the story on Salem. The designs illustrate the historic 1939 engine behind glass and lit up at night as part of a fire museum on Salem. Progress and change keep a community resilient, but this plan wants to also honor the history and the place where children are making their Christmas memories with Santa each and every year.



Existing ▲
The fire station currently has seven bays that open along Salem Street and create a "gap" in the retail environment of downtown.

Key Recommendation

▧ *8N-Re-envision the fire station site as a civic and mixed-use development.*

Top 10
Recommendation







Conceptual Opportunity ▲

(Top) Fire station reduced to two bays in a modern building with the remainder of the block redeveloped as mixed use

(Middle) Fire station reduced to two bays in a traditional building with the remainder of the block redeveloped as mixed use

(Bottom) Fire station to utilize Seaboard Street for entry/exit and maintain a Firehouse Museum on Salem with the remainder of the block redeveloped as mixed use.

There are people that put their lives in harm's way every day. It's not something they DO, it's something they ARE.

-Unknown



▲ *2019 Photograph of a 9/11 Remembrance event at the intersection of Salem and Saunders (Image credit: Bob Karp)*

8.9 Re-imagine Spaces through Art, Innovation, and Creativity!

The design team challenged the Steering Committee to **re-imagine spaces through art, innovation, and creativity** with the parklet challenge on Salem Street. The intent was to illustrate that change doesn't always come about through a large capital public project; sometimes, the most transformative changes come about because someone was willing to have fun and think outside of the box. Spaces around downtown were examined that are perfectly fine places today, but with a little creativity could actually contribute to the vibrancy of downtown.

The plan explored many ideas related to this goal as is evident in the remainder of the document, but three projects have not been highlighted yet. Those include:

- Grow Preschool on Commerce Street (alley-side)
- Intersection of Salem and Saunders (south side)
- Halle Cultural Arts Center (northern facing facade)

Key Recommendation

▧ *8O-Seek out and create a list of spaces around downtown that could use a little love; create a committee dedicated to tactical interventions in those spaces.*







Existing ▶

(Top) Grow Preschool along Commerce Street alleyway includes a play space

(Middle) South corner of Saunders and Salem intersection; currently parking

(Bottom) Halle Cultural Arts Center's blank northern facade



Implementation Award

Julia Beam, a member of the Steering Committee and owner of Grow Preschool, was inspired by the photosimulation created during the design charrette. Within three months time, she had commissioned a NC artist to paint the mural you see at the left and installed the shade structure in the play area. Talk about re-imagining through art, innovation, and creativity!

Mural created by: Michael Brown, Owner of Murals by Michael Brown
www.muralsbymichaelbrown.com





◀ Conceptual Opportunity

(Top) Grow Preschool envisioned with a colorful mural and shade structures in the play space.

(Middle) Southern corner of Saunders and Salem Street intersection envisioned as outdoor dining space with lighting and ground plane artwork.

(Bottom) Halle Cultural Arts Center's northern facade envisioned with a mural that evokes community, art, and culture to make sure it's clear to visitors and residents they need to stop in and take a look!

8.9.1 Sustainability Innovations

A wealth of information related to innovative sustainability trends can be found here: https://www.epa.gov/smartgrowth/tools-and-resources-sustainable-communities

A few highlights from this resource that the Town of Apex should consider utilizing moving forward include the following:

Climate Change

- **Adaptation Resource Center**-This interactive resource known as ARC-X helps local governments deliver services with climate change in mind. Tailored strategies show risks and relevant adaptation strategies along with case studies illustrating success stories along with EPA funding opportunities.
- **Household Carbon Footprint Calculator**-Every citizen of Apex can do more to reduce greenhouse gas emissions, and this calculator allows the public to educate themselves and make positive changes for the environment.

Smart Growth Policies

- **Smart Growth Implementation Toolkit**-Smart growth is synonymous with sustainable development, and this toolkit is designed to help local leaders untangle the policies and procedures that often serve as roadblocks to the desired outcome. Smart Growth America provides seven unique tools which include diagnostics and audits, as well as incentives and scorecards for development projects.

Economic Development

- **Local Food, Local Places Toolkit**-This guide aims to increase the vitality of historic downtowns and neighborhoods by helping attract reinvestment in local food systems. Consumers are more and more interested in local food in their homes and in the restaurants they visit. The toolkit helps a community develop a plan and achieve local food and revitalization goals.

Environmental Justice

- **EPA Environmental Justice Grants & Resources**-Grants range from technical assistance to training related to empowering communities as they develop and implement solutions related to fair and equitable treatment of all people. The program promotes people of all races enjoying the same degree of protection from environmental and health hazards and giving them a voice in the process. The EJSCREEN interactive mapping application on EPA's website combines environmental and demographic indicators to assess an area with potential issues.

Green Building

- **U.S. Green Building Council**-USGBC has long been the standard for green development with their LEED (Leadership in Energy and Environmental Design) rating systems for both buildings, neighborhoods, and individual sites. Their smart growth principles help guide communities toward excellence in sustainable design.
- **Sustainable Design & Green Building Toolkit for Local Governments**-The EPA designed an assessment toolkit spreadsheet for local municipalities to evaluate their codes and ordinances. The goal is to find and remove barriers to sustainable design in local permitting processes.

Key Recommendation

8P-Utilize available resources to ensure the community develops and operates in a way that protects the environment and promotes sustainability for future generations.



▲ *LEED certification means safer and greener development and savings over the lifetime of a project*

Housing

- **Housing and Transportation Affordability Index**-This online tool helps communities understand the true cost of housing for residents. The tool measures transportation costs associated with particular housing locations in order for communities to obtain a comprehensive view of affordability.
- **Walk Score**-Understanding walkability is vital to downtown success, and this tool aims to promote walkable neighborhoods which are better for the environment, public health, and economic development. Walk Score helps potential buyers determine where to live based on proximity to people and places they love.

Land Reuse

- **Brownfields**-The EPA offers a variety of resources related to brownfields or previously developed sites with environmental hazards. From assessment and planning grants to cleanup and environmental workforce development, the EPA offers a range of tools related to the redevelopment of these areas.

Sustainable Materials

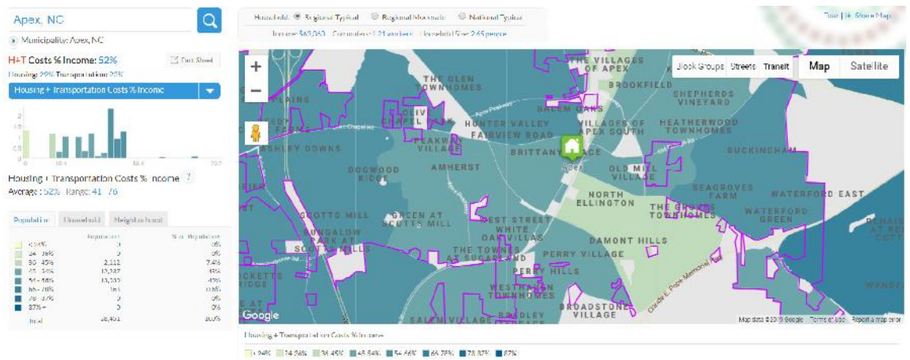
- **Excess Food Opportunities Map**-Understanding the potential magnitude of excess food in our communities can divert food from landfills and toward productive community needs. This national map makes connections between excess food generators and potential recipients.
- **Reduce, Reuse, Recycle**-This initiative educates communities on the basics of this concept along with the benefits. Links to potential resources such as a Waste Reduction Model are available to help the town's solid waste planners report greenhouse gas emissions reductions.

Transportation

- **Mixed Use Trip Generation Model**-The EPA has provided a spreadsheet tool communities can use when assessing new mixed-use development. The tool estimates trips generated to more fairly assess these projects in development review processes.
- **Smart Location Mapping**-The U.S. General Services Administration and the EPA have produced a web resource capable of smart mapping related to indicators associated with development and location efficiency. The tool includes assessment of location walkability and access to jobs via transit.

Water

- **Green Infrastructure Wizard**-Green infrastructure provides key environmental benefits through the management of water utilizing natural landscapes that are cost effective and sustainable. The EPA's interactive Green Infrastructure Wizard can produce a customized evaluation of resources related to water management and help communities make subsequent planning decisions.
- **Impervious Surface Growth Model**-While town standards should require pervious surfacing whenever possible, some level of impervious surface results with development. The EPA has provided a simple spreadsheet which estimates net impervious surface growth.



◀ *Housing + Transportation Affordability Index to understand the true cost of housing for residents*



09
IMPLEMENTATION

09 IMPLEMENTATION

While the beautiful designs and vision are a key piece of downtown's progression into the future, the recommendations and strategies of this chapter will be vital to take those pretty pictures from dream to reality. Implementation is part policy, part partnership, and part hard work. Downtown Apex has quite a story to tell, and once that story is clearly articulated, conveyed, and embedded all over town, the community can begin selling that story--to potential developers, residents, visitors, and entrepreneurs.

An infectious energy and momentum has been created through this planning process, and as the process comes to an end, this spark needs to start a fire. Apex is a community full of passionate and caring people who can fan the flames of implementation and create a place known far and wide. Downtowns, especially authentic ones like Apex, are one of the strongest playing cards any economic development staffer has to play.

Downtown Apex is on the precipice of a transformative evolution rooted in the ideas of the people who know and love this place the most—its **CITIZENS**!

10
projects the plan encourages you to tackle first

100%
chance this community will achieve implementation

10
ways to measure success

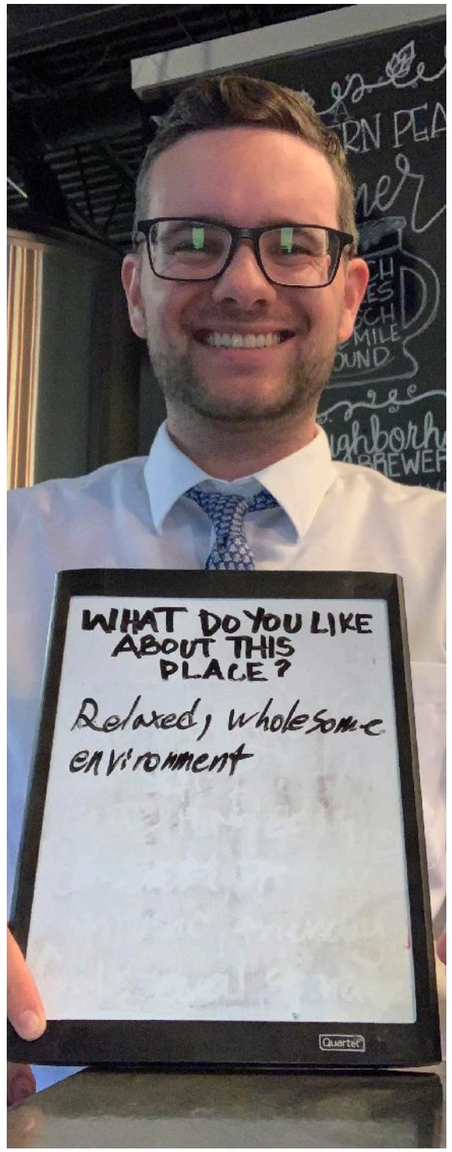
9.1 Code Recommendations

In general, front and side setbacks, building heights, and the location of certain zoning districts should be revisited to ensure that what is codified reflects the existing character that the town is trying to build upon—balanced with the need for economic development and placemaking opportunities. One example to note specifically is the plan's proposed location of a future boutique hotel at the northeast intersection of NC 55 and S. Salem Street. This business type is not currently permitted based on B1 zoning district standards.

In addition, there is an opportunity to unify certain districts based on small areas within the Small Town Character Overlay District.

A few specific considerations related to current code standards as they apply within the study area:

- **Consider increased heights stepped back off of Salem Street**. The addition of 1 – 2 stories of building density in the downtown area will improve it's day-long and year-long vibrancy as well as increase the economic return. This however, should not encourage new buildings to overshadow historic ones. The use of an upper story recess on the frontage of 10 to 20 feet not only reduces this visual impact but also provides opportunities for private outdoor space such as patios and rooftop decks.
- **Permit housing and office throughout the downtown as a principal use – just not in the storefront**. Eliminate housing and office as permitted uses along the ground floors of buildings along Salem Street from Center to Chatham.
- **Eliminate or reduce multi-family setbacks along fronting streets (currently 20 ft).** Both townhome and multi-family buildings have a 20 ft minimum setback – equivalent to the length of a standard car. In walkable urban places, the reduction of this space improves development opportunities by increase the potential building envelope. Because street trees are expected between the sidewalk and the curb there would not be a need for tree plantings in the front yard. The reduction or elimination of these setbacks also increases design flexibility. In suburban areas, the focus is on the lushness of the landscaping whereas in urban areas, the focus is on the quality and interest of the architecture.
- **Eliminate Watershed and Flood Damage standards for the central business district.** Requiring full compliance with stormwater regulations in an area that is also generally 100% impervious is very difficult and expensive. Given that much of the area is developed today, the development of existing pervious areas would have a very small impact on the greater water quality elements. There are low-impact site-specific mitigation elements that can be helpful, but the sites in downtown should not be held to the same standard as those out in the greenfield suburbs. If anything, we recommend that a regional solution be considered to manage drainage in the basins on both sides of the RR tracks.
- **Ensure that ground level transparency is to a depth of at least 20 ft (to avoid shadowboxes).** The purpose of ground level transparency is not simply to break up a wall façade but to show human activity as an encouragement for walkability. To ensure the implementation of this goal, it is important to be very prescriptive about how to achieve it.
- **Eliminate parking requirements for the central business district.** Parking should be viewed as a public utility in the downtown. By eliminating this arbitrary standard, it will open up spaces for occupation and re-use and maximize the highest return for the community's investment.
- **Permit bed/breakfast and hotel/motel in B1.** Visitors often spend the most in a business district so the more that they can be co-located the greater the benefit.



Ideas are easy.
Implementation is hard.

-Guy Kawasaki
American Marketing Specialist

Peer communities often have experienced similar issues related to the evolution of their downtown and surrounding neighborhoods, so it is fruitful to learn from them as much as possible. A few examples are found below:

Commercial Maintenance Ordinance: Many communities, including Albemarle, NC, have instituted commercial maintenance ordinances in their downtown districts to combat the common problem of derelict buildings detracting from the area's success. While most buildings in Apex are well-maintained, this type of ordinance provides another tool to ensure that all property owners are contributing to the care and quality of the downtown.

Downtown Design Guidelines: Many communities have instituted downtown design guidelines that provide guidance to owners and tenants. Facade treatment, windows, entries, color, rooftop terraces, outdoor dining, furniture, parking, signage, lighting and landscaping are just a few of the items generally found in design guidelines. These are meant to be requirements. Separately adopted design guidelines that address architectural design are generally left to some type of discretionary review – often by an appointed Design Review Board or a well-educated Planning Board.

Key Recommendations

- *9A-Modify front and side setbacks, building heights, parking, and the location of certain zoning districts to ensure the Unified Development Ordinance allows for the desired character of downtown.*

9.2 Financing & Incentives

The Town of Apex will need to tackle the implementation of the plan recommendations as funding allows and by utilizing creative financing and incentive packages. The implementation matrix in this chapter (Section 9.5) outlines whether a key recommendation is a capital or operating expenditure, or will be taken care of with private or non-city funding.

9.2.1 Downtown Development Incentives

The Town of Apex offers incentive options for businesses and entrepreneurs currently that include:

Town of Apex Development & Investment Grant
https://www.apexnc.org/902/Incentive-Policy

Facade Improvement Grant Program
https://www.apexnc.org/DocumentCenter/View/439/Facade-Grant-Application-PDF?bidId=

The biggest additional incentives the Town of Apex can provide to potential businesses are shared parking and a great public realm. Another incentive utilized by a similar community to consider is:

CDBG Small Business Loan: The City of Morganton, NC, Community Development Block Grant (CDBG) Small Business Loan Program (SBLP) is a competitive program offering startup or expansion opportunities within the city limits for loan funds up to $75,000. All businesses requesting funds between $5,000 and $30,000 must create at least one new job that meets the HUD income criteria. Businesses requesting greater than $30,000 must be able to create a minimum of 10 new full time job positions within 1 year of funding, with 51% for individuals who fall within HUD Low to Moderate Income and Household Income criteria.

9.2.2 Logistical Strategies

The new downtown coordinator position will be a leader for these logistical strategies. Their role as the key intermediary for diplomatic relations between the town and the broker community will be vital.

Online Presence of Local Businesses
Local businesses should take ownership of their online profile and presence. Most visitors to downtown pull out their smart phones to see what the available offerings are. If businesses have not taken ownership of their profile, they may not even show up on the map. By conducting this simple audit of ensuring businesses are online, the area appears as a cohesive district of shops and restaurants. Business owners should also diligently assess online reviews so customer service can be improved whenever possible.

Broker Tours
Coordinate a series of broker awareness lunches to reach out to the commercial and residential brokerage communities of Raleigh. These events should provide lunch and a walking tour of possible spaces for retail and restaurants. The goal is to create a buzz among those that represent possible retailers and restaurateurs that are seeking new or expanded locations. Every participant should be provided with a full marketing package and specific information on available space. These events should be conducted in the spring and the fall to take advantage of the nice temperatures and the full bloom of the landscaping.

Retail Attraction Committee
A Retail Attraction Committee can be tasked with developing and refining top retail categories to prospect and visit 'like districts' such as Chapel Hill, Holly Springs, Cary, and Fuquay-Varina. Regular meetings (monthly or quarterly) can be scheduled for the committee to discuss prospects before engaging in an active pursuit. Prospects should meet the criteria of being able to offer retail that meets local demand (e.g., young professionals, families, and baby boomers) and visitor demand. Committee members should be responsible for reaching out directly to prospective business owners with a marketing package for downtown Apex that describes local customers and market demand, illustrates available spaces within the core, and lists available resources and incentives for new businesses.

The information and responses collected by committee members would then be maintained in a common prospect database with business contact information, broker contact information, lifestyle/price point of business, square footage required by business, desired rent, locations of other businesses and strength of prospect. This will enable the committee to keep track of when to follow-up with prospects and be persistent.

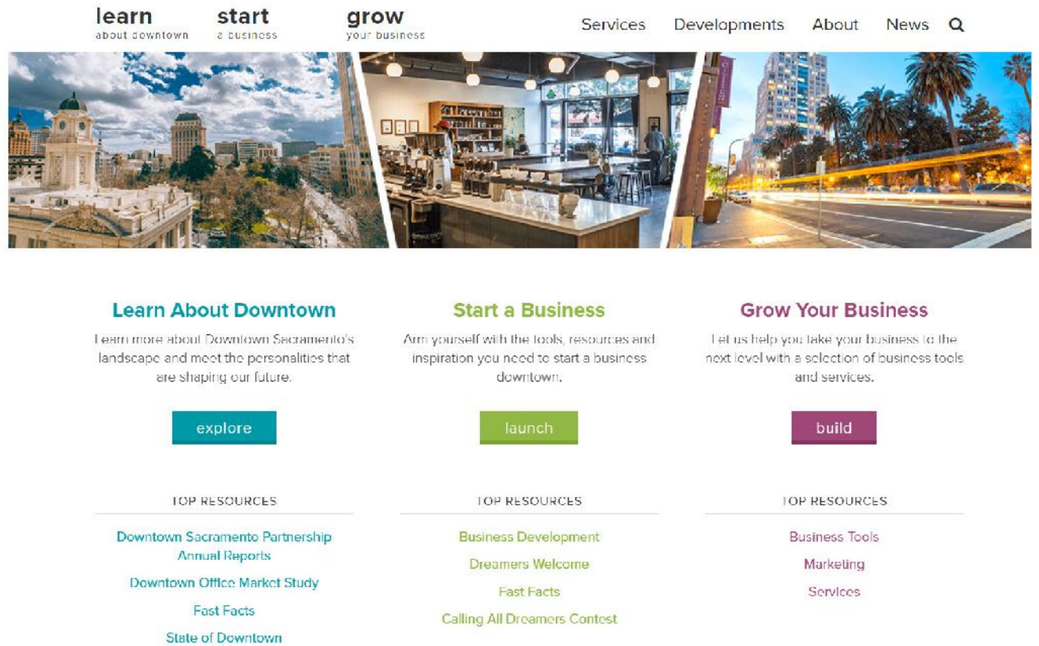
Tenant Mix Resource
As discussed in Chapter 4, curating the tenant mix will be an important piece of the story to get right. Larisa Ortiz, this plan's retail specialist, authored an extremely useful document for doing just that:

"Improving Tenant Mix", a step-by-step guide for retail attraction by commercial district managers
https://www.seattle.gov/Documents/Departments/economicDevelopment/OISI/ICSC-Guide-for-Improving-Tenant-Mix.pdf

Call for Businesses
While the Town of Apex does have a section on its website dedicated to "How to Start a Business in Apex", the page should be enhanced to include a 'Call for Businesses' tab. This page should include information for retailers and businesses looking to relocate or start a new business in downtown Apex related to market data and demographics from Chapters 4 and 5. The goal is for prospective retailers to be better aware of the market demand and potential customers in the area.

The page should also specify the downtown's strategic position and encourage businesses in key retail categories that support Downtown Apex's character and desire to be the "peak of good living."

Example of a Call for Businesses website (Image Credit: downtownsac.org)



9.2.3 Grants & Programs

Other North Carolina communities have developed grants and programs to promote investment in their downtown areas. The funding for these is often appropriated through the city's budget. The following are incentives that should be explored as additions to the current Apex offerings:

Downtown Business Marketing Grant (Monroe, NC): The ultimate goal of creating downtown as a destination is directly tied to the marketing campaigns potential visitors and residents see. This grant is seen as a co-op marketing and advertising program that provides a 50-50 matching grant to new businesses for up to 50% reimbursement of their marketing budget.

Residential Investment Grant (Monroe, NC): As noted throughout this document, Apex needs to diversify and add housing in downtown. While often smaller in number, upper story lofts are popular but often complicated by the upgrades related to the building code. This grant assists with the development of residential units in the upper levels of downtown buildings up to $20 per $100 (up to 20%) of the assessed tax value.

Public Utility Grant (Benson, NC): Often, setting up new utility services and the energy bills in older, less efficient buildings have higher costs for new business owners. This grant reimburses 25% of each month's utility bill for the period of one year.

Key Recommendations

- *9B-Audit local businesses to ensure they are taking ownership of their online presence and monitoring patron reviews. Support their digital marketing on platforms such as Google Maps, Facebook, Instagram, Yelp, and TripAdvisor by providing technical assistance (as needed) to input accurate and updated business information on these various platforms.*
- *9C-Expand the toolbox of local grants, programs and incentives available through city budget appropriations.*
- *9D-Schedule a commercial broker tour of downtown with representation from the entire Raleigh region.*
- *9E-Initiate a retail attraction committee whose responsibilities include developing a prospect database.*
- *9F-Create a full marketing package for the downtown district that includes a "Call for Business" web page as a retail attraction tool.*



New downtown businesses often need assistance in marketing themselves; downtown business marketing grants are one way the town can assist these entrepreneurs

9.2.4 Tax Incentives

While state and federal incentives have been available for several decades, many cities are finding that providing local incentives can bridge the gap of market viability for complicated projects.

Existing State & Federal Incentives

Federal Tax Credits: Since 1976, the federal government has offered a federal income tax credit for the rehabilitation of historic structures. Today, this credit consists of a 20% credit on income-producing historic properties. Rental housing development also qualifies for several different programs including Low-Income Housing Tax Credits, Tax-Exempt Bonds, Workforce Housing Loan Program, and Rental Production Program Loans. To learn more, visit https://www.nchfa.com/rental-housing-partners/rental-developers/find-rental-development-financing-options.

State Tax Credits: For those rehabilitation projects that qualify for and obtain federal tax credits, North Carolina also provides a 20% state tax credit. This gives a combined 40% credit against eligible project costs for income-producing projects. North Carolina also provides a 30% credit for the rehabilitation of non-income producing historic properties, including private residences.

Suggested Local Incentives

Local Tax Credits: To build on the current Development & Investment program, the town should consider expanding these tax incentives to housing developers in the downtown as well.

Key Recommendation

- *9G-In addition to state and federal tax credits, expand the local development and investment program to include local tax incentives for housing projects.*



A combination of incentives, strategies, and grants will promote the advancement of downtown and allow the public and private sectors to work hand-in-hand along the journey.

Case Study: Pop-Up Providence

Article Credit: Greater City Providence, an organization that promotes the growth and development of the Greater Providence, Rhode Island

What is PopUp Providence?
PopUp Providence is an award-winning, urban place-making program that introduces interactive, artistic, and cultural displays and interventions throughout the City's 25 neighborhoods.
The program supports quick, temporary, and inexpensive interventions that engage residents, workers, and visitors of all ages, and enliven the city.

How is PopUp Providence funded?
The Providence Redevelopment Agency dedicated $150,000 for the program, in October 2013, in the amount of $50,000/year, for a period three years (2013-2015).

What qualifies as a PopUp?
Installations must fall within one of the following categories:

PopUp PLAYSPACE: Indoor or outdoor, recreation or activity-based, projects that promote physical interaction.
PopUp PARKLET: On-street parking spaces that are repurposed for public space.
PopUp ART: A display of any artistic medium that is appropriate for a public setting, and directly responds to the community in which it is located.
PopUp SHOP: Vacant storefronts that are re-purposed for community, retail or commercial purposes.
PopUp AMENITY: Enhancements to the public realm, for exclusive use by the public (e.g., seating, landscaping, bicycle parking, lighting).

Who can apply for this program?
Any member of the public, including individuals, arts groups, neighborhood associations, institutions, community groups and non-profits can apply. Applicants must be 18 years of age or older at the time the application is submitted.

What are the general requirements of the program?

- Installations must be created for use and enjoyment by all members of the public, and must remain publicly-accessible at all times.
- Installations must relate to the neighborhood, serve and reflect the community, and activate and enhance the site.
- Applicants must construct and install the project within 3 months of receiving grant award.
- Applicants must maintain the project in a state of good repair.
- Applicants must operate the project, if operation is required.
- Applicant is responsible for at least 20% of total project costs. The PRA will provide up to 80% of project costs, not to exceed $10,000 per project.
- Applicants must obtain Comprehensive General Liability insurance of $1,000,000.

9.3 Events & Programming

Smaller, more frequent events are what keep a community engaged. Events like the Farmers Market tap into that engagement and provide a predictability of programming that encourages frequent visitation. As discussed in Chapter 4, downtown retail's success is now built on the experience more so than the products. Working with local retailers and restaurateurs to encourage experiential moments or events is a key programming element of the plan.

As mentioned in Chapter 4, building regular ambient and impulse programming into the newly created public spaces downtown will be a strategy that can emerge as these spaces are being transformed. Depot Plaza, Salem Street, and the alleyways present ideal opportunities to scatter these regular events and incite vibrancy--whether it is a busker or a street artist, the goal is to sometimes have the unexpected show up in downtown spaces.

The design of Depot Plaza includes a clearly defined stage area elevated above the space and offers a variety of programming opportunities. These may include: Drama at the Depot (movie night), Pumpkins on the Plaza (pumpkin carving contest, pumpkin recipe contest, pumpkin patch), and Depot Dog Days (encourage one night a month for residents to bring their dogs downtown on a leash for things like "paint your pet"). Design elements such as the interactive water feature will naturally activate the space on a regular basis. Also, particularly for children, design flexibility will allow the city to provide seasonal programming such as a small ice rink.

To build on those ideas, the plan cites several opportunities to rethink the spaces in between—the alleys, city streets, and even parking spaces. Targeted programming in these often leftover areas will add another layer of energy and expand diversity by appealing to groups that do not always attend the larger town-wide events.

Communities are also exploring the idea of event grant funding to support downtown vitality while alleviating some of the logistical work to other city organizations. Applicants typically apply in annual cycles to enhance or expand events that promote downtown as a destination. The pool of money available for this is often related to accommodations tax funding.

Key Recommendations

- *9H-Utilize the streets and alleys as key people spaces for programming.*
- *9I-Offer event grant funding to support downtown vitality by non-city organizations.*

Great things are done by a series of small things brought together.

– Vincent Van Gogh



Building upon the successful Chamber event known as Savor Apex, the entirety of Salem Street would present a wonderful opportunity in the future for an outdoor street dinner with multiple restaurants contributing various courses. Outdoor street dinner, Cullman, Alabama (Image Credit: visitcullman.org)

9.4 Top 10 Projects

The Top 10 Projects are shown in the order of priority as set by the public polling during the final presentation. Each project is also a **Key Recommendation** of the plan and can be found in the implementation matrix of this chapter (Section 9.5).

1 Transform the Salem streetscape



The Path Forward

The Salem Street streetscape is **THE** top priority according to the community. The extent of the project should be from Chatham Street to Center Street which is approximately 750 linear feet. A project of this magnitude does take time to execute from detailed concepts/schematics through construction documents/ bidding, and of course, the actual implementation of the streetscape. The investment in the public realm of Salem Street is a necessary and fruitful endeavor as the return on investment should be ten-fold. This project will enhance not just the physical walkability of the core but also the economic vitality of the entire town.

Making it Happen

- ☑ Create planning level estimates for all FOUR options and make budget appropriations for the project.
- ☑ Continue to encourage the addition of temporary parklets along Salem Street as an interim form of enhancement to the public realm. The recommended tactical urbanism committee should be given a budget appropriation to work that can be contributed to by local organizations and sponsors. Several of the plans presented would be dramatic changes to the current Salem Street environment; therefore, testing ideas will be a vital step in the public education aspect of the future project. Public engagement does not have to stop with master planning; engaging the community must continue into the implementation phase of the project.
- ☑ Hire a design firm to lead the streetscape plan development and work with the community to create the final preferred concept, schematic, and construction drawings. While public input to date does indicate a desire to remove parking from Salem Street, the streetscape plan project will need to go through conceptual, schematic, and final design phases **BEFORE** a preferred direction can be found and executed. **Again, this plan encourages testing ideas in the interim as elements of the new active parking management plan are executed and relieve the pressure on the Salem Street spaces.**
- ☑ Phase construction strategically to minimally disrupt retail and restaurant owners. Openly communicate early in the process anticipated construction schedules and provide updates throughout the process.

2 Energize the alleys... Seaboard, Commerce, and Fire Station



The Path Forward

As discussed, several key alleyways are not currently meeting their potential as people places. Shifting the way the community sees these areas will take some time and education. The "back door" nature of these spaces lends itself to taking some risks from a design standpoint. These alleys are just waiting to test the comfort level of quirky and funky within this traditional downtown.

Making it Happen

- ☑ Encourage Public Works to coordinate with businesses and design a consolidated trash/dumpster area in the alleys.
- ☑ Utilize the newly formed tactical urbanism committee to begin creating a plan of action for each alley. This initial plan should include potential community partners/sponsors for the spaces.
- ☑ Conduct a meeting with all property owners, businesses, and the town to discuss logistics of the alleys including design, ownership, purchase of materials, maintenance, and programming. These items should be established early in the process and the public-private partnership needs to be detailed and entered into by all parties.
- ☑ Encourage the public art committee to identify and commission murals in the alleys (including on the ground plane) by working with building owners.

3 Re-purpose the parking area at the Depot into the premier public space downtown



The Path Forward

The conversion of this space from a parking lot into the premier public space downtown will have quite an impact on the community. The project will need to, at a minimum, coincide with an offset solution of the 21 parking spaces within the three-minute walk zone. The details of the final design need to include a durable, simple ground plane that has interesting (non-slip) surfaces and eliminates curbs wherever possible. A balance of sun and shade areas needs careful evaluation along with a simple plant palette that does not include obtrusive or overgrown shrubbery. The design should consider lighting of various levels including ambient lighting, and furnishings should be carefully selected to be movable, and even interactive. The splash pad area should incorporate unique history moments, and the historic depot and caboose need to be carefully utilized as part of the overall plan. Self-directed activities and the materials they require should be factored in to the overall budget along with public art. Access to utilities for vendors must be considered early in the process to ensure they are seamlessly, and beautifully, designed. This includes accommodations for the annual Christmas tree lighting and outdoor concerts.

Making it Happen

- ☑ Parking recommendations will need to coincide with moving this plan forward; therefore, utilize the tactical interventions discussed in Section 8.7.4 to begin a near-term shift in how people utilize and see this space. The plan shares nearly 20 ideas the community could execute tomorrow!
- ☑ Take this time to evaluate the depot structure and caboose to identify any necessary improvements needed for an increased use by the public (including restrooms).
- ☑ Explore the addition of a depot building tenant (whether permanent or pop-up) that activates the use of the area in the interim.
- ☑ Create planning level estimates, and make budget appropriations for the project.
- ☑ Hire a design firm to lead the master plan development and work with the community to create the concept, schematic, and construction drawings.
- ☑ Openly communicate early in the process an anticipated construction schedule and provide updates throughout construction.
- ☑ Construct Depot Plaza and strategically program the new public space.

4 Add a net gain of 200 public parking spaces within a 5-minute walk, with a minimum of 100 within a 3-minute walk



The Path Forward

As outlined in Chapter 6, the solutions to parking in downtown Apex are varied and complex. Parking management is not just about the physical addition of more parking spaces. While all strategies should be implemented over time, the growth illustrated through this master plan will benefit from a net gain of public parking spaces in close proximity to the heart of Salem Street. The plan sets a goal of 200 spaces within a 5-minute walk, with a minimum of 100 new spaces within a 3-minute walk. The team recommends combining both off-street and on-street parking additions to reach this goal.

Making it Happen

- ☑ Establish leased parking agreements with private parking owners in the downtown core to create a shared parking environment.
- ☑ Provide clear wayfinding signage for all public parking areas.
- ☑ Meet with homeowners and property owners along the areas considered for on-street parking in the study area. Discuss the benefits of on-street parking including making their neighborhoods more walkable and bikable.
- ☑ Restripe existing asphalt on Center, Chatham, Mason, Saunders, and N. Salem with on-street parking. (potential net gain of 102 spaces) *(Note: Obviously, the ideal time to restripe these streets would be during planned resurfacing of the roadways. However, in the interim, the town could test the striping with less permanent methods. First, place cones to define the new travel lane areas. After a few weeks, stripe the parking using temporary paint.)*
- ☑ Create planning level cost estimates for the Templeton Street surface lot, and make budget appropriations for the project.
- ☑ Purchase additional property as appropriate to make the area yield the most efficient and logical configuration. (gravel lot could yield a net gain of 109 spaces)
- ☑ Hire a design firm to lead the parking lot plan development and work with the community to create the concept, schematic, and construction drawings.
- ☑ Openly communicate early in the process an anticipated construction schedule and provide updates throughout the process.
- ☑ Phase construction strategically to minimally disrupt parking in downtown.
- ☑ Construct the new Templeton Street surface parking lot, and install appropriate wayfinding signage to guide residents and visitors to its location.
- ☑ Work towards an app-based parking occupancy program that show real-time availability of parking spaces (i.e. Passport app).

5 Attract five new restaurants/ bars/breweries and a boutique hotel to Salem Street



The Path Forward

Retention and recruitment of new tenants for downtown will have a dedicated champion in the form of a newly hired downtown coordinator. Their role will include building relationships with both small business owners and the broker community which will help curate the appropriate mix in the downtown district. Three local breweries have shown great interest in finding a location downtown, whether independently or co-locating in a tap room space. The overwhelming response related to restaurant offerings was to attract businesses that offer breakfast and brunch options. People often confuse the attraction of similar offerings as a detriment to their business, when in fact, the opposite is true. More options create a synergy and promotes the area as a destination for food and beverage, thus, pulling from a much wider trade area. As mentioned in the goals, small towns should strive for unique, one-of-a-kind offerings.

The lodging equation in downtown should not be solved with simply another large hotel on Highway 55, US 64, or US 1. Smaller, boutique style hotels and bed and breakfasts in walkable settings are highly desirable. A variety of options will help accommodate the wide spectrum of visitors Apex sees on an annual basis—from the retired couple seeking a history lesson to millennials following the craft brew scene. The plan gives one physical option for a potential boutique hotel location, but the overriding point is to locate a site within the five-minute walk zone of downtown and shop it to developers.

Making it Happen

- ☑ Educate the new downtown coordinator in current demographic preferences and public input related to desirable businesses.
- ☑ Tap into the local network of breweries and restaurateurs to begin accommodating their space needs in downtown locations. Relationship building is **KEY**!
- ☑ Seek successful restaurateurs looking to open second locations or spin-offs of current restaurants in nearby comparative/competitive districts.
- ☑ Work with building owners to allow experimental pop-up restaurants in vacant locations.
- ☑ Identify and shop potential boutique hotel sites along Salem Street to hotel developers. Ensure high quality building design and ground level retail/restaurant space.
- ☑ Utilize the strategies outlined in 9.2.



Case Study: Hotel Florence, Florence, South Carolina

Opening in 2013, Hotel Florence was the culmination of a two-year journey that began with five local businessmen having a vision to spur revitalization of their derelict downtown. The City of Florence and other partners were able to assist Downtown Hospitality, Inc. to renovate three historic buildings and create a 49 room boutique hotel. This catalyst was the beginning of new investment in downtown living, restaurants and retail.

6 Re-envision the fire station site as a civic and mixed-use development



The Path Forward

The fire station on Salem Street has been a polarizing issue for the community with some feeling strongly the department should stay downtown, while others adamantly contend they should leave the core. The plan has set the stage for a compromise that is mutually beneficial. The site, at one-third of an acre, would be able to accommodate a two-bay fire station with upper floor living quarters along with a mixed use building. The wide existing apron can be maintained for fire truck use and serves as a generous urban sidewalk for the active ground floor use in the remainder of the building. Office space on the second level would be most appropriate as the twenty-four hour nature of the station would make upper story living not ideal.

Making it Happen

- ☑ Frame the public-private partnership of this arrangement in great detail up front. As a publicly owned property, the town can establish its development criteria/conditions and issue a Request for Information to the development community.
- ☑ Embark on a detailed design study of the fire station site by hiring a consultant team consisting of not only specialists in fire station design but also mixed use building design.
- ☑ Ensure the final design is beneficial for both the fire department and the downtown merchant environment.
- ☑ Incorporate public art into the design of the building.

7 Install wayfinding signage in and around Downtown based on a new branding campaign



The Path Forward

Branding is a calling card for a community conveyed through both digital and physical applications. Wayfinding signage is a critical component to telling the story of Apex—not just the locational information, but also the unique aspects of this place. Wayfinding must address both vehicular level and pedestrian level signage and should not be limited to directional navigation. A vast majority of the population walk around with their smart phones, and finding ways to educate those people on what makes Apex special is a wonderful opportunity. Quick Response (QR) code technology can be incorporated into wayfinding signage, leading people to a website with more information.

Making it Happen

- ☑ Conduct a branding/marketing study for the Town of Apex and ensure sub-areas like downtown have a toolbox of branding graphics similar in style but unique to the core. Utilize this brand in all wayfinding applications.
- ☑ Create a thorough wayfinding identification process in and around downtown with a matrix of signage typologies.
- ☑ Expand wayfinding to include not just directional signage but also educational signage to begin telling the story of downtown's history. Utilize QR code technology where applicable.
- ☑ Commission the signage fabrication and installation.

8 Revitalize the Tunstall House, grounds, and strollway as a pastoral treasure and link between Salem Street and the civic center



The Path Forward

The Thompson-Utley-Fletcher-Tunstall House was built in 1872 and currently needs extensive repairs. The town is committed to revitalizing the National Register property that sits at the "Peak of the Peak". The turn-of-the-century farmhouse and grounds hold a great deal of Apex history that is not understood or appreciated by all today. The plan's vision includes the creation of a rentable venue capable of hosting a range of event types and sizes. The grounds themselves need to be utilized as a community space even on non-event days. The concept plan illustrates community and pollinator gardens along with the enhancement of the strollway with respites of shade offered in pergola covered swings. The Tunstall House is a treasure which offers a unique pastoral connection between the civic campus and the downtown area. Promoting the strollway as a valuable pedestrian passageway will be critical to this area's utilization.

Making it Happen

- ☑ Create a planning level cost estimate for the renovation of the home and grounds.
- ☑ Tackle the creation of the community gardens and the enhancement of the strollway experience first. Work with local partners, such as the Apex Garden Club and NC State Extension, to find funding opportunities. A comprehensive list of opportunities can be found here: https://nccommunitygardens.ces.ncsu.edu/nccommunitygardens-funding/. Local Eagle Scout candidates could help construct the pergolas and swings for the strollway, and a memorial campagin for planting shade trees along the sidewalk would greatly enhance the experience.
- ☑ Set aside capital funding each year to begin reaching the estimated goal.
- ☑ Establish a sponsorship campaign for the property's renovation by kicking off the fundraising with a dinner gala on the grounds under a white tent. Money raised through ticket sales will begin the momentum of renovating the home and grounds.
- ☑ Continue the momentum with a social media campaign and GoFund Me page for the renovation.
- ☑ Seek local, regional, and national foundation funding related to historic preservation.

9 Make the transit station at NC 55 and Salem Street a multi-modal, iconic, gateway feature



The Path Forward

The intersection of NC 55 and S. Salem Street is a major gateway to downtown, and in its current state, the four corners do not provide a positive impression of the area. GoTriangle, the regional transit authority, has a planned "enhanced transfer station" related to future regional bus routes at this intersection's southwest corner. The station would essentially be a bus shelter as currently planned. This plan illustrates the transfer station as a true multi-modal transit center for the Town of Apex. Shifting trends in how our country is moving around its urban areas have many communities considering multi-modal centers. These locations offer not only regional bus connectivity, but they can also be home to emerging mobility technology such as autonomous shuttles, bike-share programs, and electric scooters.

Making it Happen

- ☑ Bring all the players (local, regional, state) to the table to have a discussion about the shift in vision to a more comprehensive mobility approach. Ensure the Apex Transit Advisory Committee is at the table, and strive to align timeline strategies related to the regional transit coming along with the NC 55 widening project.
- ☑ Ensure the intersection of NC 55 and Salem Street is a high quality intersection with bicycle detection loops, pedestrian-scaled lighting and wayfinding signage, high visibility crosswalks, and mast arms.
- ☑ Host a Lunch & Learn with Smart Mobility experts to understand emerging technology, trends, and even pilot programs related to autonomous shuttles.
- ☑ Engage a team of designers to create a conceptual vision for the multi-modal transit center. Ensure the design incorporates opportunities for pop-up offerings (whether indoor or outdoor) riders may be interested in such as coffee, sandwiches, etc.
- ☑ Consider applying for and deploying a pilot autonomous shuttle for downtown.

10 Construct 100 new housing units within a 10-minute walk (1/2 mile) of Downtown



The Path Forward

People are the key ingredient to vibrancy. The importance of quality housing within a walkable and bikable distance to the heart of Salem Street cannot be overstated. Over 65% of the town's trending demographics are interested in urban living in all of its various formats. From upper story lofts to accessory dwelling units, identifying and working with the development community to bring the housing to the market will help downtown not just survive, but thrive. As previously mentioned, over 300 units were identified within a five-minute walk of downtown, and over 850 units were identified in total within a twenty-minute walk of the core. The plan encourages the construction of 100 units within a ten-minute walk of downtown within the first five years of the plan's adoption.

Making it Happen

- ☑ Permit accessory dwelling units throughout downtown, and provide public education to encourage their construction.
- ☑ Encourage the creation of upper story living in existing downtown buildings through education of upfit requirements and local tax incentives.
- ☑ Identify opportunities for infill construction and lot consolidation that encourage housing construction.
- ☑ Conduct an Affordable Housing Action Plan and begin securing options or purchasing scattered sites for use as below-market-rate/workforce housing.
- ☑ Consider incentives to facilitate permitting (e.g., streamlined schedules, reduced permit or tap fees).

9.5 Implementation Matrix

In order for the vision and recommendations expressed in this plan to move forward, specific key recommendations will need to be implemented by the Town of Apex and its partners. Many of the recommendations seek to provide the conditions under which the vision can be achieved, by way of providing sensible land use regulation, necessary public investments, the development of appropriate programs and policies, encouraging catalyst projects, and other actions.

The items in the table are prioritized based on the legend noted at the right. The funding is listed as an order of magnitude as way to evaluate the relative costs of one action over another. As a means of attempting to quantify these relative costs over a twenty year period, the table below summarizes an estimated range of cost values that may be used.

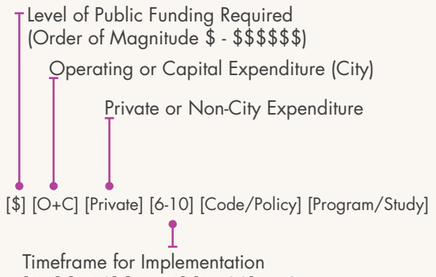
Order of Magnitude	Estimated Cost Range
$	$1 - $50,000
$$	$50,000 - $250,000
$$$	$250,000 - $1 million
$$$$	$1 million - $2 million
$$$$$	$2 million - $5 million
$$$$$$	$5 million+

The execution of the implementation steps will likely be phased and is subject to a variety of factors, which determine their timing. These include:

- The availability of personnel and financial resources necessary to implement specific proposals;
- Whether an implementation step is a necessary precursor to or component of the rational evaluation of a new development project;
- The interdependence of the various implementation tasks, in particular, the degree to which implementing one item is dependent upon the successful completion of another item; and,
- The relative severity of the challenge which a particular implementation task is designed to remedy.
- The ability to leverage an opportunity to move a specific project forward that may not otherwise be prioritized.

In view of these factors, it is not possible to put forward a precise timetable for the various implementation items. The priority for implementation will be listed by the period in which items should be completed. Year 1-5 items and certain on-going items are the highest priority while Year 6-20+ projects could be completed as resources allow.

Key Recommendations Table Legend

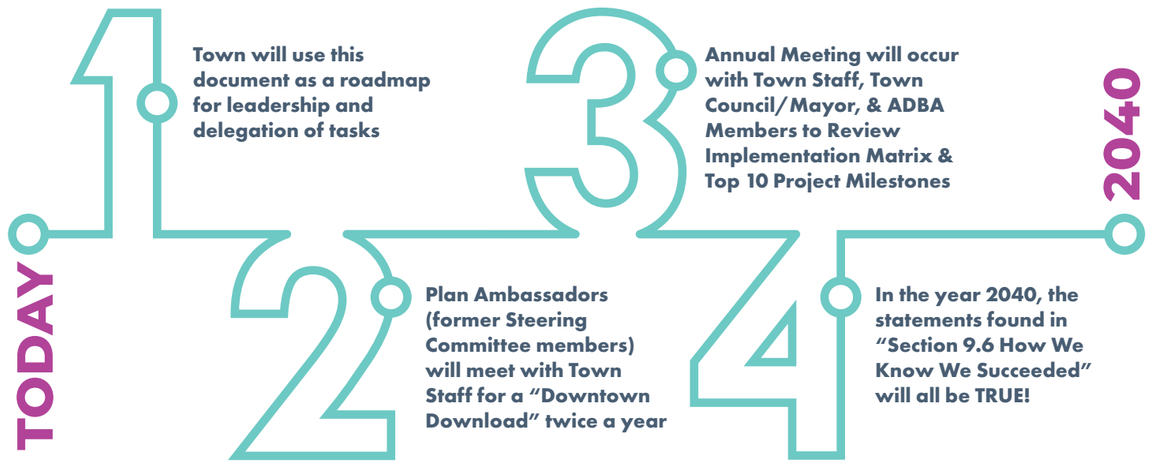


▨ = **Top 10 Project**

Key Recommendation

▨ *9J-Perform annual reviews to assess progress related to the items in the plan's implmentation matrix with staff, council, and ADBA representatives.*

Reference Number	Project/Task	Page Number	Level of Public Funding Required	Operating or Capital Expenditure	Private or Non-City Expenditure	On-going	Year 1-5	Year 6-10	Year 11-15	Year 16-20	Year 20+	Code/Policy	Program/Study
4 Retail Market Conditions & Strategies													
4A	Improve the public realm for retail by adding interim parklets along Salem Street to allow for more spillover retail/dining experiences.	72	$	O+C	Public/ Private		X						
4B	Strengthen downtown Apex as a "theme/festival" destination district by adding 60-70,000 square feet of space to create 150,000 square feet total, which will increase the capture rate and grow the trade area by connecting the disconnected micro-climates with new offerings.	72	$$$$$$	O+C	Public/ Private		X	X					
4C	Ensure the appropriate tenant mix by aligning retail recruitment efforts with demographics/demand and leakage opportunities.	72	$	O	Public/ Private	X							X
4D	Develop communication materials based on a new downtown brand to share market information and the overall downtown investment strategy with potential investors and tenants.	72	$	O			X						
4E	Program spaces with ambient entertainment to encourage greater visitation to downtown on non-event days.	72	$	O	Public/ Private	X							X
4F	Promote and program events that drive retail sales and are done in collaboration with merchants and drive people into stores rather than keep them outside of stores.	72	$	O	Public/ Private	X							X



Reference Number	Project/Task	Page Number	Level of Public Funding Required	Operating or Capital Expenditure	Private or Non-City Expenditure	On-going	Year 1-5	Year 6-10	Year 11-15	Year 16-20	Year 20+	Code/Policy	Program/Study
6 Parking Conditions & Strategies													
6A	Prioritize and invest in consistency and character of the Apex streetscapes.	101	$$$$$$	C			X	X					
6B	Improve sidewalk and crosswalk conditions within the core of downtown.	101	$$$	C			X						
6C	Improve consistency of parking signage and wayfinding in and around downtown.	101	$	C			X						
6D	Review current parking enforcement program including current time-limited locations and compare with high-demand parking utilization counts.	102	$	O			X						X
6E	Conduct data collection for a parking turnover analysis (length of stay) for high-demand parking areas.	102	$	O		X							X
6F	Allow overnight parking in the downtown core to make downtown residential viable and support safe travel of patrons who choose to ride-share home.	102	$	O	Public/ Private	X							X
6G	Work with the new Downtown Development Coordinator and Downtown Business Association on a strategy to increase turnover for on-street locations.	102	$	O			X						X
6H	Create a Downtown Ambassador's program for (polite) enforcement efforts.	102	$	O			X						X
6I	Initiate a no cost warning ticket for first-time 'violators'.	102	$	O			X						X
6J	Add a net gain of 200 public parking spaces within a 5-minute walk, with a minimum of 100 within a 3-minute walk.	102	$$$	C			X						
6K	Establish leased parking agreements with private parking owners.	103	$	O	Public/ Private			X					
6L	Create a valet program for evenings and weekends.	103	$	O	Public/ Private		X						X
6M	Conduct a preliminary engineering feasibility study for a potential parking deck.	103	$	C			X						X
6N	Consider establishing hourly paid parking along Salem Street.	103	$	O				X					X
6O	Incorporate a bike-share program with stations around key destinations in downtown.	103	$	C			X						X
6P	Balance demand more evenly by (a) encouraging turnover in lots that reach 85% occupancy, and (b) allowing longer-term parking in lots that were below 60% occupied.	105	$	O		X							X
6Q	Prepare for national smart mobility trends by reaching out to peer communities, attending national or regional conference sessions, planning studies aimed at feasibility-level analysis, and continually reaching out to the citizens of Apex for involvement and guidance.	106	$	O		X							X
6R	Evaluate all emerging technology packages and select an app-based parking occupancy system for the Town of Apex's public parking areas.	106	$$$	C			X						X
7 Development Conditions & Strategies													
7A	Work with developers to create neighborhoods that mix housing typologies in a range of price points and also provide common open space.	115	$	O	Public/ Private	X						X	
7B	Adopt an affordable housing action plan and seek guidance from peer communities in North Carolina, such as Davidson, to understand their approach to affordable/workforce housing.	115	$$	O			X					X	X
7C	Encourage the active reuse of historic structures with businesses that add vibrancy to Salem Street.	117	$	O	Public/ Private	X						X	
7D	Attract a boutique hotel to downtown Apex to provide an alternative hospitality option within walking distance of the core.	117	$	O	Public/ Private			X					
7E	Promote sensitive infill of housing and commercial in the Justice Heights neighborhood.	117	$	O	Public/ Private	X						X	
7F	Direct incremental infill within the downtown core of both mixed use and all forms of urban housing.	118	$	O	Public/ Private		X	X					

Reference Number	Project/Task	Page Number	Level of Public Funding Required	Operating or Capital Expenditure	Private or Non-City Expenditure	On-going	Year 1-5	Year 6-10	Year 11-15	Year 16-20	Year 20+	Code/Policy	Program/Study
7G	Require new development to build quality street network connections based on an overall connectivity vision.	120	$	O	Public/ Private	X						X	
7H	Discourage outparcel development that functions independently and encourage phased infill that shares parking and access while addressing the streets.	120	$	O	Public/ Private	X						X	
8 Key Goals													
8A	Transform the Salem streetscape.	126	$$$$$	O+C			X						
8B	Energize the alleys...Seaboard, Commerce, and Fire Station.	137	$-$$		Private		X						
8C	Attract five new restaurants/bars/ breweries and a boutique hotel to Salem Street.	139	$	O	Public/ Private		X						
8D	Recruit and form relationships with developers familiar with towns like Apex to implement urban housing in downtown.	142	$	O	Public/ Private	X							
8E	Work to meet demand for downtown housing and improve the housing stock through institutional partnerships.	142	$$	O+C	Public/ Private	X							X
8F	Construct 100 new housing units within a 10-minute walk (1/2 mile) of downtown	142	$	O	Public/ Private		X	X					
8G	Re-purpose the parking area at the Depot into the premier public space downtown.	146	$$$$	C	Public/ Private		X	X					
8H	Make the transit station at NC 55 and Salem Street a multi-modal, iconic, gateway feature.	148	$$$$$$	C				X					
8I	Install wayfinding and gateway signage in and around downtown based on a new branding campaign.	149	$	C			X						X
8J	Attract local breweries downtown and encourage co-location.	150	$	O	Public/ Private		X						
8K	Work with local and regional artists to implement public art projects along Salem Street that honor its history and vision for the future.	154	$	C	Public/ Private		X						
8L	Host a mural competition to generate excitement for public art downtown.	154	$	O	Public/ Private		X						X
8M	Revitalize the Tunstall House, grounds, and strollway as a pastoral treasure and link between Salem Street and the civic center	157	$$$	O+C	Public/ Private	X							

Reference Number	Project/Task	Page Number	Level of Public Funding Required	Operating or Capital Expenditure	Private or Non-City Expenditure	On-going	Year 1-5	Year 6-10	Year 11-15	Year 16-20	Year 20+	Code/Policy	Program/Study
8N	Re-envision the fire station site as a civic and mixed-use development.	158	$$$$$$	C	Public/ Private		X						X
8O	Seek out and create a list of spaces around downtown that could use a little love; create a committee dedicated to tactical interventions in those spaces.	160	$	O+C	Private	X							X
8P	Utilize available resources to ensure the community develops and operates in a way that protects the environment and promotes sustainability for future generations.	162	$	O+C	Public/ Private	X						X	X
9 Implementation													
9A	Modify front and side setbacks, building heights, parking, and the location of certain zoning districts to ensure the Unified Development Ordinance allows for the desired character of downtown.	167	$	O			X					X	
9B	Audit local businesses to ensure they are taking ownership of their online presence and monitoring patron reviews.	170	$	O	Public/ Private	X							X
9C	Expand the toolbox of local grants, programs and incentives available through city budget appropriations.	170	$$$	O+C		X						X	
9D	Schedule a commercial broker tour of downtown with representation from the entire Raleigh region.	170	$	O	Public/ Private		X						
9E	Initiate a retail attraction committee whose responsibilities include developing a prospect database.	170	$	O	Public/ Private		X						X
9F	Create a full marketing package for the downtown district that includes a “Call for Business” web page as a retail attraction tool.	170	$$	O			X						
9G	In addition to state and federal tax credits, expand the local development and investment program to include local tax incentives for housing projects.	171	$$$	O+C		X						X	
9H	Utilize the streets and alleys as key people spaces for programming.	173	$	O	Public/ Private	X							
9I	Offer event grant funding to support downtown vitality by non-city organizations.	173	$$	O+C	Public/ Private	X							X
9J	Perform annual reviews to assess progress related to the items in the plan’s implmentation matrix with staff, council, and ADBA representatives.	184	$	O	Public/ Private	X							X

9.6 HOW WE KNOW WE SUCCEEDED

1 Salem Street will be full of people —day and night.



2 Retail and restaurant rents will outperform office.



3 We've added 100 more housing units to the downtown area.



4 We've created a REAL parking problem.



5 People of all ages, ethnicities, and economic levels will be downtown.



6 Entrepreneurs will have opened 10 more businesses.



7 Friends and families will be playing and making memories in downtown.



8 Residents and visitors will know the story of downtown Apex.



9 People will reach downtown Apex by biking, walking, bus, and car.



10 Partnerships and old-fashioned hard work will have made it happen.




Stantec

Attachment 2

Draft Downtown Apex Master Plan and Parking Study: Summary of Comments and Recommended Changes

Comment Summary	Recommendation
Incorporate stormwater mitigation into redesign for Salem Street	Section 8.2 (Page 129) – Add new bullet: Incorporate green infrastructure elements such as permeable pavement, bioswales, planter boxes, and trees to mitigate stormwater impacts.
Concern over adding housing downtown	No change – Additional housing in downtown will happen incrementally with upper story loft space conversions, new mixed-use buildings, and accessory dwelling units among others. Finding a way to provide housing within an easy walk or bicycle ride will reduce congestion downtown and add vibrancy.
Need for pedestrian and roadway improvements downtown, particularly sidewalks	No change - Multi-modal transportation projects were identified as part of the updated transportation plan adopted in February 2019. That plan does prioritize installation of sidewalks within the downtown area.
Add charging stations to parking lots	Section 6.7 (page 106) – Add new bullet: Charging stations for electric vehicles in public parking areas.
Need for additional/more schools	No change - School planning and siting was not within the scope of this specific study; however, the Town does work with the school system on plans for future schools.
Close Salem Street between Center Street and Chatham Street to vehicles – make it a pedestrian-only street	No change - This idea was considered during the charrette and was not recommended for inclusion in the plan document. Salem Street is an important route of travel and the businesses along Salem Street rely on the exposure from vehicular traffic. Pedestrian volumes are not high enough to warrant a pedestrian-only street. The recommended changes to the streetscape, including widened sidewalks, will enhance the pedestrian experience and feeling of safety for non-motorized travelers.
Incorporate the ability to screen outdoor movies in the design for the Depot plaza	No change – This idea is already recommended for testing as part of a tactical urbanism project at the depot on page 152. It can be further considered during the detailed design and construction drawing process for the proposed Depot Plaza on page 176.

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: PUBLIC HEARING

Meeting Date: December 17, 2019

Item Details

Presenter(s): Lauren Staudenmaier, Planner I

Department(s): Planning Department

Requested Motion

Public Hearing and possible motion on Rezoning Application #19CZ20 2708 Blazing Trail Drive. The applicant, Jones & Cnossen Engineering, PLLC., seeks to rezone approximately 2.00 acres located at 2708 Blazing Trail Drive from Rural Residential (RR) to Medium Density-Conditional Zoning (MD-CZ).

Approval Recommended?

The Planning Department recommends approval.

The Planning Board heard this item at their December 9, 2019 meeting and unanimously recommended approval.

Item Details

Attachments

1. Vicinity Map
2. Rezoning Application
3. Staff Report

All property owners within 300 feet of this rezoning have been notified per UDO Sec. 2.2.11 *Public Notification*.

BACKGROUND INFORMATION:

Location: 2708 Blazing Trail Drive
Applicant/Owner: Peter Cnossen, Jones & Cnossen Engineering, PLLC./Otha Mckoy Heirs

PROJECT DESCRIPTION:

Acreage: ±2.00
PIN: 0721518983
Current Zoning: Rural Residential (RR)
Proposed Zoning: Medium Density Residential–Conditional Zoning (MD-CZ)
2045 Land Use Map: Medium Density Residential
Town Limits: In Town

Adjacent Zoning & Land Uses:

	Zoning	Land Use
North:	Planned Unit Development-Conditional Zoning (PUD-CZ #14CZ10)	Single-family residential (Parkside at Bella Casa)
South:	Planned Unit Development-Conditional Zoning (PUD-CZ #14CZ10)	Single-family residential (Parkside at Bella Casa)
East:	Rural Residential (RR)	Single-family residential; Vacant
West:	Rural Residential (RR)	Single-family residential; Vacant

Existing Conditions:
The subject property is located on the east side of Blazing Trail, just north of Humie Olive Road and Apex Friendship High School. There are two existing residential structures on the property.

Neighborhood Meeting:
The applicant conducted a neighborhood meeting on September 30, 2019. The neighborhood meeting report is attached.

2045 LAND USE MAP:
The 2045 Land Use Map identifies the properties subject to this rezoning as Medium Density Residential. The proposed rezoning to Medium Density-Conditional Zoning (MD-CZ) is consistent with that land use classification.

PROPOSED ZONING CONDITIONS:

Limitation of Uses:
The Rezoned Lands may be used for, and only for, the uses listed immediately below. The permitted uses are subject to the limitations and regulations stated in the UDO and any additional limitations or regulations stated below. For convenience, some relevant sections of the UDO may be referenced; such references do not imply that other sections of the UDO do not apply.

Permitted Uses and Limitations:
1. Single-family
2. Utility, minor
3. Accessory apartment

Conditions:
1. Vinyl siding is not permitted; however, vinyl windows, decorative elements and trim are permitted.
2. All single-family homes shall have a crawl space or have a raised foundation which at a minimum rises at least 20 inches from average grade across the front of the house to the finished floor level at the front door.
3. Garage doors must have windows, decorative details or carriage-style adornments on them.
4. The garage cannot protrude more than 1 foot out from the front façade or front porch.
5. All roofs shall be pitched at 5:12 or greater for 75% of the building designs.
6. The width of the garage doors shall be no more than 60% of the total width of the house and garage together.
7. Eaves shall project at least 12 inches from the wall of the structure.
8. The visible side of a home on a corner lot facing the public street shall contain at least 3 decorative elements such as, but not limited to, the following elements:
    - Windows
    - Bay window
    - Recessed window
    - Decorative window
    - Wrap around porch or side porch
    - Two or more building materials
    - Decorative brick/stone
    - Decorative trim
    - Decorative shake
    - Decorative air vents on gable
    - Decorative gable
    - Decorative cornice
    - Column
    - Portico
    - Balcony
    - Dormer
9. A varied color palette shall be utilized on homes throughout the subdivision to include a minimum of three color families for siding and shall include varied trim, shutter and accent colors complementing the siding color.
10. House entrances for units with front-facing single-car garages shall have a prominent covered porch/stoop area leading to the front door.
11. The rear and side elevations of the units that can be seen from the right-of-way shall have trim around the windows.
12. Front porches shall be a minimum of 6 feet deep.

13. A minimum of one (1) residential dwelling in this development shall be constructed to include the installation of solar panels and a power system of at least 4 KW capacity. The lots of which these homes are located shall be identified on the Master Subdivision Plat, which may be amended from time to time. All other single-family detached homes shall be pre-configured with conduit for a solar energy system.
14. Home Owner Association covenants shall not restrict the construction of an accessory dwelling unit.
15. All single-family homes shall be built to meet or exceed the minimum standards for Energy Star certification.
16. A pedestrian connection consisting of 5' wide sidewalk within a 10' wide public access easement on Home Owners Association common area shall be provided from the stub of Lake Waccamaw Trail to the existing sidewalk within the Townes at Bella Casa Association, Inc. to the south. If an easement is not granted for this sidewalk connection by the Townes at Bella Casa Association, Inc., then the pedestrian connection consisting of 5' wide sidewalk within a 10' wide public access easement on Home Owners Association common area shall be provided from the stub of Lake Waccamaw Trail to Blazing Trail Drive.
17. The side yard setback for single-family lots shall be reduced from 6' minimum with a 16' aggregate to a 5' minimum with a 12' aggregate to accommodate the pedestrian connection from Lake Waccamaw Trail to Blazing Trail Drive.

PLANNING STAFF RECOMMENDATION:
Planning staff recommends approval of #19CZ20 with the conditions offered by the applicant.

PLANNING BOARD RECOMMENDATION:
The Planning Board heard this item at their December 9, 2019 meeting and unanimously recommended approval.

ANALYSIS STATEMENT OF THE REASONABLENESS OF THE PROPOSED REZONING:
This Statement will address consistency with the Town's comprehensive and other applicable plans, reasonableness, and effect on public interest:

Approval of the rezoning is reasonable because the proposed Medium Density Residential-Conditional Zoning district is consistent with Medium Density Residential land use classification on the 2045 Land Use Map. The density will be keeping with the surrounding approved development and provide a transition between the single-family dwellings to the north and the townhomes to the south.

The proposed rezoning is reasonable and in the public interest because the proposed rezoning will continue the single-family development pattern from the north and provide a public pedestrian connection to Blazing Trail Drive from the adjacent properties to the north. The proposed rezoning will maintain the character and appearance of the area and provide the flexibility to accommodate the growth in population, economy, and infrastructure consistent with that contemplated by the 2045 Land Use Map.

CONDITIONAL ZONING STANDARDS:
The Town Council shall find the MD-CZ designation demonstrates compliance with the following standards. 2.3.3.F:

Legislative Considerations
The applicant shall propose site-specific standards and conditions that take into account the following

considerations, which are considerations that are relevant to the legislative determination of whether or not the proposed conditional zoning district rezoning request is in the public interest. These considerations do not exclude the legislative consideration of any other factor that is relevant to the public interest.

1) *Consistency with 2045 Land Use Map.* The proposed Conditional Zoning District use's appropriateness for its proposed location and consistency with the purposes, goals, objectives, and policies of the 2045 Land Use Map.
2) *Compatibility.* The proposed Conditional Zoning District use's appropriateness for its proposed location and compatibility with the character of surrounding land uses.

3) *Zoning district supplemental standards.* The proposed Conditional Zoning District use's compliance with Sec 4.4 *Supplemental Standards,* if applicable.

4) *Design minimizes adverse impact.* The design of the proposed Conditional Zoning District use's minimization of adverse effects, including visual impact of the proposed use on adjacent lands; and avoidance of significant adverse impacts on surrounding lands regarding trash, traffic, service delivery, parking and loading, odors, noise, glare, and vibration and not create a nuisance.

5) *Design minimizes environmental impact.* The proposed Conditional Zoning District use's minimization of environmental impacts and protection from significant deterioration of water and air resources, wildlife habitat, scenic resources, and other natural resources.

6) *Impact on public facilities.* The proposed Conditional Zoning District use's avoidance of having adverse impacts on public facilities and services, including roads, potable water and wastewater facilities, parks, schools, police, fire and EMS facilities.

7) *Health, safety, and welfare.* The proposed Conditional Zoning District use's effect on the health, safety, or welfare of the residents of the Town or its ETJ.

8) *Detrimental to adjacent properties.* Whether the proposed Conditional Zoning District use is substantially detrimental to adjacent properties.

9) *Not constitute nuisance or hazard.* Whether the proposed Conditional Zoning District use constitutes a nuisance or hazard due to traffic impact or noise, or because of the number of persons who will be using the Conditional Zoning (CZ) District use.

10) *Other relevant standards of this Ordinance.* Whether the proposed Conditional Zoning District use complies with all standards imposed on it by all other applicable provisions of this Ordinance for use, layout, and general development characteristics.


Rezoning #19CZ20
MT ZION CHURCH RD
PINEOLA BOG TRL
WEYMOUTH WOODS TRL
BLAZING TRAIL DR
LAKE WACCAMAW TRL
RICHARDSON RD
Parkside at Bella Casa
MASONBORO FERRY DR
Whistling Quail
WHISTLING QUAIL RUN
TORDELO PL
HUMIE OLIVE RD
Greater Christian Chapel Church
0
250
500
Feet
October 2019
May 2019 Aerial Photography
Prepared by: Town of Apex Planning Department

PETITION TO AMEND THE OFFICIAL ZONING MAP & 2045 LAND USE MAP

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: _____ Submittal Date: _____

2045 LUM Amendment: _____ Fee Paid: _____

Project Information

Project Name: 2708 Blazing Trail Drive

Address(es): 2708 Blazing Trail Drive, Apex, NC 27502

PIN(s): 0721518983

Acreage: 2.0

Current Zoning: RR Proposed Zoning: MD-CZ

Current 2045 LUM Designation: MD

Proposed 2045 LUM Designation: MD

See next page for LUM Amendment.

If any portion of the project is shown as mixed use (3 or more stripes on the 2045 Land Use Map) provide the following:

Area classified as mixed use: Acreage: _____

Area proposed as non-residential development: Acreage: _____

Percent of mixed use area proposed as non-residential: Percent: _____

Applicant Information

Name: Jones & Cnossen Engineering, PLLC

Address: PO Box 1062

City: Apex State: NC Zip: 27502

Phone: 9193871174 E-mail: peter@jonescnossen.com

Owner Information

Name: Otha Mckoy Heirs

Address: 2708 Blazing Trail Drive

City: Apex State: NC Zip: 27502

Phone: _____ E-mail: _____

Agent Information

Name: Faithwill Homes LLC

Address: 2101 Della Court

City: Apex State: NC Zip: 27502

Phone: 9173717175 E-mail: sanjay.khazanchi@gmail.com

Other contacts: _____

PETITION TO AMEND THE OFFICIAL ZONING MAP & 2045 LAND USE MAP

Application #: _____ Submittal Date: _____

2045 LAND USE MAP AMENDMENT (IF APPLICABLE)

The applicant does hereby respectfully request the Town Council amend the 2045 Land Use Map. In support of this request, the following facts are shown:

The area sought to be amended on the 2045 Land Use Map is located at:

_____

_____

Current 2045 Land Use Classification: _____

Proposed 2045 Land Use Classification: _____

What condition(s) justifies the passage of the amendment to the 2045 Land Use Map? Discuss the existing use classifications of the subject area in addition to the adjacent land use classifications. Use additional pages as needed.

_____

_____

_____

_____

_____

_____

_____

_____

PETITION INFORMATION

Application #: _____ Submittal Date: _____

An application has been duly filed requesting that the property described in this application be rezoned from RR to MD-CZ. It is understood and acknowledged that if the property is rezoned as requested, the property described in this request will be perpetually bound to the use(s) authorized and subject to such conditions as imposed, unless subsequently changed or amended as provided for in the Unified Development Ordinance. It is further understood and acknowledged that final plans for any specific development to be made pursuant to any such Conditional Zoning shall be submitted for site or subdivision plan approval. Use additional pages as needed.

PROPOSED USES:

The Rezoned Lands may be used for, and only for, the uses listed immediately below. The permitted uses are subject to the limitations and regulations stated in the UDO and any additional limitations or regulations stated below. For convenience, some relevant sections of the UDO may be referenced; such references do not imply that other sections of the UDO do not apply.

1	Single family	21	
2	Utility, minor	22	
3	Accessory apartment	23	
4		24	
5		25	
6		26	
7		27	
8		28	
9		29	
10		30	
11		31	
12		32	
13		33	
14		34	
15		35	
16		36	
17		37	
18		38	
19		39	
20		40	

PETITION INFORMATION

Application #: _____ Submittal Date: _____

PROPOSED CONDITIONS:

The applicant hereby requests that the Town Council of the Town of Apex, pursuant to the Unified Development Ordinance, approve the Conditional Zoning for the above listed use(s) subject to the following condition(s). Use additional pages as needed.

See attached.

LEGISLATIVE CONSIDERATIONS - CONDITIONAL ZONING

The applicant shall propose site-specific standards and conditions that take into account the following considerations, which are considerations that are relevant to the legislative determination of whether or not the proposed conditional zoning district rezoning request is in the public interest. These considerations do not exclude the legislative consideration of any other factor that is relevant to the public interest. Use additional pages as needed.

1) *Consistency with 2045 Land Use Map.* The proposed Conditional Zoning (CZ) District use's appropriateness for its proposed location and consistency with the purposes, goals, objectives, and policies of the 2045 Land Use Map.

The medium density residential (MD) zoning is consistent with the 2045 Land Use Map.

2) *Compatibility.* The proposed Conditional Zoning (CZ) District use's appropriateness for its proposed location and compatibility with the character of surrounding land uses.

The limited uses and density for this parcel are compatible with the adjacent neighborhoods consisting of single family homes and townhomes.

Jones & Cnossen
ENGINEERING, PLLC
Civil Engineering | Construction Management | Land Planning

221 N. SALEM ST, SUITE 001
PO BOX 1062
APEX, NC 27502
Office: 919-387-1174
Fax: 919-387-3375
www.jonescnossen.com

November 22, 2019

2708 Blazing Trail – Rezoning Conditions

Single-Family Homes

1. Vinyl siding is not permitted; however, vinyl windows, decorative elements and trim are permitted.
2. All single-family homes shall have a crawl space or have a raised foundation which at a minimum rises at least 20 inches from average grade across the front of the house to the finished floor level at the front door.
3. Garage doors must have windows, decorative details or carriage-style adornments on them.
4. The garage cannot protrude more than 1 foot out from the front façade or front porch.
5. All roofs shall be pitched at 5:12 or greater for 75% of the building designs.
6. The width of the garage doors shall be no more than 60% of the total width of the house and garage together.
7. Eaves shall project at least 12 inches from the wall of the structure.
8. The visible side of a home on a corner lot facing the public street shall contain at least 3 decorative elements such as, but not limited to, the following elements:
    - Windows
    - Bay window
    - Recessed window
    - Decorative window
    - Trim around the windows
    - Wrap around porch or side porch
    - Two or more building materials
    - Decorative brick/stone
    - Decorative trim
    - Decorative shake
    - Decorative air vents on gable
    - Decorative gable
    - Decorative cornice
    - Column
    - Portico
    - Balcony
    - Dormer
9. A varied color palette shall be utilized on homes throughout the subdivision to include a minimum of three color families for siding and shall include varied trim, shutter and accent colors complementing the siding color.
10. House entrances for units with front-facing single-car garages shall have a prominent covered porch/stoop area leading to the front door.
11. The rear and side elevations of the units that can be seen from the right-of-way shall have trim around the windows.
12. Front porches shall be a minimum of 6 feet deep.

13. A minimum of one (1) residential dwelling in this development shall be constructed to include the installation of solar panels and a power system of at least 4 KW capacity. The lots of which these homes are located shall be identified on the Master Subdivision Plat, which may be amended from time to time. All other single-family detached homes shall be pre-configured with conduit for a solar energy system.
14. Home Owner Association covenants shall not restrict the construction of an accessory dwelling unit.
15. All single-family homes shall be built to meet or exceed the minimum standards for Energy Star certification.

Pedestrian Connection

A pedestrian connection consisting of 5' wide sidewalk within a 10' wide public access easement on Home Owners Association common area shall be provided from the stub of Lake Waccamaw Trail to the existing sidewalk within The Townes at Bella Casa Association, Inc. to the south. If an easement is not granted for this sidewalk connection by The Townes at Bella Casa Association, Inc., then the pedestrian connection consisting of 5' wide sidewalk within a 10' wide public access easement on Home Owners Association common area shall be provided from the stub of Lake Waccamaw Trail to Blazing Trail Drive.

Side Setback

The side yard setback for single-family lots shall be reduced from 6' minimum with a 16' aggregate to a 5' minimum with a 12' aggregate to accommodate the pedestrian connection from Lake Waccamaw Trail to Blazing Trail Drive.

PETITION INFORMATION

Application #: _____ Submittal Date: _____

3) Zoning district supplemental standards. The proposed Conditional Zoning (CZ) District use's compliance with Sec 4.4, Supplemental Standards, if applicable.

The uses proposed that do fall under the supplemental standards will comply with the standards outlined in the UDO.

4) *Design minimizes adverse impact.* The design of the proposed Conditional Zoning (CZ) District use's minimization of adverse effects, including visual impact of the proposed use on adjacent lands; and avoidance of significant adverse impacts on surrounding lands regarding trash, traffic, service delivery, parking and loading, odors, noise, glare, and vibration and not create a nuisance.

The site fronts along Blazing Trail Drive and Lake Waccamaw Trail stubs to the northern property boundary. The development is expected to have minimal impact on the adjacent properties since similar uses are proposed by this rezoning.

5) *Design minimizes environmental impact.* The proposed Conditional Zoning District use's minimization of environmental impacts and protection from significant deterioration of water and air resources, wildlife habitat, scenic resources, and other natural resources.

This project will adhere to all required buffering, will be dedicating Resource Conservation Area and will be adhering to the Town of Apex stormwater requirements.

6) *Impact on public facilities.* The proposed Conditional Zoning (CZ) District use's avoidance of having adverse impacts on public facilities and services, including roads, potable water and wastewater facilities, parks, schools, police, fire and EMS facilities.

This is a small parcel with a few units and it's impact on public facilities will also be small.

7) *Health, safety, and welfare.* The proposed Conditional Zoning (CZ) District use's effect on the health, safety, or welfare of the residents of the Town or its ETJ.

The development of this parcel should not have a negative affect on the healthy, safety and welfare of Apex citizens.

PETITION INFORMATION

Application #: _____ Submittal Date: _____

8) *Detrimental to adjacent properties.* Whether the proposed Conditional Zoning (CZ) District use is substantially detrimental to adjacent properties.

This rezoning is consistent with the adjacent development standards and will not have a negative affect on the development potential of other adjacent parcels.

9) *Not constitute nuisance or hazard.* Whether the proposed Conditional Zoning (CZ) District use constitutes a nuisance or hazard due to traffic impact or noise, or because of the number of persons who will be using the Conditional Zoning (CZ) District use.

Residential homes generally do not constitute a nuisance or hazard because of the character of the neighborhood. This is a small parcel and the impact of these few units on the surrounding area will be minimal.

10) *Other relevant standards of this Ordinance.* Whether the proposed Conditional Zoning (CZ) District use complies with all standards imposed on it by all other applicable provisions of this Ordinance for use, layout, and general development characteristics.

We are providing architectural conditions for design of the residential structures.

Lying and being in Buckhorn Township, Wake County, North Carolina, and described as follows more fully to wit;

BEGINNING at a calculated point on the eastern right-of-way of Blazing Trail Drive and being the northwestern corner of The Townes At Bella Casa Association, Inc.; thence the following two (2) courses and distances with aforesaid eastern right-of-way, a curve in a counter-clockwise direction having a radius of 2,068.17 feet, a length of 34.45 feet and a chord of North 06°28'28" East, 34.45 feet to a calculated point, and North 06°00'00" East, 163.23 feet to a calculated point, being the southwestern corner of Lot 389 of Parkside At Bella Casa Phase 11; thence with the southern property lines of Lot 389, Lot 369, terminus of Lake Waccamaw Trail, and Lot 368 of Parkside At Bella Casa Phase 1, South 84°43'42" East, 427.08 feet to a calculated point, being the northwestern corner of Steven Thomas Hardesty; thence with the western property line of aforesaid Hardesty, South 06°00'00" West, 210.23 feet to a calculated point, being the northwestern corner of The Townes At Bella Casa Association, Inc.; thence with the northern property line of The Townes At Bella Casa Association, Inc., North 83°02'44" West, 427.39 feet to the point and place of BEGINNING and containing 2.00 acres more or less. The above described tract of land being all of Wake County PIN 0721.04-51-8983.

CERTIFIED LIST OF NEIGHBORING PROPERTY OWNERS

Application #: _____ Submittal Date: _____

Provide a certified list of property owners subject to this application and all property owners within 300' of the subject property and HOA Contacts.

	Owner's Name	PIN
1.	See Attached List	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

I, Peter Chadwick, certify that this is an accurate listing of all property owners and property owners within 300' of the subject property.

Date: 10/1/19 By: Peter B Chadwick

COUNTY OF WAKE STATE OF NORTH CAROLINA

Sworn and subscribed before me, Erin Marcum, a Notary Public for the above State and County, on this the 1st day of October, 2019.

SEAL

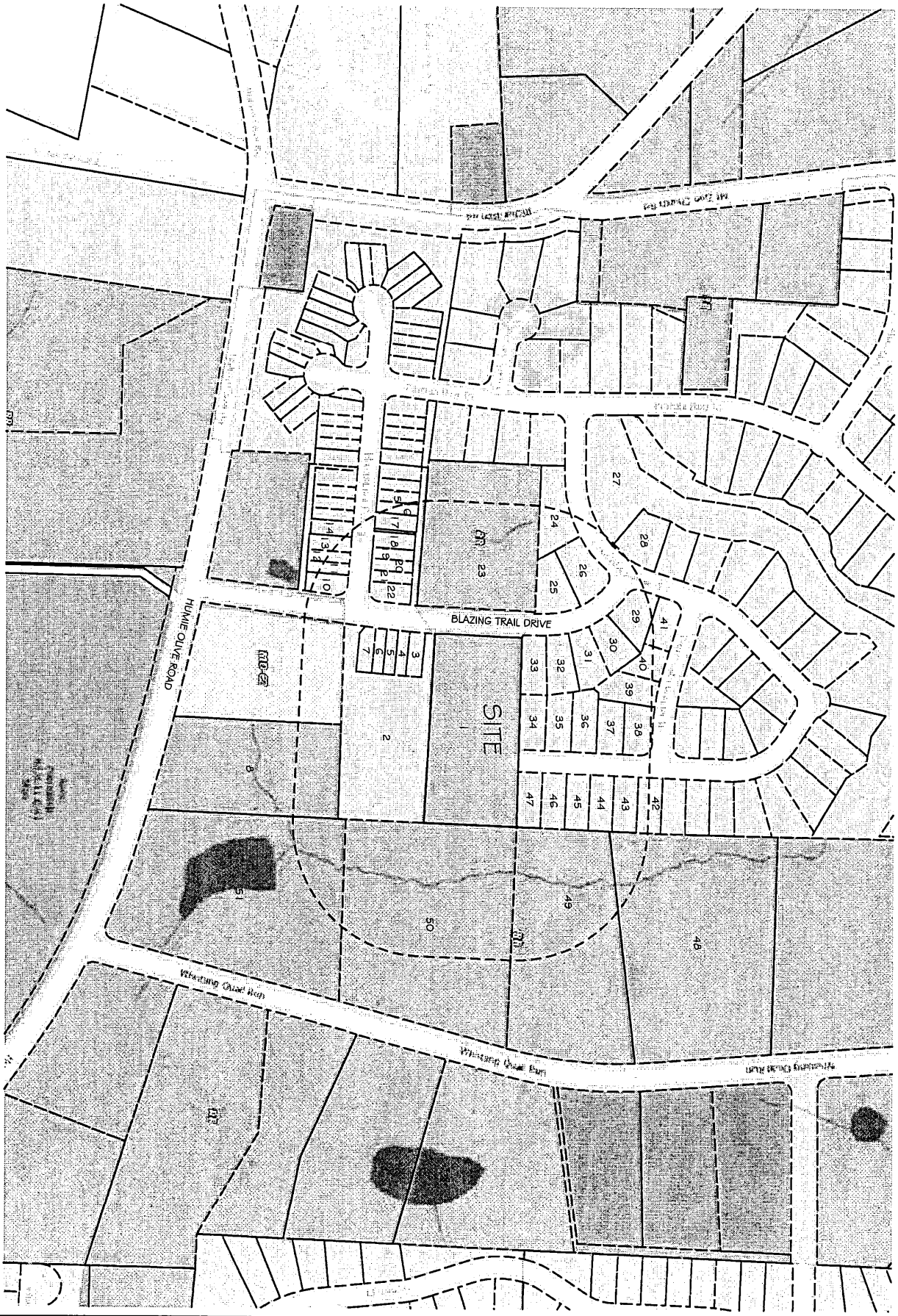
ERIN MARCUM
NOTARY PUBLIC
Wake County
North Carolina
My Commission Expires 11/19/20

Notary Public

Erin Marcum
Print Name

My Commission Expires: November 19, 2020

	A	B	C	D	E	F
1		1924 - 2708 Blazing Trail	ADJACENT PROPERTY OWNERS LIST			
2						
3	Parcel #	Name	Address I	Address II	City/State/Zip Code	Pin #
4	NA	TOWN OF APEX	PLANNING DEPT	PO BOX 250	APEX NC 27502	
5	1	OTHA MCKOY HEIRS	2708 BLAZING TRAIL DR		APEX NC 27502-6717	0721518983
6	2	THE TOWNES AT BELLA CASA ASSOCIATION INC	RS FINCHER & CO	315 S SALEM ST STE 500	APEX NC 27502-1863	0721518752
7	3	JULIE A. HAIGHT	2141 BLAZING TRAIL DR		APEX NC 27502-3679	0721517820
8	4	MICHAEL & JULIANNE KELLY	2143 BLAZING TRAIL DR		APEX NC 27502-3679	0721517727
9	5	GUOHUA YANG & HUI ZHENG	3016 NASHVILLE DR		SAN JOSE CA 95133-2059	0721517724
10	6	PIERRE ALAIN GREMAUD & ROSEMARY ANN LOYCANO	2147 BLAZING TRAIL DR		APEX NC 27502-3679	0721517722
11	7	RAJAN BHANOT & PREETI CHAUHAN	2149 BLAZING TRAIL DR		APEX NC 27502-3679	0721517619
12	8	ELVIN SCOTT	7900 HUMIE OLIVE RD		APEX NC 27502-9604	0721519475
13	9	RAY ANTHONY POWELL	7904 HUMIE OLIVE RD		APEX NC 27502-9604	0721517458
14	10	BALAJI & RUPALI DESHPANDE	17 CROYDON AVE		RONKONKOMA NY 11779-1947	0721515569
15	11	RAYMOND JIANG & JULIA YANG	2705 MASONBORO FERRY DR		APEX NC 27502-3683	0721515630
16	12	VENKATA NAGARAJU BUDDARAPU & ADILAKSHMI PATTEM	2707 MASONBORO FERRY DR		APEX NC 27502-3683	0721515600
17	13	JOAN E LUND TRUSTEE	THE LUND LIVING TRUST	3328 TURNER RIDGE DR	NEW HILL NC 27562-9322	0721514670
18	14	JASON & ROSE MARNELL	2713 MASONBORO FERRY DR		APEX NC 27502-3683	0721514641
19	15	WILLIAM J KAVENEY	2720 MASONBORO FERRY DR		APEX NC 27502-3683	0721513776
20	16	THOMAS & JACQUELYN HOWARD	2754 LAKE WACCAMAW TRL		APEX NC 27502-8555	0721513796
21	17	SANTO & ROSEMARY LANZA	2716 MASONBORO FERRY DR		APEX NC 27502-3683	0721514735
22	18	PETER W MAJKA JR & ALINA D MAJKA	1967 MOSTYN LN		APEX NC 27502-6509	0721514775
23	19	FRED & SHARON RONECKER	2708 MASONBORO FERRY DR		APEX NC 27502-3683	0721515705
24	20	JANA A ACKLEY	2706 MASONBORO FERRY DR		APEX NC 27502-3683	0721515724
25	21	MICHAEL W BURGER	2704 MASONBORO FERRY DR		APEX NC 27502-3683	0721515754
26	22	STEFAN & TARA PODVOJSKY	2702 MASONBORO FERRY DR		APEX NC 27502-3683	0721515784
27	23	NARENDRA VAMAN & PRUTHVI DESHPANDE PALEKAR	121 AMIABLE LOOP		CARY NC 27519-5578	0721514966
28	24	BELLA CASA HOMEOWNERS ASSOCIATION, INC	OMEGA ASSOCIATION MANAGEMENT	160 NE MAYNARD RD STE 210	CARY NC 27513-9676	0721524101
29	25	DANIEL & JENNIFER SMITH /TR	2116 BLAZING TRAIL DR		APEX NC 27502-3679	0721525171
30	26	JAMES & SONYA DOBSON	2100 BLAZING TRAIL DR		APEX NC 27502-3679	0721525138
31	27	BELLA CASA HOMEOWNERS ASSOCIATION, INC	OMEGA ASSOCIATION MANAGEMENT	160 NE MAYNARD RD STE 210	CARY NC 27513-9676	0721529922
32	28	JEFFREY & BETHANY RUDY	2770 LAKE WACCAMAW TRL		APEX NC 27502-8555	0721524362
33	29	TREVOR & RACHEL CAMPBELL	2769 LAKE WACCAMAW TRL		APEX NC 27502-8555	0721526330
34	30	MARK R FLUGRATH & LEILA R MATHERS	2109 BLAZING TRAIL DR		APEX NC 27502-3679	0721527205
35	31	JOSHUA & JENNIFER ALMOND	2113 BLAZING TRAIL DR		APEX NC 27502-3679	0721527139
36	32	KING WA CHUNG & MEI WEN XIE	2117 BLAZING TRAIL DR		APEX NC 27502-3679	0721527153
37	33	GREYSON & LAUREN DAVIS.	2121 BLAZING TRAIL DR		APEX NC 27502-3679	0721527057
38	34	JUAN CARLOS DELGADO & LORENA CASTELLANOS	2677 LAKE WACCAMAW TRL		APEX NC 27502-8558	0721528077
39	35	LUTHER & KATHRYN CROSS	2681 LAKE WACCAMAW TRL		APEX NC 27502-8558	0721528173
40	36	DANIEL & LINDA YAGER	635 FIRST ST APT 104		ALEXANDRIA VA 22314-1575	0721528179
41	37	CHRISTOPHER & CHRISTINA MARKULIC	2689 LAKE WACCAMAW TRL		APEX NC 27502-8558	0721528284
42	38	RICHARD & KERRY PROSKE	2693 LAKE WACCAMAW TRL		APEX NC 27502-8558	0721528391
43	39	JEREMY & MICHELLE AYCOCK	2709 WEYMOUTH WOODS TRL		APEX NC 27502-8566	0721528209
44	40	BELLA CASA HOMEOWNERS ASSOCIATION, INC	OMEGA ASSOCIATION MANAGEMENT	160 NE MAYNARD RD STE 210	CARY NC 27513-9676	0721527343
45	41	BRIAN & JEANETTE CALABRESE	2765 LAKE WACCAMAW TRL		APEX NC 27502-8555	0721526357
46	42	MICHAEL & AMIE STEWART	2696 LAKE WACCAMAW TRL		APEX NC 27502-8558	0721620363
47	43	KENNETH EINHORN & MARTINE THEVENET	2692 LAKE WACCAMAW TRL		APEX NC 27502-8558	0721620268
48	44	NANCY GUENTHER	2688 LAKE WACCAMAW TRL		APEX NC 27502-8558	0721620262
49	45	DAVID & BRENDA LAWHON	2684 LAKE WACCAMAW TRL		APEX NC 27502-8558	0721620157
50	46	MICHAEL & SHARON FADELICI	2680 LAKE WACCAMAW TRL		APEX NC 27502-8558	0721620151
51	47	CHARLES & REBECCA AIKENS	2676 LAKE WACCAMAW TRL		APEX NC 27502-8558	0721620056
52	48	JOHNNY B ISENHOUR	2640 WHISTLING QUAIL RUN		APEX NC 27502-9699	0721623467
53	49	JERRY BENJAMIN LEWTER SR TRUSTEE	JERRY BENJAMIN LEWTER SR FAMILY TRUST	2700 WHISTLING QUAIL RUN	APEX NC 27502-8401	0721623186
54	50	STEVEN THOMAS HARDESTY	2712 WHISTLING QUAIL RUN		APEX NC 27502-8401	0721613839
55	51	ANDREW & SYLVIA PARKS	2728 WHISTLING QUAIL RUN		APEX NC 27502-8401	0721612452


BLAZING TRAIL DRIVE
HUMIE OLIVE ROAD
SITE
Wheating Quail Run
Wheating Quail Run
MH-2A
MH-2B
MH-2C
MH-2D
MH-2E
MH-2F
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MH-4E
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MH-4Q
MH-4R
MH-4S
MH-4T
MH-4U
MH-4V
MH-4W
MH-4X
MH-4Y
MH-4Z

AGENT AUTHORIZATION FORM

Application #: _____ Submittal Date: _____

Otha McKoy Heirs is the owner* of the property for which the attached application is being submitted:

- ☐ Land Use Amendment
- ☑ Rezoning: For Conditional Zoning and Planned Development rezoning applications, this authorization includes express consent to zoning conditions that are agreed to by the Agent which will apply if the application is approved.
- ☐ Site Plan
- ☐ Subdivision
- ☐ Variance
- ☐ Other: _____

The property address is: 2708 Blazing Trail Drive

The agent for this project is: Jones & Crossen Engineering, PLLC

☐ I am the owner of the property and will be acting as my own agent

Agent Name: Peter Crossen

Address: 221 N. Salem St, Suite 001, Apex, NC 27502

Telephone Number: 919-387-1124

E-Mail Address: peter@jonescrossen.com

Signature(s) of Owner(s)*

Mattie Barbee

Mattie Barbee — 9-28-19

Type or print name — Date

Nancy Thomas

Nancy Thomas — 9/28/2019

Type or print name — Date

Attach additional sheets if there are additional owners.

*Owner of record as shown on the latest equalized assessment rolls of Wake County. An option to purchase does not constitute ownership. If ownership has been recently transferred, a copy of the deed must accompany this authorization.

Pursuant to Article 40 of Chapter 66 of the North Carolina General Statutes (the Uniform Electronic Transactions Act) this application and all documents related hereto containing an electronic or digitized signature are legally binding in the same manner as are hard copy documents executed by hand signature. The parties hereby consent to use electronic or digitized signatures in accordance with the Town's Electronic Signature Policy and intend to be bound by the application and any related documents. If electronic signatures are used the application shall be delivered in an electronic record capable of retention by the recipient at the time of receipt.

AFFIDAVIT OF OWNERSHIP

Application #: _____ Submittal Date: _____

The undersigned, Nancy Thomas (the "Affiant") first being duly sworn, hereby swears or affirms as follows:

1. Affiant is over eighteen (18) years of age and authorized to make this Affidavit. The Affiant is the sole owner, or is the authorized agent of all owners, of the property located at 2708 Blazing Trail Dr., Apex and legally described in **Exhibit "A"** attached hereto and incorporated herein (the "Property").

2. This Affidavit of Ownership is made for the purpose of filing an application for development approval with the Town of Apex.

3. If Affiant is the owner of the Property, Affiant acquired ownership by deed, dated 3/09/2004, and recorded in the Wake County Register of Deeds Office on 3/10/2004, in Book 10704 Page 11064.

4. If Affiant is the authorized agent of the owner(s) of the Property, Affiant possesses documentation indicating the agency relationship granting the Affiant the authority to apply for development approval on behalf of the owner(s).

5. If Affiant is the owner of the Property, from the time Affiant was deeded the Property on 3/09/2004, Affiant has claimed sole ownership of the Property. Affiant or Affiant's predecessors in interest have been in sole and undisturbed possession and use of the property during the period of ownership. Since taking possession of the Property on 3/09/2004, no one has questioned Affiant's ownership or right to possession nor demanded any rents or profits. To Affiant's knowledge, no claim or action has been brought against Affiant (if Affiant is the owner), or against owner(s) (if Affiant is acting as an authorized agent for owner(s)), which questions title or right to possession of the property, nor is any claim or action pending against Affiant or owner(s) in court regarding possession of the Property.

This the 30 day of September, 2019.

Nancy Thomas (seal)

Nancy Thomas

Type or print name

STATE OF NORTH CAROLINA
COUNTY OF Wake

I, the undersigned, a Notary Public in and for the County of Wake, hereby certify that Nancy Thomas, Affiant, personally known to me or known to me by said Affiant's presentation of said Affiant's Drivers License, personally appeared before me this day and acknowledged the due and voluntary execution of the foregoing Affidavit.

ATHENA ASHLEY WEST Notary Public Wake County NORTH CAROLINA [NOTARIAL SEAL] Exp. 10-08-2023

Athena Ashley West
Notary Public
State of North Carolina
My Commission Expires: 10/08/2023

AFFIDAVIT OF OWNERSHIP: EXHIBIT A – LEGAL DESCRIPTION

Application #: _____ Submittal Date: _____

Insert legal description below.

Lying and being in Buckhorn Township, Wake County, North Carolina, and described as follows more fully to wit;
BEGINNING at a calculated point on the eastern right-of-way of Blazing Trail Drive and being the northwestern corner of The Townes At Bella Casa Association, Inc.; thence the following two (2) courses and distances with aforesaid eastern right-of-way, a curve in a counter-clockwise direction having a radius of 2,068.17 feet, a length of 34.45 feet and a chord of North 06°28'28" East, 34.45 feet to a calculated point, and North 06°00'00" East, 163.23 feet to a calculated point, being the southwestern corner of Lot 389 of Parkside At Bella Casa Phase 11; thence with the southern property lines of Lot 389, Lot 369, terminus of Lake Waccamaw Trail, and Lot 368 of Parkside At Bella Casa Phase 1, South 84°43'42" East, 427.08 feet to a calculated point, being the northwestern corner of Steven Thomas Hardesty; thence with the western property line of aforesaid Hardesty, South 06°00'00" West, 210.23 feet to a calculated point, being the northwestern corner of The Townes At Bella Casa Association, Inc.; thence with the northern property line of The Townes At Bella Casa Association, Inc., North 83°02'44" West, 427.39 feet to the point and place of BEGINNING and containing 2.00 acres more or less. The above described tract of land being all of Wake County PIN 0721.04-51-8983.

NOTICE OF NEIGHBORHOOD MEETING

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

09/18/19

Date

Dear Neighbor:

You are invited to a neighborhood meeting to review and discuss the development proposal at

2708 Blazing Trail Drive — Address(es)

0721518983 — PIN(s)

in accordance with the Town of Apex Neighborhood Meeting procedures. This meeting is intended to be a way for the applicant to discuss the project and review the proposed plans with adjacent neighbors and neighborhood organizations before the submittal of an application to the Town. This provides neighbors an opportunity to raise questions and discuss any concerns about the impacts of the project before it is officially submitted. Once an application has been submitted to the Town, it may be tracked using the Interactive Development Map or the Apex Development Report located on the Town of Apex website at www.apexnc.org.

A Neighborhood Meeting is required because this project includes (check all that apply):

	Application Type	Approving Authority
☑	Rezoning (including Planned Unit Development)	Town Council
☐	Major Site Plan	Town Council (QJPH*)
☐	Special Use Permit	Town Council (QJPH*)
☐	Residential Master Subdivision Plan (excludes exempt subdivisions)	Technical Review Committee (staff)

*Quasi-Judicial Public Hearing: The Town Council cannot discuss the project prior to the public hearing.

The following is a description of the proposal (also see attached map(s) and/or plan sheet(s)):

Please see enclosed letter.

Estimated submittal date: October 1, 2019

MEETING INFORMATION:

Property Owner(s) name(s): Otha Mckoy Heirs

Applicant(s): Jones & Cnossen Engineering, PLLC

Contact information (email/phone): peter@jonescnossen.com, 919-387-1174

Meeting Address: Halle Cultural Arts Center, 237 N Salem St, CAC Studio A

Date of meeting**: September 30, 2019

Time of meeting**: 6:00 - 8:00 pm

MEETING AGENDA TIMES:

Welcome: 6:00 pm Project Presentation: 6:10 pm Question & Answer: 6:30 pm

**Meetings shall occur between 5:00 p.m.-9:00 p.m. on a Monday through Thursday (excluding Town recognized holidays). If you have questions about the general process for this application, please contact the Planning Department at 919-249-3426. You may also find information about the Apex Planning Department and on-going planning efforts at http://www.apexnc.org/180/Planning.

Jones & Cnossen
ENGINEERING, PLLC
Civil Engineering | Construction Management | Land Planning

221 N. SALEM ST, SUITE 001
PO BOX 1062
APEX, NC 27502
Office: 919-387-1174
Fax: 919-387-3375
www.jonescnossen.com

September 18, 2019

RE: 2708 Blazing Trail Drive

Dear Property Owner,

On behalf of our client, we are preparing an application to change the zoning of the above referenced property to Medium Density Residential (MD). The MD zoning is consistent with the Town of Apex 2045 Land Use Map and the uses will be limited to single family and townhomes to match neighboring properties. This letter was sent to you because the Wake County tax records indicate that you own property within 300 feet of the rezoning area. The current zoning of the parcel is Rural Residential and we are asking the Town Council to approve this zoning change for a residential project. We have attached an area map showing the proposed zoning parcel.

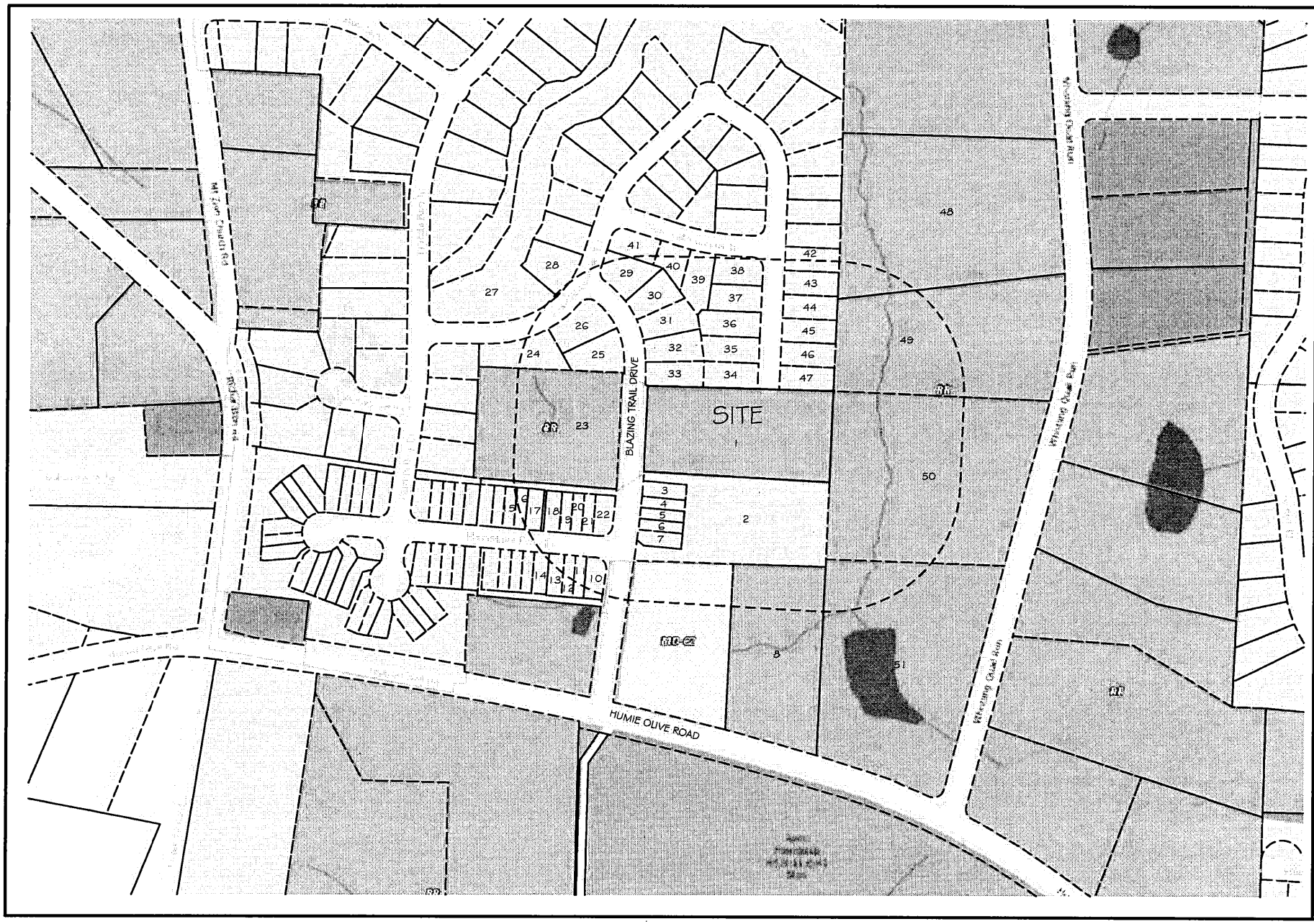
There will be at least two official public hearings where you will have the opportunity to voice your opinion about this rezoning. The application should go before the Planning Board on December 9th, 2019 and then it should go to the Town Council for a final vote on December 17th, 2019.

We will be holding an informal meeting to offer you an additional opportunity to comment on this rezoning. The meeting will be held at The Halle Cultural Arts Center, located at 237 N Salem St. Apex, NC on September 30, 2019 from 6 pm - 8 pm. This is a time where I can present the zoning proposal and then you can comment on the plan. If you have any questions about the rezoning approval process or this informal meeting, please feel free to contact our office.

Respectfully,

Peter Cnossen, P.E.
Jones & Cnossen Engineering, PLLC

W/attachment



Jones & Cnossen
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SUITE 001
PO BOX 1062
APEX, NC 27502
Office: 919-387-1174
Registration: P-0151
www.jonesencnossen.com

2708 BLAZING TRAIL DRIVE
CONDITIONAL REZONING

TOWN OF APEX — WAKE COUNTY, NORTH CAROLINA

NEIGHBORHOOD MEETING NOTICE EXHIBIT

NTS	PDC
09/17/19	
1	
1924	

PROJECT CONTACT INFORMATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Development Contacts:

Project Name: 2708 Blazing Trail Drive Zoning: MD-CZ

Location: 2708 Blazing Trail Drive

Property PIN(s): 0721518983 Acreage/Square Feet: 2.0

Property Owner: Otha Mckoy Heirs

Address: 2708 Blazing Trail Drive

City: Apex State: NC Zip: 27502

Phone: _____ Email: _____

Developer: Faithwill Homes LLC

Address: 2101 Della Court

City: Apex State: NC Zip: 27502

Phone: 9173717175 Fax: _____ Email: sanjay.khazanchi@gmail.com

Engineer: Peter Cnossen, Jones & Cnossen Engineering, PLLC

Address: PO Box 1062

City: Apex State: NC Zip: 27502

Phone: 919-387-1174 Fax: 919-387-3375 Email: peter@jonescnossen.com

Builder (if known): _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ Email: _____

Please note that Town staff will not have complete information about a proposed development until the application is submitted for review. If you have a question about Town development standards and how they relate to the proposed development, please contact the appropriate staff person listed below.

Town of Apex Department Contacts

Planning Department Main Number (Provide development name or location to be routed to correct planner)	(919) 249-3426
Parks, Recreation & Cultural Resources Department Angela Reincke, Parks Planner	(919) 249-7468
Public Works - Transportation Russell Dalton, Senior Transportation Engineer	(919) 249-3358
Water Resources Department Mike Deaton, Stormwater & Utility Engineering Manager Stan Fortier, Senior Engineer (Sedimentation & Erosion Control)	 (919) 249-3413 (919) 249-1166
Electric Utilities Division Rodney Smith, Electric Technical Services Manager	(919) 249-3342

Jones & Cnossen
ENGINEERING, PLLC
Civil Engineering | Construction Management | Land Planning

221 N. SALEM ST, SUITE 001
PO BOX 1062
APEX, NC 27502
Office: 919-387-1174
Fax: 919-387-3375
www.jonescnossen.com

September 30, 2019

2708 Blazing Trail – Rezoning Conditions

Single Family Homes

1. All residential buildings shall have exterior materials of brick, stone, wood and/or hardiplank siding.
2. All roofs shall be pitched at 5:12 or greater and shall be covered with wood or asphalt shingles.
3. Covered porches are required on the front façade of each residence facing the public right-of-way.
4. All single-family homes shall have a crawl space or have a raised foundation which at a minimum rises at least 20 inches from average grade across the front of the house to the finished floor level at the front door.

Duplexes

1. Vinyl siding is not permitted; however, vinyl windows, decorative elements and trim are permitted.
2. All duplexes shall have a crawl space or have a raised foundation which at a minimum rises at least 20 inches from average grade across the front of the house to the finished floor level at the front door.
3. Garage doors must have windows, decorative details or carriage-style adornments on them.
4. The garage cannot protrude more than 1 foot out from the front façade or front porch.
5. The width of the garage doors shall be no more than 60% of the total width of the house and garage together.
6. Eaves shall project at least 12 inches from the wall of the structure.
7. The visible side of a home on a corner lot facing the public street shall contain at least 3 decorative elements such as, but not limited to, the following elements:
    - Windows
    - Bay window
    - Recessed window
    - Decorative window
    - Trim around the windows
    - Wrap around porch or side porch
    - Two or more building materials
    - Decorative brick/stone
    - Decorative trim
    - Decorative shake
    - Decorative air vents on gable
    - Decorative gable
    - Decorative cornice
    - Column
    - Portico
    - Balcony
    - Dormer

NEIGHBORHOOD MEETING SIGN-IN SHEET

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

9

Meeting Address: Halle Cultural Arts Center, 237 N Salem St, CAC Studio A

Date of meeting: September 30, 2019 Time of meeting: 6:00 - 8:00 pm

Property Owner(s) name(s): Otha Mckoy Heirs

Applicant(s): Faithwill Homes, LLC

Please print your name below, state your address and/or affiliation with a neighborhood group, and provide your phone number and email address. Providing your name below does not represent support or opposition to the project; it is for documentation purposes only.

	NAME/ORGANIZATION	ADDRESS	PHONE #	EMAIL	SEND PLANS & UPDATES
1.	Charles Aikens	2676 Lake Waccamaw trl.	[redacted]		
2.	Rebecca Aikens	"			
3.	Ramiro Aguirre	2527 Masonboro Ferry			
4.	Juan Delgado	2677 Lake Waccamaw Trl.			
5.	Greyson Davis	2121 Blazing Trail			
6.	Mark Flugrath	2109 Blazing Trail			
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					

Use additional sheets, if necessary.

NEIGHBORHOOD MEETING SIGN-IN SHEET

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Please print your name below, state your address and/or affiliation with a neighborhood group, and provide your phone number and email address. Providing your name below does not represent support or opposition to the project; it is for documentation purposes only.

Towne Pres. HOA *

	NAME/ORGANIZATION	ADDRESS	PHONE #	EMAIL	SEND PLANS & UPDATES
1.	Kristen M McClure	2715 Masonboro Ferry D	[redacted]		
2.	Scott Domes	2710 Weymouth Woods Tr			
3.	Jeremy Aycock	2709 Weymouth Woods Trl			
4.	Nick Johnson	2712 Lake Waccamaw Trl			
5.	Mary Jo Aguirre	2727 Masonboro Ferry			
6.	Sharon Fadelici	2680 Lake Waccamaw Trl			
7.	David & Ann Lawhon	2684 Lake Waccamaw			
8.	RICK BUNNELL	2770 MASONBORO FERRY			
9.	PETER MAJKA.	2710 MASONBORO FERRY			
10.					
11.					
12.					
13.					
14.					

Use additional sheets, if necessary.

SUMMARY OF DISCUSSION FROM THE NEIGHBORHOOD MEETING

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Property Owner(s) name(s): Otha Mckoy Heirs

Applicant(s): Faithwill Homes, LLC

Contact information (email/phone): peter@jonescnossen.com/919-387-1174

Meeting Address: Halle Cultural Arts Center, 237 N Salem St, CAC Studio A

Date of meeting: September 30. 2019 Time of meeting: 6:00-8:00 pm

Please summarize the questions/comments and your response from the Neighborhood Meeting in the spaces below (attach additional sheets, if necessary). Please state if/how the project has been modified in response to any concerns. The response should not be "Noted" or "No Response". There has to be documentation of what consideration the neighbor's concern was given and justification for why no change was deemed warranted.

Question/Concern #1:
Are buffers required between properties and can they be increased in size and number of plantings?

Applicant's Response:
Perimeter buffers are required and they will meet the minimum requirements of the Town UDO. Buffers may be increased in both dimension and number of plantings. This will be discussed with the owner.

Question/Concern #2:
Two direct neighbors asked if buffers are allowed to be cleared? They are concerned about tall pines along the property line and the potential for damage.

Applicant's Response:
In general, developments are not allowed to clear perimeter buffers as they are to remain intact. But, I would discuss this possibility with staff since it was brought up as a concern by adjoining property owners.

Question/Concern #3:
What is the intent for extension of Lake Waccamaw Trail?

Applicant's Response:
Lake Waccamaw Trail is planned to dead end in a cul-de-sac. There is no intent for extension back to Blazing Trail Drive or to adjacent properties to the south and east.

Question/Concern #4:
Traffic was discussed as the neighbors have witnessed cut through traffic to avoid the school area. Also, there was mention of the coming elementary school and potential intersection issues on Humie Olive Road.

Applicant's Response:
The planned development will only yield about 6 lots given minimum lot widths in MD zoning. So, the development should not have any adverse impact on traffic.

Summary of Discussion from the Neighborhood Meeting 09/30/19

Additional Questions

Q: Will the development have an HOA?

A: The development will likely have an HOA. The owner may petition to join the neighboring HOA if there is interest. This has not been discussed but may be done in the future if there is interest.

Q: Will the development construct a stormwater pond? And will drainage be diverted away from neighboring properties to the north?

A: The development will be required to meet Town of Apex stormwater requirements. It's envisioned that the stormwater device will be constructed in the southeastern corner of the site; adjacent to HOA property since no structures exist in this area. Site runoff will be directed away from neighboring properties to the north as much as practical.

Q: Will the development be allowed to have a cell tower?

A: No. Cell towers are not a permitted use in rezoning petition.

Q: What are the proposed number of lots?

A: MD zoning allows up to 6 units/acre. However, given the 50' minimum lot width, only 5-6 lots are envisioned for the development. The street frontage is planned to match existing Parkside at Bella Casa.

Q: Concern expressed for heavy traffic on Lake Waccamaw Trail during construction.

A: Development of lots along Blazing Trail Drive would likely be accessed from this street. However, Lake Waccamaw Trail will need to be use for development of lots at the end of this street.

AFFIDAVIT OF CONDUCTING A NEIGHBORHOOD MEETING, SIGN-IN SHEET AND ISSUES/RESPONSES SUBMITTAL

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

I, Peter Cnossen, do hereby declare as follows:
Print Name

1. I have conducted a Neighborhood Meeting for the proposed Rezoning, Major Site Plan, Master Subdivision Plan, or Special Use Permit in accordance with UDO Sec. 2.2.7 *Neighborhood Meeting*.

2. The meeting invitations were mailed to the Apex Planning Department, all property owners within 300 feet of the subject property and any neighborhood association that represents citizens in the area via first class mail a minimum of 10 days in advance of the Neighborhood Meeting.

3. The meeting was conducted at Halle Cultural Arts Center, 237 N Salem St, CAC Studio A (location/address) on September 30, 2019 (date) from 6:00 pm (start time) to 8:00 pm (end time).

4. I have included the mailing list, meeting invitation, sign-in sheet, issue/response summary, and zoning map/reduced plans with the application.

5. I have prepared these materials in good faith and to the best of my ability.

10/1/19
Date

By: Peter M Cnossen

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Erin Marcum, a Notary Public for the above State and County, on this the 1st day of October, 2019.

SEAL

ERIN MARCUM
NOTARY PUBLIC
Wake County
North Carolina
My Commission Expires 11/19/20

Notary Public

Erin Marcum
Print Name

My Commission Expires: November 19, 2020

PLANNING BOARD REPORT TO TOWN COUNCIL

Rezoning #19CZ20 2708 Blazing Trail Drive

December 9, 2019 Planning Board Meeting

Report Requirements:

Per NCGS 160A-387, all proposed amendments to the zoning ordinance or zoning map shall have a written report provided from the Planning Board to the Town Council within 30 days of referral of the amendment to the Planning Board, or the Town Council may proceed in its consideration of the amendment without the Planning Board report. Furthermore, in no case is the Town Council bound by the recommendations, if any, of the Planning Board.

Per NCGS 160A-383, the Planning Board shall advise and comment on whether the proposed zoning amendment is consistent with all applicable officially adopted plans, and provide a written recommendation to the Town Council that addresses plan consistency and other matters as deemed appropriate by the Planning Board, but a comment by the Planning Board that a proposed amendment is inconsistent with the officially adopted plans shall not preclude consideration or approval of the proposed amendment by the Town Council.

PROJECT DESCRIPTION:

Acreage:	+/- 2.00 acres
PIN:	0721518983
Current Zoning:	Rural Residential (RR)
Proposed Zoning:	Medium Density-Conditional Zoning (MD-CZ)
2045 Land Use Map:	Medium Density Residential
Town Limits:	In Town limits

Applicable Officially Adopted Plans:

The Board must state whether the project is consistent or inconsistent with the following officially adopted plans, if applicable. Applicable plans have a check mark next to them.

☒ 2045 Land Use Map

☒ Consistent ☐ Inconsistent Reason: _____

☒ Apex Transportation Plan

☒ Consistent ☐ Inconsistent Reason: _____

☒ Parks, Recreation, Open Space, and Greenways Plan

☒ Consistent ☐ Inconsistent Reason: _____

LEGISLATIVE CONSIDERATIONS:

The applicant shall propose site-specific standards and conditions that take into account the following considerations, which are considerations that are relevant to the legislative determination of whether or not the proposed conditional zoning district rezoning request is in the public interest. These considerations do not exclude the legislative consideration of any other factor that is relevant to the public interest.

1. *Consistency with 2045 Land Use Map*. The proposed Conditional Zoning (CZ) District use's appropriateness for its proposed location and consistency with the purposes, goals, objectives, and policies of the 2045 Land Use Map.
   ☒ Consistent ☐ Inconsistent Reason: _____

2. *Compatibility.* The proposed Conditional Zoning (CZ) District use's appropriateness for its proposed location and compatibility with the character of surrounding land uses.
   ☒ Consistent ☐ Inconsistent Reason: _____

3. *Zoning district supplemental standards*. The proposed Conditional Zoning (CZ) District use's compliance with Sec 4.4 Supplemental Standards, if applicable.
   ☒ Consistent ☐ Inconsistent Reason: _____

4. *Design minimizes adverse impact.* The design of the proposed Conditional Zoning (CZ) District use's minimization of adverse effects, including visual impact of the proposed use on adjacent lands; and avoidance of significant adverse impacts on surrounding lands regarding trash, traffic, service delivery, parking and loading, odors, noise, glare, and vibration and not create a nuisance.
   ☒ Consistent ☐ Inconsistent Reason: _____

5. *Design minimizes environmental impact.* The proposed Conditional Zoning District use's minimization of environmental impacts and protection from significant deterioration of water and air resources, wildlife habitat, scenic resources, and other natural resources.
   ☒ Consistent ☐ Inconsistent Reason: _____

6. *Impact on public facilities.* The proposed Conditional Zoning (CZ) District use's avoidance of having adverse impacts on public facilities and services, including roads, potable water and wastewater facilities, parks, schools, police, fire and EMS facilities.

☒ Consistent ☐ Inconsistent Reason: _____

7. *Health, safety, and welfare.* The proposed Conditional Zoning (CZ) District use's effect on the health, safety, or welfare of the residents of the Town or its ETJ.

☒ Consistent ☐ Inconsistent Reason: _____

8. *Detrimental to adjacent properties.* Whether the proposed Conditional Zoning (CZ) District use is substantially detrimental to adjacent properties.

☒ Consistent ☐ Inconsistent Reason: _____

9. *Not constitute nuisance or hazard.* Whether the proposed Conditional Zoning (CZ) District use constitutes a nuisance or hazard due to traffic impact or noise, or because of the number of persons who will be using the Conditional Zoning (CZ) District use.

☒ Consistent ☐ Inconsistent Reason: _____

10. *Other relevant standards of this Ordinance.* Whether the proposed Conditional Zoning (CZ) District use complies with all standards imposed on it by all other applicable provisions of this Ordinance for use, layout, and general development characteristics.

☒ Consistent ☐ Inconsistent Reason: _____

Planning Board Recommendation:

Motion: to recommend approval as submitted.
Introduced by Planning Board member: Beth Godfrey
Seconded by Planning Board member: Mark Steele

☐ *Approval*: the project is consistent with all applicable officially adopted plans and the applicable legislative considerations listed above.

☒ *Approval with conditions*: the project is not consistent with all applicable officially adopted plans and/or the applicable legislative considerations as noted above, so the following conditions are recommended to be included in the project in order to make it fully consistent:

As submitted by the applicant.

☐ *Denial*: the project is not consistent with all applicable officially adopted plans and/or the applicable legislative considerations as noted above.

With 8 Planning Board Member(s) voting "aye"
With 0 Planning Board Member(s) voting "no"

Reasons for dissenting votes:

This report reflects the recommendation of the Planning Board, this the 9th day of December 2019.

Attest:

Margo Bills, Planning Board Chair

Dianne Khin, Planning Director

TOWN OF APEX
POST OFFICE BOX 250
APEX, NORTH CAROLINA 27502
PHONE 919-249-3426

PUBLIC NOTIFICATION OF PUBLIC HEARINGS

CONDITIONAL ZONING #19CZ20
2708 Blazing Trail Drive

Pursuant to the provisions of North Carolina General Statutes Section 160A-364 and to the Town of Apex Unified Development Ordinance (UDO) Section 2.2.11, notice is hereby given of public hearings before the Planning Board and Town Council of the Town of Apex. The purpose of these hearings is to consider the following:

Applicant: Otha McKoy Heirs
Authorized Agent: Peter Cnossen, Jones & Cnossen Engineering, PLLC
Property Address: 2708 Blazing Trail Drive
Acreage: ±2.00
Property Identification Number (PIN): 0721518983
2045 Land Use Map Designation: Medium Density Residential
Current Zoning of Property: Rural Residential (RR)
Proposed Zoning of Property: Medium Density-Conditional Zoning (MD-CZ)

Public Hearing Location: Apex Town Hall
73 Hunter Street, Apex, North Carolina
Council Chambers, 2nd Floor

Planning Board Public Hearing Date and Time: December 9, 2019 4:30 P.M.
Town Council Public Hearing Date and Time: December 17, 2019 7:00 P.M.

Vicinity Map:



Property owners within 300 feet of the proposed conditional zoning have been sent this notice via first class mail. All interested parties may appear at the public hearing and be heard with respect to the application. Maps showing the location for the above site(s) to be considered in addition to a copy of the 2045 Land Use Map can be inspected at the Apex Town Hall or call 919-249-3426, Department of Planning and Community Development, for further information. To view the petition and related documents on-line: https://www.apexnc.org/DocumentCenter/View/29324.

Dianne F. Khin, AICP
Planning Director

Published Dates: November 22, 2019-December 17, 2019

https://www.apexnc.org/DocumentCenter/View/30018/19CZ20-Public-Notice
Search...
Legal Notice of Public Hearing... | apexnc.org
File Edit Go to Favorites Help
Convert Select
Historic Map' | Apex, NC - Official Websit... | Planning Department Ma... | Permit Center IDT | Real Estate Search | Unified Development Ordi... | Applications & Schedules ... | ExecuTime Enterprise Wor...

TOWN OF APEX
POST OFFICE BOX 250
APEX, NORTH CAROLINA 27502
PHONE 919-249-3426

PUBLIC NOTIFICATION OF PUBLIC HEARINGS

CONDITIONAL ZONING #19CZ20
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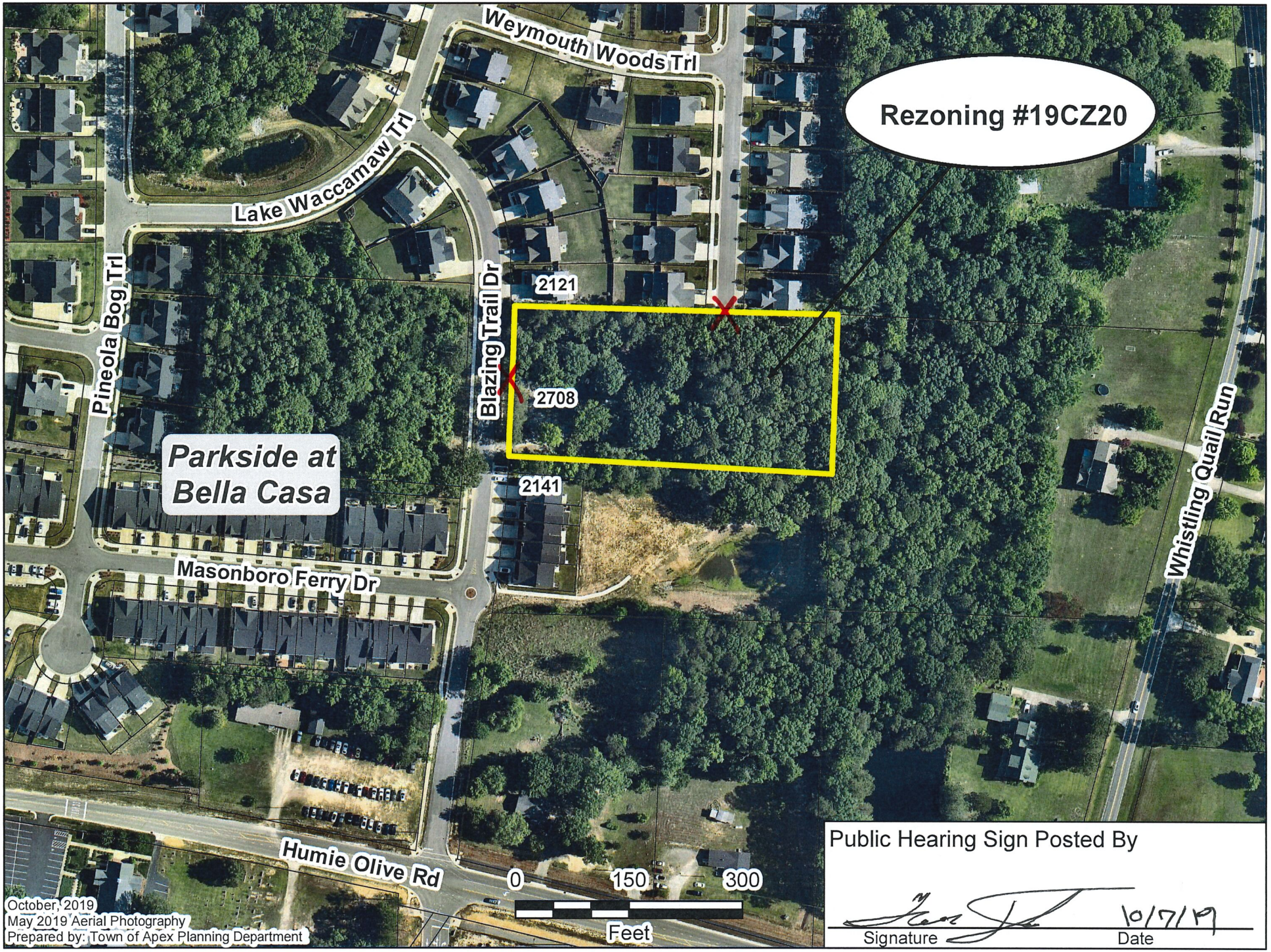
Dianne F. Khin, AICP
Planning Director

Published Dates: November 22, 2019-December 17, 2019

3:00 PM
11/22/2019


Rezoning #19CZ20
Weymouth Woods Trl
Lake Waccamaw Trl
Pineola Bog Trl
Blazing Trail Dr
Whistling Quail Run
2121
2708
2141
Parkside at Bella Casa
Masonboro Ferry Dr
Humie Olive Rd
0
150
300
Feet
October, 2019
May 2019 Aerial Photography
Prepared by: Town of Apex Planning Department
Public Hearing Sign Posted By
Signature
10/7/19
Date

TOWN OF APEX
POST OFFICE BOX 250
APEX, NORTH CAROLINA 27502
PHONE 919-249-3426

AFFIDAVIT CERTIFYING
Public Notification – Written (Mailed) Notice

Section 2.2.11
Town of Apex Unified Development Ordinance

Project Number and/or Name:	Rezoning #19CZ20
Project Location:	2708 Blazing Trail Drive
Applicant or Authorized Agent:	Peter Cnossen
Firm:	Jones & Cnossen Engineering, PLLC

This is to certify that I as Planning Director, mailed or caused to have mailed by first class postage for the above mentioned project on November 22, 2019, a notice containing the time and place, location, nature and scope of the application, where additional information may be obtained, and the opportunity for interested parties to be heard, to the property owners within 300' of the land subject to notification. I further certify that I relied on information provided to me by the above-mentioned person as to accuracy and mailing addresses of property owners within 300' of the land subject to notification.

11/22/19
Date

Planning Director

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Jeri Chastain Pederson, a Notary Public for the above State and County, this the 22 day of November, 2019.

JERI CHASTAIN PEDERSON
Notary Public
Wake County, North Carolina
My Commission Expires
March 10, 2024
SEAL

Jeri Chastain Pederson
Notary Public

My Commission Expires: 03/10/2024

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: PUBLIC HEARING

Meeting Date: December 17, 2019

Item Details

Presenter(s): Liz Loftin, Senior Planner

Department(s): Planning

Requested Motion

Public Hearing and possible motion to remove the Historic Landmark status for the property located at 4525 Green Level West Road in compliance with North Carolina General Statute 160A-400.4 through 160A-400.15.

Approval Recommended?

Planning Department recommends approval.

Item Details

The house known as the James Madison Williams House caught fire on May 22, 2019 and was a total loss.

Attachments

- Staff Report
- Vicinity map

STAFF REPORT

Removal of Historic Landmark Status, James Madison Williams House

December 17, 2019 Town Council Meeting

The purpose of the public hearing is to consider the facts, recommendation, and receive public comment in order to formulate a decision on the proposed application for the removal of the Historic Landmark status.

A public hearing notice has been posted in accordance with applicable requirements.

BACKGROUND INFORMATION:

Location: 4525 Green Level West Road
Applicant/ Property Owner: Eliza C. Williams

PROJECT DESCRIPTION:

Acreage: 6.46 Acres
PIN: 0713943728 (portion of)

EXISTING CONDITIONS/BACKGROUND:

On Wednesday, May 22, 2019 the Apex Historic Landmark known as the James Madison Williams House was tragically lost to a fire. It was a complete loss and nothing was able to be salvaged from the farmhouse structure. The farmhouse was the center of the landmark designation and since it no longer remains the site has lost its historical significance. Although the six outbuildings associated with the property remain, without the principal farmhouse, these structures do not possess the special character and integrity for local landmark designation.

REQUEST:

The applicant is requesting the removal of the Historic Landmark status for the James Madison Williams house located at 4525 Green Level West Road, in the Town of Apex, North Carolina, and owned by Eliza C. Williams, so that the Williams family can build a new family home on the site.


James Madison Williams House
Batchelor Rd
Green Level West Rd
0
100
200
Feet
November, 2019
November 2019 Aerial Photography
Prepared by: Town of Apex Planning Department

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

November 7, 2019

Gary Roth
Capital Area Preservation, Inc.
P.O. Box 28072
Raleigh, NC 27611

RE: Proposed de-designation of the **James Madison Williams House, 4525 Green Level West Road, Apex, Wake County**

Dear Mr. Roth:

Thank you for notifying our office of the proposed de-designation of the James Madison Williams House located at 4525 Green Level West Road in Apex. We understand from your email of Thursday, October 24, 2019, that the property was tragically lost due to a fire several months ago. Although the six outbuildings associated with the property remain, we understand that without the principle property these structures do not possess the special character and integrity for local landmark designation. Thus, the proposed de-designation of the property appears to be appropriate.

We have updated our records to reflect that the James Madison Williams House is no longer extant. We request a copy of the de-designation ordinance to include in our files once it is available.

This letter serves as our comments on the proposed de-designation of the James Madison Williams House. Please contact me at 919-814-6575 should you have any questions about our comments.

Sincerely,

Amber E. Stimpson

Amber E. Stimpson
Local Preservation Commissions / CLG Coordinator

CC: Commission Chair

Enclosure

November 7, 2019

To Whom it May Concern,

On Wednesday, May 22, our family home and Apex Historic Landmark, known as the James Madison Williams House, was tragically lost to a fire. It was a complete loss and nothing was able to be salvaged from the structure. It was my understanding that the main farmhouse was the center of the landmark designation, and since it no longer remains, the site has its historic significance. We are requesting that the property be de-designated as an Apex Historic Landmark so that we can build a new family home on the site. Please let me know if you need anything else. Thank you.

Sincerely, Jimmy Williams Elizabeth Williams

Jimmy Williams on behalf of the Williams Family

Incident Number:19-0024721 **Alarm Date:05/22/2019**

FDID:09200

Wake County

Basic Fire Report

Basic Information

Location:
Exact Location 4525 GREEN LEVEL WEST RD
Street Address Apex, NC 27523

TIMES
Alarm: 05:45:00
Arrival: 06:30:00
Controlled:
Cleared: 11:17:00

Incident Type: 111 Building fire
Assistance Rendered: Cause and Origin Investigation
Requesting Agency: 04 Town of Apex Fire Dept
Shift: A A Shift
District: 04 Apex
Actions Taken: 86 Investigate
Haz Mat Release: N None

GPS Coordinates:
Lat: 35.770907
Lon: -78.935093

Property Information

Property Use: 419 1 or 2 family dwelling
Mixed Property Use: NN Not mixed use

Property Value:	200,804.00	**Property Loss Dollars:**	200,804.00
Contents Value:	30,000.00	**Contents Loss Dollars:**	30,000.00

Involvements:

Name:	Address:	Phone:	Involvement Type:
Williams, Jimmy	4525 GREEN LEVEL WEST RD Apex, NC 27523	919-369-8964	
Williams, Eliza	4525 GREEN LEVEL WEST RD Apex, NC 27523		

Responding Personnel and Units: Totals: Units: 1 Personnel: 2

Personnel:

Staff ID	Name	Unit	Rank	Activity	
200	Stanley, David R	WC1	FSR	901	General Office Work
200	Stanley, David R	WC1	FSR	820	Fire Investigations
202	Gupton, H. Lee	WC1	FSR	820	Fire Investigations
202	Gupton, H. Lee	WC1	FSR	820	Fire Investigations
202	Gupton, H. Lee	WC1	FSR	820	Fire Investigations

Units Times:

Unit:	Notified:	Roll:	Arrival:	Cleared:	In Service:
WC1	05:45:00	05:45:00	06:30:00	11:17:00	11:17:00

Narrative:

WC-1 David Stanley responded to the above listed address at the request of Apex Fire Department Command. Upon arrival he met with Command (Apex Battalion Chief Beasley) and received an incident briefing and a formal request for an origin and cause investigation. Given the proximity to shift change, WC-1 Stanley contacted on coming WC-1 Lee Gupton and requested that he respond directly to the scene. WC-1 Stanley began processing the scene immediately by obtaining a verbal witness statement from the occupant of the residence and a signed consent to search. A visual observation of the scene was performed, and the scene was photographically documented. WC-1 Gupton will be listed as the Lead Investigator for this incident and will be responsible for this report and the associated narrative.

05/22/2019 20:04:40 LLGupton

This investigation was inactivated based on an email received from the Wake County Sheriff's Department Lieutenant Brent David of the Criminal Investigative Division on 5/5/2019

*** Denotes that dates on this incident occurred over multiple days.

06/05/2019 06:40:04 LLGupton

Authorizations:

Lead Investigator: 202 Gupton, H. Lee **Rank:** FSR Fire Services Responder

Initial Responder: 200 Stanley, David R **Rank:** FSR Fire Services Responder

*** Denotes that dates on this incident occurred over multiple days.

Incident Number:19-0024721 **Alarm Date: 05/22/2019**

FDID:09200

Wake County

Fire/Structure Fire Report

Fire Information:

Residential Units: 1 **On-Site Materials or Products:** **On-Site Materials or Products Usage:**

Buildings Involved: 1

Acres Burned: 0

Ignition Details:

Area of Origin: 74 Attic: vacant, crawl space above top story,

Heat source: UU Undetermined

Item First Ignited: UU Undetermined

Type of Material First Ignited:

Cause of Ignition: 5A Undetermined

Contributing Factors:

NN None

Human Factors:

N None

Equipment Involved:

NNN None

Make: **Model:** **Serial Number:**

Year: **Power Source:** **Portability:**

NN None

Involvement Type: N None

Model: **Year:** 0

Plate: **State:** **Serial Number/VIN:**

Structure Fire Information:

Structure Information:

Structure Type: 1 Enclosed building

Building Status: 2 In normal use

Floors Above Grade: 2

Floors Below Grade:

Main Floor Size: 3,414

Floor of Origin: 2

Fire Spread: 4 Confined to building of origin

Number of Stories Damaged by Flame:

Minor:	0	1-24%
Significant:	0	25-49%
Heavy:	0	50-74%
Extreme:	2	75-100%

Dectectors and Exitinguishment Systems:

Detectors Present: 1 Present

Detector Type: 1 Smoke

Power Supply: 1 Battery only

Detector Operation: 2 Detector operated

Effectiveness: 1 Detector alerted occupants, occupants

AES Presence: N None Present

Wake County
Arson/Arson Involvements Report

Case/Scene:

Agency Refered To: WCSD Wake Co. Sheriff's Dept
330 S. Salisbury Street
P.O. Box 550
P.O. Box 550

Case Status: 3 Investigation inactive

Fire Involvement on 1st Arrival:

Cause and Origin Narrative:

SUMMATION

WC-1 David Stanley responded to the above listed address at the request of Apex Fire Department Command. Upon arrival he met with Command (Apex Battalon Chief Beasley) and received an incident briefing and a formal request for an origin and cause investigation. Given the proximity to shift change, WC-1 Stanley contacted on coming WC-1 Lee Gupton and requested that he respond directly to the scene. WC-1 Stanley began processing the scene immediately by obtaining a verbal witness statement from the occupant of the residence. A visual observation of the scene was performed, and the scene was photographically documented. Given that the owner/occupant with the reasonable expectation of privacy left the scene shortly after the initial interview due to health concerns, this fire will be investigated using the exigent circumstance exception to the warrant requirements. WC-1 Gupton will be listed as the Lead Investigator for this incident and will be responsible for this report and the associated narrative.

PARTICIPATING INVESTIGATORS

H. Lee Gupton, NC-CFI, Deputy Fire Marshal, Wake County Fire Services, WC-1 C-Shift, Lead Investigator
David Stanley, NC-CFI, Deputy Fire Marshal, Wake County Fire Services, WC-1 A-Shift, Initial Responder
Chad Edmunds, Special Agent, ATF, Investigative Assistance/Investigative Resource

BUILDING CONSTRUCTION

The structure was determined to be a two-story, wood-frame, single-family residence consisting of approximately 3414 square feet of conditioned space according to Wake County Tax Records. Based on tax record information and owner statements, the structure was originally built in 1911 and was renovated in the mid 1950's. The structure was known as the James Madison Williams House and was built in what was known as the Queen Anne style of design and construction based on information obtained from the Capital Area Preservation Society. The floor of the original structure was of rough sawn wood floor joist which at some point was enclosed with a masonry foundation wall to create a ventilated crawlspace. The wall studs, second level floor/ceiling assembly and roof structure were also constructed of rough sawn lumber. The roof sheathing consisted of one-inch thick skip-sheathing and covered with tin shingles. The interior wall and ceiling finishes were of drywall which covered the tongue and groove finishes that were original to the structure. The substrate of the floors was determined to the original heart-pine flooring and covered with carpet and vinyl sheet goods. The finished bedrooms of the second level occupied only between 25% and 30% of the of the overall floor level. The remainder of the space was unconditioned and used primarily for storage. The dwelling was provided with battery operated smoke detectors on each floor level and in each bedroom based on statements provided by the owner and her son. In addition, a monitored security system was present within the structure and smoke detection components were incorporated into the system. It is not known if the battery-operated smoke detectors functioned. However, based on occupant statements, the notification appliance of the security/fire detection system did activate and awoke the occupant. The structure was occupied and secured at the time of the incident. An examination of the mechanical components of the structure revealed that the lower level was conditioned by a propane powered gas-pack that was located along the rear of the structure. The second level was conditioned by a gas furnace located in the unfinished area of the second floor. The condenser for this furnace was located along the rear of the structure as well. Gas logs were present within the fire place and all gas appliances noted above were fed from a remotely located above-ground propane tank in the rear yard. The electrical power was supplied via an overhead service drop to a 200-Ampere meter base located along the front left corner. This meter feed a 200-Ampere main breaker 42 circuit panel located under the enclosed portion of the carport along the front wall. Based on occupant/owner statements, no abnormalities had been experienced with the electrical system.

FIRE DEPARTMENT ACTIONS

Apex Fire Department along with automatic aid from Cary Fire Department and North Chatham Fire Department were dispatched to the above listed address in reference to a reported structure fire. Due to closest unit response and proximity Cary Engine 8 was the first apparatus to arrive and reported a working structure that was fully involved. Cary Engine 8 Officer (Captain Andy Hiscock) established command and performed a size up. Engine 8 deployed a 5-inch large diameter hose lay to the roadway for a water shuttle operation. Upon arrival of Cary Battalion 2 (Battalion Chief Kevin Annis), Command was transferred to him. As Apex Fire Department Battalion Chief 5 Michael Beasley arrived on scene, Command was transferred to him. Cary Engine 8 deployed attack lines to the rear of the structure to cool large propane tanks. North Chatham units provided the water shuttle operation while Apex and Cary Fire Departments performed suppression and overhaul operations. Eventually foam was used to extinguish the fire. WC-1 was dispatched automatically as a resource when this incident was upgraded to a working fire.

WITNESS STATEMENTS

Written witness statements were provided by the first arriving fire department personnel on board Cary Engine 8. Refer to the written statements in this file from Captain Andy Hiscock, Firefighter Phillip Bass, Firefighter Kenneth Gordon, Firefighter William Kochies and Firefighter Russell Fuller.

An initial interview was conducted by WC-1 Stanley upon arrival with the owner/occupant Eliza Williams. A more formal interview was conducted by WC-1 Gupton at approximately 11:15 hours after she was requested to return to the scene. The statement is transcribed below;

Mrs. Williams stated that she was awoken by the horn of the ADT burglar alarm system and she assumed someone was attempting to break into the residence. She proceeded from her bedroom to check all the doors throughout the first-floor level and found nothing wrong. On her way back to her bedroom, she noticed that smoke was coming down the stairwell and was starting to roll out onto the twelve-foot ceilings of the first floor. She stated that the smoke was light gray in color at that time. She stated that she proceeded to her bedroom, got dressed, grabbed her pocketbook and then proceeded back through the residence to the carport exit door bypassing at least two other exit doors as this was habit given that they always exit through the carport door. Once in the carport area, she stated that she realized that she did not have her phone. She stated that she proceeded back through the residence to her bedroom, unplugged her phone and attempted to call 911 from the bedroom, but the call dropped. She then called her son while proceeding back to the carport door and exited the structure. She advised that when she exited she went to the backyard where she could see flames protruding through the roof along the rear of the roof structure. She then moved to the front yard and waited for the fire department's arrival. She stated that she was upset, emotional and already had a scheduled doctor's appointment that morning and contacted her daughter to come pick her up and carry her to the scheduled appointment. In addition, she has lost her eyeglasses and all diabetic medications as a result of the fire and needed to have her daughter take her to the doctor, pharmacy and ophthalmologist to obtain needed medications and eyeglasses.

A verbal witness statement was obtained from Jimmy Williams, the son of Eliza Williams at the scene by WC-1 Gupton at approximately 08:45 hours and is transcribed below;

Mr. Williams advised on structural and finish elements throughout the structure. He stated that there were 9-volt battery operated smoke detectors located throughout the dwelling which he was responsible for and he made certain that the batteries were changed regularly as his mother resided alone within the structure. In addition, an ADT monitored burglar alarm system was in place within the dwelling. The system did have smoke detection components tied to the burglar alarm. The two smoke detectors tied to this system were located on the first floor in the main corridor and the second-floor detector was located along the rear wall above the air-return near the door leading to the attic storage area. He stated that the upper level consisted of an open area below the turret and bedrooms located to the left and right sides of this open area. A smaller door leading to the unfinished storage area was located along the rear wall that separated the finished area from the unfinished storage area. He advised that the only electrical components present in the storage area were those associated with the gas furnace located just inside the door to the unfinished area and one overhead light that was mounted to a cross member and suspended from the roof structure. This light was controlled by a switch on the finished side of the wall and to the left of the door leading to the unfinished area. In addition, the air return was present in this same area as well as the ADT smoke detector. He stated that the gas line for the gas furnace was believed to have been run up through the wall from the crawlspace of the first floor, but was uncertain. He stated that they had experienced no issues with the furnace or electrical components of the structure. Furthermore, the air-conditioning to the second level via the gas furnace air-handler was in the off position as it had not gotten hot enough in the upper level to have it operating yet. He provided information with respect to the

renovation that occurred at some point in the mid 1950's where all of the original tongue and grove wall and ceiling finishes were covered in drywall and electricity was introduced into the structure.

FIRE SCENE PROCESSING

The fire scene processing began immediately upon arrival of WC-1 Stanley by obtaining initial photographs and performing initial interviews with the occupant and her son. An incident briefing was conducted with Command and they advised that this was determined to be located within the Apex Fire Department's Fire Response District, but due to proximity, Cary Fire Department Engine 8 was the first to arrive. As suppression efforts were still underway, he contacted on-coming WC-1 Gupton and requested that he respond directly to the scene with a spare vehicle. WC-1 Stanley remained on the scene and coordinated with Command. WC-1 Gupton contacted Chad Edmunds of the Bureau of Alcohol, Tobacco and Firearms for assistance as an external resource. Once all parties had arrived on scene, an in-depth interview with Mr. Williams was conducted and visual observations of the remains of the structure were made. The owner/occupant Eliza Williams was requested to return to the scene or investigators could meet her at another location as she was extremely emotional about the loss of the dwelling. Once she had returned to the scene, an in-depth interview with her was conducted. Given the second floor was obliterated by the fire and only portions of the first-floor walls and floor remained intact, the information obtained from the interviews were used to form a hypothesis of the fire origin. Statements made by Eliza Williams were that when she exited the structure, the two vehicles parked under the carport were not involved in the fire. In addition, Jimmy Williams stated that when he arrived on scene (prior to the fire department), that the vehicles were just beginning to become involved. The statements of Captain Andy Hiscock advised that upon his initial size up, both vehicles were involved. Statements by Eliza Williams were that upon exiting the structure and carport area, she could see fire on the rear of roof. Based on a building layout of the second floor provided by Jimmy Williams, this portion of the roof would have been directly above the unfinished storage area of the second level.

Potential ignition sources were discussed in the storage area and the only ones known to be present were those of the gas furnace and its associated electrical and gas components. The other was that of the overhead light and associated wiring present the storage area. The weather conditions prior to the incident were reportedly 70 degrees Fahrenheit with a 55% relative humidity and winds from the east at 9 miles per hour.

CONCLUSION

It is the consensus of the investigators involved that this fire be classified as undetermined given that no specific ignition source or ignition sequence could be determined. The area of origin is that of the unfinished storage area of the second-floor level. This incident will remain under investigation until such time as additional information may be forthcoming. Although no indications of criminal activity were observed, given that this fire cause is left undetermined, a referral was sent to the Wake County Sheriff's Office per departmental policy.

FDID	State	Incident #	Exposure	CAD #	Station	Shift
09205	NC	190001586	0	19-001584	5	A

Incident Date
5/22/2019

Event / Call Time
04:31:02

Incident Type
111 Building fire

Incident Action
11 Extinguishment by fire service personnel
86 Investigate

Times

Alarm Time	Enroute	Arrival	Last Unit Cleared	Time Controlled
04:32:14	04:34:15	04:42:39	15:35:52	

EMS Unit	EMS Dispatch	EMS Enroute	EMS Arrival	With Patient

General

Location Type
1 - Street address

Property ID
4525 GREEN LEVEL WEST RD Apex

District/Box	State	City	Zip Code
County	NC - North Carolina	Apex	27523

Number/Milepost	Street or Highway	Apt./Suit/Room
4525	GREEN LEVEL WEST RD	

Number/Milepost	Crossing street

Narrative

Apex, Cary and North Chatham Fire Departments responded to a structure fire at 4525 Greenlevel West Rd. Cary Engine 8 was first on scene and reported heavy fire showing and established command. Cary Battalion 2 was the first chief officer on scene and assumed command from Engine 8. Due to the level of fire involvment all fire attack was defensive from the exterior of the structure. The only occupant was able to escape before any fire department resources arrived. There were no reported injuries to civilian or fire service personnel. Fire department units remained on scene until Wake County fire marshals completed their investigation, at that point the property was turned back over to the owners.

Fire

Total of Buildings Involved 1 **Total Acres Burned** ☑ **Less Than One Acre Burned**

Ignition

Area of Fire Origin
UU Undetermined

Heat Source
UU Undetermined

Item First Ignition
UU Undetermined

Type of Material First Ignited
uu Undetermined

Cause of Ignition
U - Cause undetermined after investigation

Equipment Involved

Brand **Model**

Serial Number **Year**

Equipment Power Source

Equipment Portability

If Age is a Factor

Age **Human Factors Gender**

Suppression Factors

411 Delayed detection of fire
412 Delayed reporting of fire

Factor Contributing To Ignition

UU Undetermined

Human Factors Contributing To Ignition

N - None

On Site Material

Mobile Property Involved

Involvement Type **Property Type** **Make**

Model **Year** **License Plate** **State** **VIN**

Structure Fire

Structure Type
1 - Enclosed building

Structure Status
2 - In normal use

Fire Spread
4 - Confined to building of origin

Main Floor Size

Length	X	Width	OR	Square Feet
				3414

Floor of Origin
2

Building Height

Stories Above Grade	Stories Below Grade
2	0

Stories Flame Damage

Minor	Significant	Extreme	Heavy
			2

Detector Presence
1 - Present

Detector Type
1 - Smoke

Detector Power Supply
U - Undetermined

Detector Operation
2 - Detector operated

Detector Effectiveness
1 - Detector alerted occupants -

Detector Failure Reason

AES Presence
N - None Present

AES Type

AES Operation

AES Failure Reason

Number Of Sprinklers

Arson

General Information

Case Status

Availability Of Material First Ignited

Extentof Fire Involvement on Arrival

Entry Method

Incendiary Device

Container

Ignition/Delay Device

Fuel

Property Ownership

Suspected Motivation Factors

Apparent Group Involvement

Initial Observations

Laboratories Used

Other Investigative Information

Other Information

Junvenile Information

Property

☑ **Is Residential** **Number of Residential Units:** 1

Estimated Dollar Value and Losses

PRE-INCIDENT VALUES

Property $500,000.00

Contents $250,000.00

LOSSES (If no loss, leave blank)

Property $500,000.00

Contents $250,000.00

Property Use / HazMat / Detector Status

Property Use

419 1 or 2 family dwelling

Mixed Property Use

65 - Farm use

HazMat Release

Detector Status

1 - Detector alerted occupants

Mutual Aid

Notify Date/Time **Cancel Date/Time** **Arrival Date/Time** **Cleared Date/Time**

Agency Information

Fire Department	FDID	State
Cary Fire Department	09203	NC

Custom Department Identifier	Mutual Aid Purpose	Agency Incident #
		19-0004425

Aid

Fire Apparatus Provided 6	**EMS Apparatus Provided**
Fire Personnel Provided 21	**EMS Personnel Provided**
Rescue Apparatus Provided	**Other Apparatus Provided**
Rescue Personnel Provided	**Other Personnel Provided**

Notify Date/Time	Cancel Date/Time	Arrival Date/Time	Cleared Date/Time

Agency Information

Fire Department	FDID	State
North Chatham Volunteer Fire Department	01905	NC

Custom Department Identifier	Mutual Aid Purpose	Agency Incident #
		1922997

Aid

Fire Apparatus Provided 5	**EMS Apparatus Provided**
Fire Personnel Provided 7	**EMS Personnel Provided**
Rescue Apparatus Provided	**Other Apparatus Provided**
Rescue Personnel Provided	**Other Personnel Provided**

Response

Apparatus ID	CAD App ID	Dispatch (DP)	Dispatch (DC)	Enroute (ER)	Arrival (AR)	Cleared	# of Personnel
BAT5	BAT5	04:32:15	04:32:15	04:34:35	04:44:21	12:09:04	1

Apparatus Narrative

BATT5 of type Chief officer Car responded after receiving a STRUCTURE FIRE-SINGLE RESIDENT call at 05/22/19 04:32:15. Apparatus went enroute at 05/22/19 04:34:35. arrived on site at 05/22/19 04:44:21. after performing Incident command. by Michael G Beasley,

- On arrival we found a single family structure well involved in fire
Crews made an exterior defensive attack due to the structure already well involved in fire.

Actions for Apparatus	
81	Incident command

Personnel	Arrival Time	Clear Time	Actions Taken
Michael Beasley	04:44:21	12:09:04	

Apparatus ID	CAD App ID	Dispatch (DP)	Dispatch (DC)	Enroute (ER)	Arrival (AR)	Cleared	# of Personnel
E35	E35	04:32:14	04:32:14	04:34:15	04:42:39	11:58:37	3

Apparatus Narrative

Engine 35 arrived on scene to a working house fire. Upon arrival Cary Fire Department established Fire Command and initiated an exterior, defensive attack as the home was at least two thirds involved with fire. Engine 35's personnel formed a Rapid Intervention Team with Cary Rescue 7. We were then asked by Command to protect exposures and to extinguish the fire from a safe distance. We used two different attack lines that were already in use. We switched to a foam operation with our Pro Paks but went back to attack nozzles. Veasey, Wallace, and Hamilton were relieved by Dague, Cirasole, and Wilson after 0800. We drove the CERT Van back to Station 5.

Actions for Apparatus	
73	73 Provide manpower

Personnel	Arrival Time	Clear Time	Actions Taken
Robert Veasey	04:42:39	11:58:37	73 - Provide
Lawrence Hamilton	04:42:39	11:58:37	73 - Provide
Loren Wallace	04:42:39	11:58:37	73 - Provide

Apparatus ID	CAD App ID	Dispatch (DP)	Dispatch (DC)	Enroute (ER)	Arrival (AR)	Cleared	# of Personnel
TANK31	TANK31	04:45:32	04:45:32	04:56:28	05:13:14	07:44:56	1

Apparatus Narrative

TANK 1 of type Tanker & pumper combination responded after receiving a STRUCTURE FIRE-SINGLE RESIDENT call at 05/22/19 04:45:32. Apparatus went enroute at 05/22/19 04:56:28. arrived on site at 05/22/19 05:13:14. Team cleared site at 05/22/19 07:44:56. after performing Provide water. by Jonathon Baker,

Actions for Apparatus	
76	Provide water

- What was found when you arrived on scene?
- What was done to mitigate the situation?
- What was the outcome?

Personnel	Arrival Time	Clear Time	Actions Taken
Jonathon Baker	05:13:14	07:44:56	

Apparatus ID	CAD App ID	Dispatch (DP)	Dispatch (DC)	Enroute (ER)	Arrival (AR)	Cleared	# of Personnel
TANK35	TANK35	04:45:32	04:45:32	11:50:44	12:28:27	15:35:52	0

Apparatus Narrative

Did not respond

Apparatus ID	CAD App ID	Dispatch (DP)	Dispatch (DC)	Enroute (ER)	Arrival (AR)	Cleared	# of Personnel
E34	E34	11:50:44	11:50:44	11:50:44	12:01:38	15:35:52	2

Apparatus Narrative

E34 of type Engine responded after receiving a STRUCTURE FIRE-SINGLE RESIDENT call at 05/22/19 11:50:44. Apparatus went enroute at 05/22/19 11:50:44. arrived on site at 05/22/19 12:01:38. Team cleared site at 05/22/19 15:35:52. by Joshua B Stone, Zachary R Lindsey,

Engine 34 stood by during investigation and cooled hot spots.

Personnel	Arrival Time	Clear Time	Actions Taken
Joshua Stone	12:01:38	15:35:52	
Zachary Lindsey	12:01:38	15:35:52	

Owner /Involved Person and Entities

Owner Full Name	Owner / Involved	Person / Entity	Phone Number	Entity Name
Williams,Eliza C	1 - Owner	1 - Person		

Authorization

Member Making Report

Member Making Report	Member Making Assignment	Report Completed Date
Michael Beasley	Battalion Chief	5/23/2019

Officer In Charge

Officer In Charge	Officer In Charge Assignment
Michael Beasley	Battalion Chief

Review

Report Reviewed By	Report Reviewed Date
Michael Beasley	5/23/2019

CAD Details

EventDetails: AgencyCode: AFD ReportNumber: 19001584 CadInciNumber: 190522065 NatureCode: 69E6 NatureDescription: STRUCTURE FIRE-SINGLE RESIDENT EventPriorityCode: P PriorityDispatchDeterminant: 69E06 LocationTypeCode: 1 StreetNumber: 4525 StreetDirection/: StreetName: GREEN LEVEL WEST StreetType: RD StreetPostDirection/: ApartmentSuite/: ApartmentSuiteUnfiltered/: FullAddress: 4525 GREEN LEVEL WEST RD CityCode: APEX CityCodeDescription: APEX State: NC ZipCode: 27523 SiteName/: SiteCADKey/: SiteTypeCode/: XStreetDirection/: XStreetName/: XStreetType/: XStreetPostDirection/: EventLatitude: 35.76897 EventLongitude: -78.93483 SPGeox: 2019335.00 SPGeoy: 734785.00 DMSLatitude: 35 46 8.29 N DMSLongitude: 78 56 5.39 W DMMLatitude: 35 46.1382 N DMMLongitude: 78 56.0898 W AdditionalAddressInfo: DIST: 237.05 ft (S)COUNTY JURISDICTION (N) EventStartTime: 2019-05-22 04:31:02 FirstDispatchTime: 2019-05-22 04:32:14 FirstEnrouteTime/: FirstOnSceneTime/: UnderControlTime/: LastUnitClearTime/: FirstTransportTime/: LastTransportArriveTime/: EventCompletedTime/: LastExportTime: 2019-05-22 04:32:16 PatientContactTime/: EventDistrict: 035 EventStation: S35 EventBeat/: EventReportingArea: 35O CadResponsePlan: APXN CadResponsePlanCategory: 69MD CallerName: VERIZON CallerAddress: 2 NC 540 SB CallerNumber: 9193698964 CallSource: W911 E911Used: T CallTakerUserId: LPAUL CallTakerName: Paul,Lauren DispatcherUserId: TBAZEMOR DispatcherName: BAZEMORE, TIFFANY EventDispositionCode/: MultipleEventDispositions/: FirstAgencyArriveTime/: CadNotes/: PrimaryUnit: E35 LinkedEvents: Event: AgencyCode: CPD ServiceType: LAW ReportNumber/: CadInciNumber: 190522067 Event: AgencyCode: WCEM ServiceType: EMS ReportNumber/: CadInciNumber: 190522068 Event: AgencyCode: CFD ServiceType: FIRE ReportNumber: 19004425 CadInciNumber: 190522069

TOWN OF APEX
POST OFFICE BOX 250
APEX, NORTH CAROLINA 27502
PHONE 919-249-3426

PUBLIC NOTIFICATION OF PUBLIC HEARINGS

Historic Landmark De-Designation
James Madison Williams House

Pursuant to the provisions of North Carolina Statutes Section § 160A-400.1. through § 160A-400.15. and to the Town of Apex Unified Development Ordinance (UDO) Section 2.2.11, notice is hereby given of public hearings before the Town Council of the Town of Apex. The purpose of these hearings is to consider the following:

The house known as the James Madison Williams House caught fire on May 22, 2019 and was a total loss.

Applicant/Property Owner: Eliza C. Williams
Property Address: 4525 Green Level West Road
Acreage: ± 6.46
Property Identification Number (PIN): 0713943738 (only a portion)
2045 Land Use Map Designation: Low Density Residential
Zoning of Property: Rural Residential (RR)

Public Hearing Location: Apex Town Hall
73 Hunter Street, Apex, North Carolina
Council Chambers, 2nd Floor

Town Council Public Hearing Date and Time: December 17, 2019 7:00 P.M.

Vicinity Map:



All interested parties may appear at the public hearing and be heard with respect to the application. Maps showing the location for the above site(s) to be considered in addition to a copy of the 2045 Land Use Map can be inspected at the Apex Town Hall or call 919-249-3426, Department of Planning and Community Development, for further information. To view the petition and related documents on-line: https://www.apexnc.org/DocumentCenter/View/30056/

Dianne F. Khin, AICP
Planning Director

Published Dates: November 27, 2019 – December 17, 2019

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POST OFFICE BOX 250
APEX, NORTH CAROLINA 27502
PHONE 919-249-3426

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Dianne F. Khin, AICP
Planning Director

Published Dates: November 27, 2019 – December 17, 2019

1:27 PM
11/27/2019

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: PUBLIC HEARING

Meeting Date: December 17, 2019

Item Details

Presenter(s): Liz Loftin, Senior Planner

Department(s): Planning

Requested Motion

Public Hearing and possible motion to designate the property located at 2708 Olive Chapel Road a Historic Landmark in compliance with North Carolina General Statute 160A-400.4 through 160A-400.15.

Approval Recommended?

Planning Department recommend approval.

Item Details

Attachments

- Staff Report
- Vicinity Map
- Landmark Application

STAFF REPORT

Historic Landmark Designation, Tom Olive House

December 17, 2019 Town Council Meeting

The purpose of the public hearing is to consider the facts, recommendation, and receive public comment in order to formulate a decision on the proposed application for Historic Landmark status.

A public hearing notice has been posted in accordance with applicable requirements.

BACKGROUND INFORMATION:

Location: 2708 Olive Chapel Road
Applicant/Property Owner: Michael A. Ingram

PROJECT DESCRIPTION:

Acreage: .66 Acres
PIN: 0721392386

EXISTING CONDITIONS:

The proposed landmark site includes the original Tom Olive house, likely built around 1905 based on its architectural style and resemblance to other dwellings in the area.

BACKGROUND:

In 2019, Mike Ingram purchased the Tom Olive House from Lennar Carolinas. Mr. Ingram has undertaken a full restoration of the house using the Secretary of Interior's Standards for Rehabilitation and plans by historic preservation architects Maurer Architecture as guides. Capital Area Preservation holds a historic preservation easement on the house. The easement will protect its historic character in perpetuity.

HISTORY:

Built ca. 1905, the Tom Olive House is locally significant for its Queen Anne architecture. The house is historically associated with the Olive family, a multi-generation family of successful farmers and community leaders in western Wake County. The key Queen Anne features of the Tom Olive house are its fishtail shingles in the front gables, the sawn brackets and pendants that top the cut-way bays, and a front porch of turned posts, balusters, and arched spandrels. The dwelling retains excellent overall physical integrity and has experienced very limited changes to the exterior. The interior retains its original floor plan and much of the interior finish materials have survived.

REQUEST:

The applicant is requesting the Tom Olive House at 2708 Olive Chapel Road be declared an Apex Historic Landmark. The designated landmark boundary includes approximately .66 acres. Landmark designation means the community recognizes the house as an important historic resource worthy of preservation. Any substantial exterior design changes to a designated landmark are subject to the design review procedures of the Wake County Historic Preservation Commission.


Tom Olive House
Sunflower Rd
Milkthistle Aly
Smith Farm
Hayride Aly
Barn Door Dr
Farmhouse Dr
Livestock Aly
Kythira Dr
Olive Chapel Rd
November, 2019
November 2019 Aerial Photography
Prepared by: Town of Apex Planning Department
0
50
100
Feet

ALSEY THOMAS OLIVE HOUSE
LANDMARK REPORT



2708 OLIVE CHAPEL ROAD
Apex, Wake County, North Carolina

PREPARED FOR:
Capital Area Preservation
1101 Haynes Street, Suite 001
Raleigh, North Carolina 27604

December 2019

RGA
CULTURAL
RESOURCE
CONSULTANTS

ALSEY THOMAS OLIVE HOUSE LANDMARK REPORT

2708 OLIVE CHAPEL ROAD

Apex, Wake County, North Carolina

Principal Investigator:

Ellen Turco, MA

Authors:

Ellen Turco, Principal Senior Historian
Olivia Heckendorf, Architectural Historian

Prepared by:

Richard Grubb & Associates, Inc.
106 North Avenue
Wake Forest, North Carolina 27587

Prepared for:

Capital Area Preservation
1101 Haynes Street, Suite 001
Raleigh, North Carolina 27604

Date:

December 6, 2019

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APPLICATION FOR HISTORIC LANDMARK DESIGNATION

Preparing Your Application:
Please use black ink or type and use paper no larger than 11" x 17" for the required supporting information. Capital Area Preservation (CAP) staff is available to advise in the preparation of applications.

Filing Your Application:
When completed, the attached application will initiate consideration of a property for designation as a local historic landmark. The application will enable the Wake County Historic Preservation Commission (WCHPC) to determine whether the property qualifies for designation.

Mail the application to Capital Area Preservation, PO Box 28072, Raleigh, NC, 27611. Submitted materials become the property of the Wake County Government and will not be returned. Incomplete applications may be returned to the applicant for revision. CAP staff will contact applicants after receiving an application to discuss the next steps of the designation process (see *Landmark Designation Q & A* for more information). Please feel free to contact CAP with any questions at 919.833.6404, or e-mail at info@cappresinc.org. CAP can be found on the web at www.cappresinc.org.

Thank you very much for your interest in protecting Wake County's historic resources!

**The guidelines developed for this application are based on the evaluation process used by the National Register of Historic Places. National Register evaluation principles regarding criteria, category classifications, and integrity have been adapted for local applications.*

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1. Name of Property

Historic Name: Alsey Thomas Olive House

Current Name: Alsey Thomas Olive House

Location

Please include the full street address of the property, including its local planning jurisdiction. Wake County Property Identification (PIN) and Real Estate Identification (REID) Numbers can be found at the Wake County property information website at **http://imaps.co.wake.nc.us/imaps/mainpage.htm**, or by contacting the Wake County Planning Department.

Street Address: 2708 Olive Chapel Road, Apex, Wake County, North Carolina 27502

Planning Jurisdiction: AP PIN Number: 0721392386 REID: 0458130

Deed Book and Page Number: Book 017413 Page: 00435

Current Tax Value of Property: $194,352

2. Owner Information (If more than one, list primary contact)

Name: Michael Ingram

Address: 2735 NC Highway 751, Apex, North Carolina 27523

Phone: 919-422-5690 Email: _____

Ownership (check one): ☒ Private ☐ Public

3. Applicant/Contact Person (If other than owner)

Name: _____

Address: _____

Phone: _____ Email: _____

4. Signatures

I have read the general information on landmark designation provided by the Wake County Historic Preservation Commission and affirm that I support landmark designation of the property defined herein.

Owner: _____ **Date:** _____

Owner: _____ **Date:** _____

Owner: _____ **Date:** _____

Owner: _____ **Date:** _____

Applicant: _____ **Date:** _____
(If different from owner)

OFFICE USE ONLY: Received by: **Date:**

5. General Data/Site Information

Date of Construction and major alterations and additions: Circa 1905

Number, type, and date of construction of outbuildings: None

A. Approximate lot size or acreage: 0.66 acres

B. Architect, builder, carpenter, and/or mason: Unknown

C. Original Use: Dwelling

D. Present Use: Dwelling

6. Classification

A. Category (select type from below): Building

- **Building –** created principally to shelter any form of human activity (i.e. house, barn/stable, hotel, church, school, theater, etc.)
- **Structure** - constructed usually for purposes other than creating human shelter (i.e. tunnel, bridge, highway, silo, etc.)
- **Object** - constructions that are primarily artistic in nature. Although movable by nature or design, an object is typically associated with a specific setting or environment (i.e. monument, fountain, etc.)
- **Site** - the location of a historic event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archeological value, regardless of the value of any existing structure (i.e. battlefields, cemeteries, designed landscape, etc.)

B. Number of Contributing and non-contributing resources on the property:

A contributing building, site, structure, or object adds to the historic associations, historic architectural qualities, or archeological values for which a property is significant because it was present during the period of significance, relates to the documented significance of the property, and possesses historic integrity or is capable of yielding important information about the period.

	Contributing	Non-contributing
Buildings	1	0
Structures	0	0
Objects	0	0
Sites	0	0

Previous field documentation (when and by whom): Wake County Historic Architecture Survey, Kelly Lally, 1990-1991; Wake Municipalities Phase III Survey, Heather Wagner Slane, 2017

Please contact the Survey Coordinator at the State Historic Preservation Office to determine if the property is included in the Wake County survey (919.807.6573).

National Register Status and date (listed, eligible, study list): N/A

Please contact the National Register Coordinator at the State Historic Preservation Office to determine National Register Status (919.807.6587).

7. <u>Supporting Documentation</u> (Please type or print and attach to application on separate sheets. Please check box when item complete.)

A. Physical Description Narrative of All Resources on the Site ☒
For primary resource, describe overall form, number of stories, construction materials, roof shape, porches, windows, doors, chimney, important decorative elements, and significant interior features whether or not the interior is being proposed for designation. Provide number, type and location of outbuildings, with an entry on each that includes construction date and brief description. Provide description of landscape and setting of all buildings, structures, etc. on the property.

B. Historical Background Narrative ☒
Chronology of the property and its owners, including any historical events or historic persons associated with the property, presented in paragraph form.

C. Significance Statement ☒
In a clear, concise statement tell why the property meets the criteria for local designation. Please refer to pages 47-48 in *The Handbook for Historic Preservation Commissions in North Carolina* when preparing statement of significance. A link to the Handbook can be found on the SHPO website site at http://www.hpo.ncdcr.gov/commhome.htm. Specifically refer to the Criteria for Significance and Aspects of Integrity. Also state if the property rises to the level of significance needed for designation when compared with all others of its style, type and period in the county, town or city. For example, a building or structure might be a community's only surviving examples of Greek Revival architecture or it may be a unique local interpretation of the Arts and Crafts movement.

D. Landmark Boundary ☒
Describe the land area to be designated, address any prominent landscape features. Clearly explain the significance of the land area proposed for designation and its historical relationship to the building(s), structure(s) or object(s) located within the property boundary or, in the case of sites, the historical event or events that make the land area significant. For buildings and structures, the designated land area may represent part of or the entire original parcel boundaries, or may encompass vegetative buffers or important outbuildings. For objects, the designated land area may continue to provide the object's historic context (i.e., a statue's historic park setting). For sites, the designated area may encompass a landscape that retains its historic integrity (i.e. a battlefield encompassing undisturbed historic view sheds).

E. Bibliography ☒
Bibliography of sources consulted.

8. Photographs ☒
All photographs are required to be **<u>digital, in JPEG (.jpg) format, and submitted on a CD or DVD</u>**. Please note the following requirements:

- *<u>Minimum Standard:</u>* **6.5" x 4.5" at a resolution of 300ppi** (a pixel dimension of **1950 x 1350**)
- *<u>File Size:</u>* There is no maximum or minimum for the file size of an image; however, smaller file sizes may be necessary when emailing images.
- *<u>Proof Sheet:</u>* Proof sheets are required to show what is on a CD or DVD without having to load the disk. Proofs may be printed in either color or black and white as long as the images are crisp and legible. There should be a minimum of four and a maximum of six proofs per 8.5" x 11" sheet, with no image smaller than 3.25" on its longest side. Proofs should be labeled as they appear on the disk.
- *<u>Naming Images</u>*: Please label image files for the Local Designation Application as follows:

  LM_PropertyName Description.jpg
  Example: LM__Smith House_front façade.jpg)

For buildings and structures, include exterior photos of all elevations of the primary resource and any other contributing and non-contributing resources; photos of details of significant exterior features, such as notable trim; photos of the main building or structure within its setting; photos of each significant landscape feature; and photos of notable interior spaces, significant trim and other features. For objects, include a view of the object within its setting, as well as a variety of representative views. For sites, include overall views and any significant details.

9. Floor Plan (for buildings and structures) ☒

Please include a floor plan showing the original layout, approximate dimensions of all rooms, and any additions (with dates) to the building or structure. Drawings do not have to be professionally produced nor do they need to be to exact scale, but should accurately depict the layout of the property. (Building sketches from the Wake County property information website are not acceptable.)

10. Maps ☒

Include two (2) maps: one (1) clearly indicating the location of the property in relation to nearby streets and other buildings, and one (1) showing the proposed landmark boundary of the property and all significant resources. Tax maps with the boundaries of the property are preferred, but survey or sketch maps are acceptable. Please show street names and numbers and all structures on the property.

7A. PHYSICAL DESCRIPTION NARRATIVE

Alsey Thomas Olive House, ca. 1905

The Alsey Thomas Olive House (WA1043) is located at 2708 Olive Chapel Road in Apex, Wake County, North Carolina, approximately four miles from historic downtown Apex. The house faces south and is positioned roughly in the center of an irregularly shaped 0.66-acre lot on the north side of the road. In 2018, the parcel was subdivided from the Smith Farm residential subdivision, which is currently being developed on the land surrounding the parcel.

The lot is level and bounded by Olive Chapel Road on south side, Farmhouse Drive on the north side, Livestock Alley and a reserved open space lot for the Smith Farm subdivision on the east side. A gravel driveway at the western edge of the parcel accesses the property via Olive Chapel Road. The driveway bends to curve around the house and terminates at the parcel's east edge[1]. Two mature magnolia trees, which are visible on a 1938 aerial photograph, are situated in the front yard between the house and Olive Chapel Road. Other than these trees, there are no significant landscape features or outbuildings associated with the history of the dwelling as an anchor of a southwestern Wake County family farm.

Exterior

The Alsey Thomas Olive House was built circa 1905 and expanded in 2019. The 1905 section is a roughly H-shaped, two-story wood frame building with a one-story front porch (Plates 7.a.1 – 7.a.6). This core section consists of parallel east and west wings joined by a central connector containing the interior stair hall. In 2019, a second story was added on top of the formerly one-story east wing. The east wing was extended to the rear to equal the length of the west wing. The east wing addition mirrors the original west wing with its cornice returns and beadboard soffits. A 2019 one-story shed roof addition projects from the rear (north) elevation. Corbelled interior chimneys rises from the roof ridge of both the east and west wings.

The dwelling's restrained Queen Anne detailing is concentrated on its symmetrical façade, which is dominated by the front gables of the east and west wings. The wings have cut-away corners which create two projecting, three-sided bays on either side of the recessed central connector wing. The cut-away corners are decorated with gracefully curved brackets and pendants. The gable ends are embellished with returns, a wide plain frieze board, and fish scale shingles. Set under the peak of each front gable is a pair of arched louvered vents.

A one-story porch with a deck-on-hip roof extends across the front elevation. The porch is notable for its original vernacular Queen Anne decorative elements. The elements include six support posts with curved spandrels. The three-part posts have a turned central section with rectangular top and bottom sections. This treatment is repeated in a truncated manner on the porch balustrades, which consist of closely spaced balusters set between a plain handrail and bottom rail between the porch posts. The porch retains its original beadboard ceiling. In 2019, the porch floor was replaced with non-historic pressure treated lumber. The front door is tucked beneath the porch and centered in the recessed area between the two wings. The current, non-historic single-leaf door is scheduled to be replaced with a double-leaf door similar to the original ones that were removed at an unknown date. Double-light side lights flank the door which is surmounted by a double-light transom.

The main block of the house, the front porch, and two-story addition rest on a raised brick foundation of brick piers infilled with a later brick curtain wall. The foundation of the east ell and the shed roof rear addition is supported by concrete block that has been parged over. All the roof planes are covered with a metal roof installed in 2019. The main block of the house retains its original two-over-two double-hung wood sash windows. The four windows on the angled walls of the front bays are one-over-one.

1 The semicircular drive shown on the aerial photograph in Figure 10.2 does not reflect present conditions.

Original plain weatherboard siding covers the house. The east ell is covered with newly milled boards that match the original ones. The soffits are finished with beadboard. Plain corner boards are found throughout the house. All window and door openings exhibit plain wood surrounds with drip caps. The majority of the two-over-two double-hung wood sash windows remain in their original openings. New windows will be installed on the shed roof rear addition.

Interior

The Alsey Thomas Olive House has four rooms on the first floor and three original rooms on the second floor (Figures 9.1 and 9.2) (Plates 7.a.7 – 7.a.9). A 2019 addition expanded the first floor kitchen and added a breakfast nook and bathroom, and increased the second floor from three bedrooms to four (See Figures 9.1 and 9.2.) The rooms are oriented on either side of a central stair hall on both floors. The first floor has a dining room and kitchen on the east side of the hall and a living room and bedroom on the west side. A bathroom was added at the end of the central hall in 2019. The house retains much of its original materials including vertical waist-high beadboard wainscot, tongue-and-groove wood flooring, beadboard ceilings, and five-panel doors. The walls of the center hall are covered with diagonal beadboard wainscot.

Mantels are an important stylistic component of the house. Each of the four main rooms on the first story has a fireplace. The mantels of the dining room and living room are similar and feature a paneled lintel with a central raised medallion and plasters stacked with roundels, modillions, incised geometric designs and foliate carvings. In comparison, the first-floor bedroom mantel is plain with chamfered posts supporting a plain lintel. There are three fireplaces on the second floor. Each mantel is identical and features a lintel with a raised rectangular panel flanked by sawn pilasters.

7B. HISTORICAL BACKGROUND NARRATIVE AND ARCHITECTURAL CONTEXT

The Olives first settled in western Wake County, North Carolina during the early 1800s (Irene Kittinger 2019). By 1900, the large, extended family spread out in the area west of Apex to Chatham County, and from US 64 south to US 1 (Figure 7.b.1). The survey records located in the North Carolina State Historic Preservation Office list 13 historic properties that are affiliated with the Olive family. One of these properties is the circa 1905 Alsey Thomas Olive House (SHPO Survey Site No. WA 1043) located at 2708 Olive Chapel Road, which is the subject of this local landmark designation report. This report outlines the lives of two couples, Cader and Louisa Hunter Olive and their son and daughter-in-law Thomas Alsey "Tom" Olive and Caldenna "Enna" Markham Olive. Cader and Louisa assembled a farm of over 200 acres in western Wake County where Tom and Enna would build their Queen Anne-style home.

Like most Wake County residents of the nineteenth and early twentieth centuries, the Olives were engaged in agricultural work. They were also leaders in the educational and religious life of their immediate community. Cader and Louisa founded a community church, which became Olive Chapel Baptist Church, a cemetery, and a school in the 1850s. Their strong beliefs in the value of education were passed down through the generations as all of Tom and Enna's children were college educated, which was a notable accomplishment for a farm family in the early twentieth century. Tom and Enna's children attended North Carolina Women's College, Meredith College, Wake Forest College, and North Carolina State College.

The land associated with the Alsey Thomas Olive House came into the family in 1846 when Cader Olive (1813-1904) purchased 264 acres on "both sides of Big Beaver Creek" from his father's sister, Siddy Richardson, and her husband for $152 (Wake County Deed Book [WCDB] 88; page150). Cader and Louisa Hunter Olive (1817-1898) built a log dwelling on the tract on the south side of Olive Chapel Road. The Olives' log homestead stood until about 1976 and is not included in the 13 historic structures associated with the Olives (Belvin and Riggs 1983:371). The couple had 11 children and supported the family through farming and sawmilling. Cader and Louisa played a role in the development and growth of the local community, which became known as "Olive Chapel." The couple donated materials for the construction of the Olive Chapel Baptist Church located approximately 1.5 miles west of their home in 1850. What began as a family burial ground near the church grew into a large community cemetery containing hundreds of graves. They also established a school for local white children near the church. The church was the social and religious nexus of the Olive Chapel community which maintains an active congregation today.

In 1850, Cader owned at least two enslaved persons, a 22-year-old black woman and a 2-year-old old female child described as mulatto (US Federal Census Slave Schedule, 1850). The Cader and Louisa's assets and social status in their community placed them in the "large farm owner" socioeconomic group as defined by historian Kelly A. Lally. They were grouped with other farmers who owned several hundred acres but fewer than 20 slaves. This group was just below the planter class which included people who owned large, productive tracts in the more fertile northern and eastern parts of the county and held over 20 enslaved persons. The enslaved, slave-less yeoman farmers with fewer than 200 acres, and landless tenant farmers and laborers made up the bottom of the half of Wake County's antebellum socioeconomic ladder (Lally 1994:15–17). The Olives were well-off but were not among Wake County's economic elite.

Tom (1853-1926) and Enna (1860-1918) Olive were married in 1884. The young couple lived with the elder Olives in the log house. They benefitted from Cader and Louisa's status and, based on the long-term nature of their shared living arrangements, it can be assumed that the older and younger Olives remained close throughout their lives. Tom and Enna had two

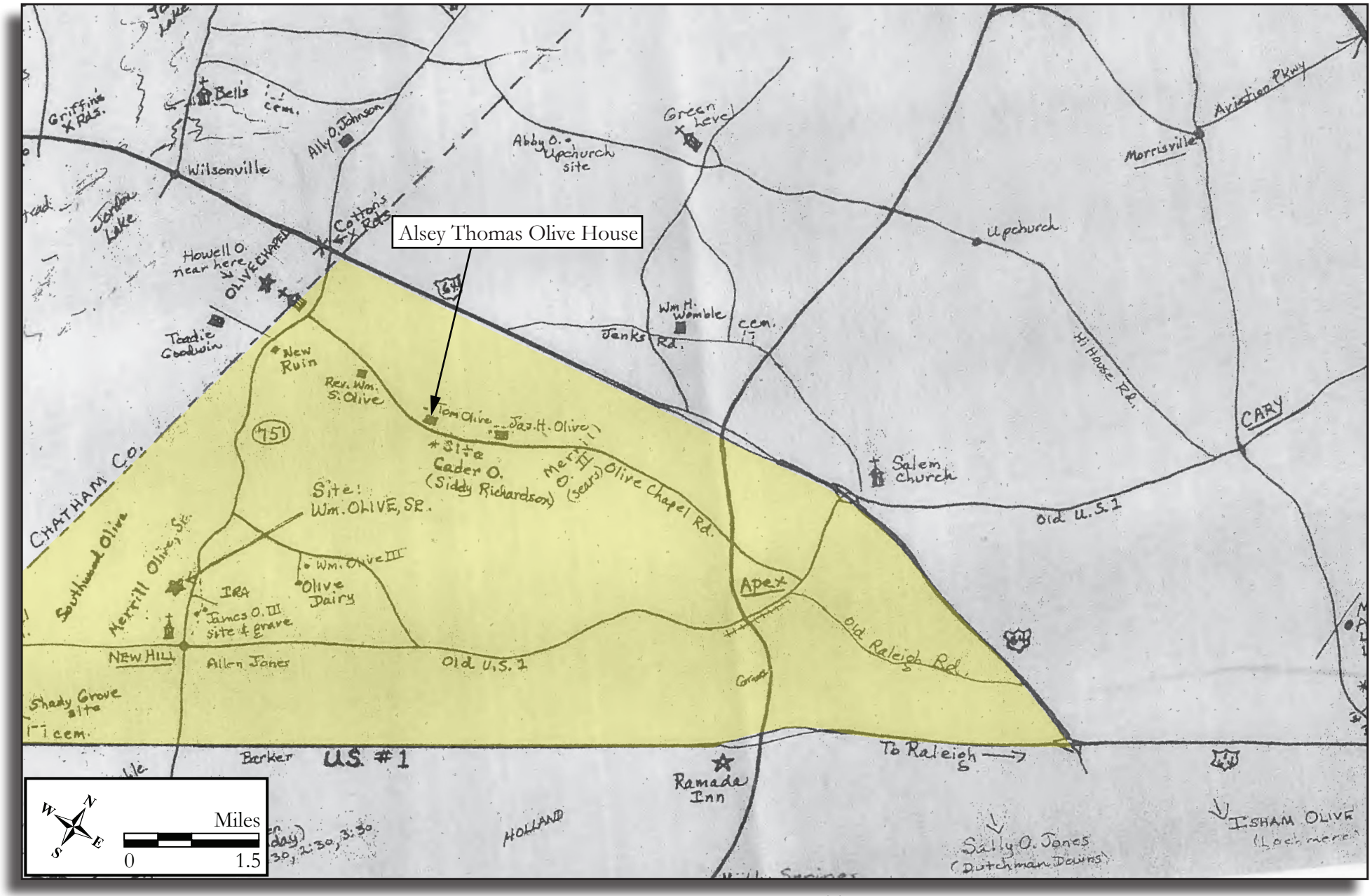

Figure 7.b.1: Sketch map of Olive Family sites in western Wake County showing the Alsey Thomas Olive House and sites related to the extended Olive family. Map drawn by Irene Kittinger, circa 1988 (Source: Elizabeth Reid Murray Collection, Box 344, Olivia Raney Local History Library).

children while living in Cader and Louisa's log house. Their first child was born in 1885 and did not survive his infancy. A second son, Thomas Homer (1886-1954), was born soon after. Around 1887, Tom embarked on a short-lived career in the lumber industry which took the young family away from Wake County. They first relocated to Manly, near Southern Pines, to help Enna's brothers operate a sawmill. It was in Manly that children Loula Bryan (1888-?), Luscious Bunyan "Bun" (1890-?), and Walter Wendell (c. 1893-1969) were born. The Olives moved again around 1891, this time to South Georgia, to work in the turpentine industry.

In 1894, Cader and Louisa sold two tracts of land "on the Waters of Big Beaver Creek in White Oak Township" to Tom and Enna for $1,000 (WCDB 190; page 347). The first parcel was identified as the "home tract" which corresponds with the 264 acres purchased by Cader and Louisa in 1846. The second tract is 2.5 acres on the south side of Beaver Creek that Cader had purchased from William Branch in 1860 (WCDB 38; page151).

The younger Olives' 1894 purchase of the family homeplace likely coincided with their return to North Carolina. They moved back to the log house with Cader and Louisa, expanded it, and had three more children: James Gordon (1897-1969), Nellie Irene (1900-1993), and Rachel Royster (1904-1990). Once back home, Tom and Enna took over farming from Cader and Louisa (1900 US Federal Census). The Olive farm produced a variety of crops such as tobacco, cotton, corn, wheat, and oats. Black Angus beef cattle, colts, sheep, chickens and hogs were raised. Louisa Olive died in 1898. Cader survived until 1904 (Belvin and Riggs 1983:371–372).

Around 1905 Tom and Enna completed construction of a new house on the north side of Olive Chapel Road across the road from the log house the extended family had shared since the mid-1880s. This is the dwelling that became known as the Alsey Thomas Olive House (WA 1043). Its precise construction date is unknown. Stylistic clues and family oral traditions date it to around 1905 (Figure 7.b.2). This would place the house's construction to near the time of Cader's death, so it is not known if he was involved in the design of the new house, or if he survived long enough to see it completed. In 1905, Tom and Enna's seven surviving children were between the ages of 2 and 19. The large house would have comfortably accommodated the family. Family oral history states that in 1908, Tom had a tennis court built for the family in an Oak Grove near the house; however, the court is not visible on historic aerial photographs (Belvin and Riggs 1983:371). Aerial photographs from 1938 and 1951 show a cluster of farm buildings on the south side of Olive Chapel Road directly across from the Alsey Thomas Olive House (Figures 7.b.3 and 7.b.4). It is possible that these buildings were constructed proximate to the family's original log house and that around 1905, when the family moved to the "modern" house on the north side of the road, the log house was converted for agricultural purposes. Outbuildings around the circa 1905 house on the north side of the Olive Chapel Road are notably absent on the 1938 and 1951 aerial photographs, suggesting that domestic and work areas were intentionally separated from one another.

Tom and Enna chose the Queen Anne style of architecture for their new home. The style was popular nationally, was a tasteful statement of the family's local status, and was well suited for its prominent location on Olive Chapel Road. The Olives were doing what many across the county were doing in the early years of the twentieth century, replacing dated, and in some cases primitive, antebellum houses with modern houses that referenced the latest style of architecture. The size and style of the Alsey Thomas Olive House suggests that the family was doing well financially at this time.

Nationally, the Queen Anne style replaced the Greek Revival, Italianate and picturesque styles of the Victorian period that were popular, at least in vernacular form, across North Carolina in the late 1800s. Queen Anne houses are characterized by their irregular and often asymmetrical massing and the exuberant use of complex decorative components. The advent of light "balloon" framing, which facilitated the style's complex massing and efficient methods for the mass production and rail distribution of decorative building elements, enabled the spread of the style from about 1890 to its gradual replacement with the Colonial Revival style beginning around 1910. Decorative exterior trim



Figure 7.b.2: Archival photograph of the Alsey Thomas Olive House, undated (Source: Capital Area Preservation).



Figure 7.b.3: 1938 aerial photograph of Wake County (Source: USDA Historical Aerial Photos, UNC Libraries).

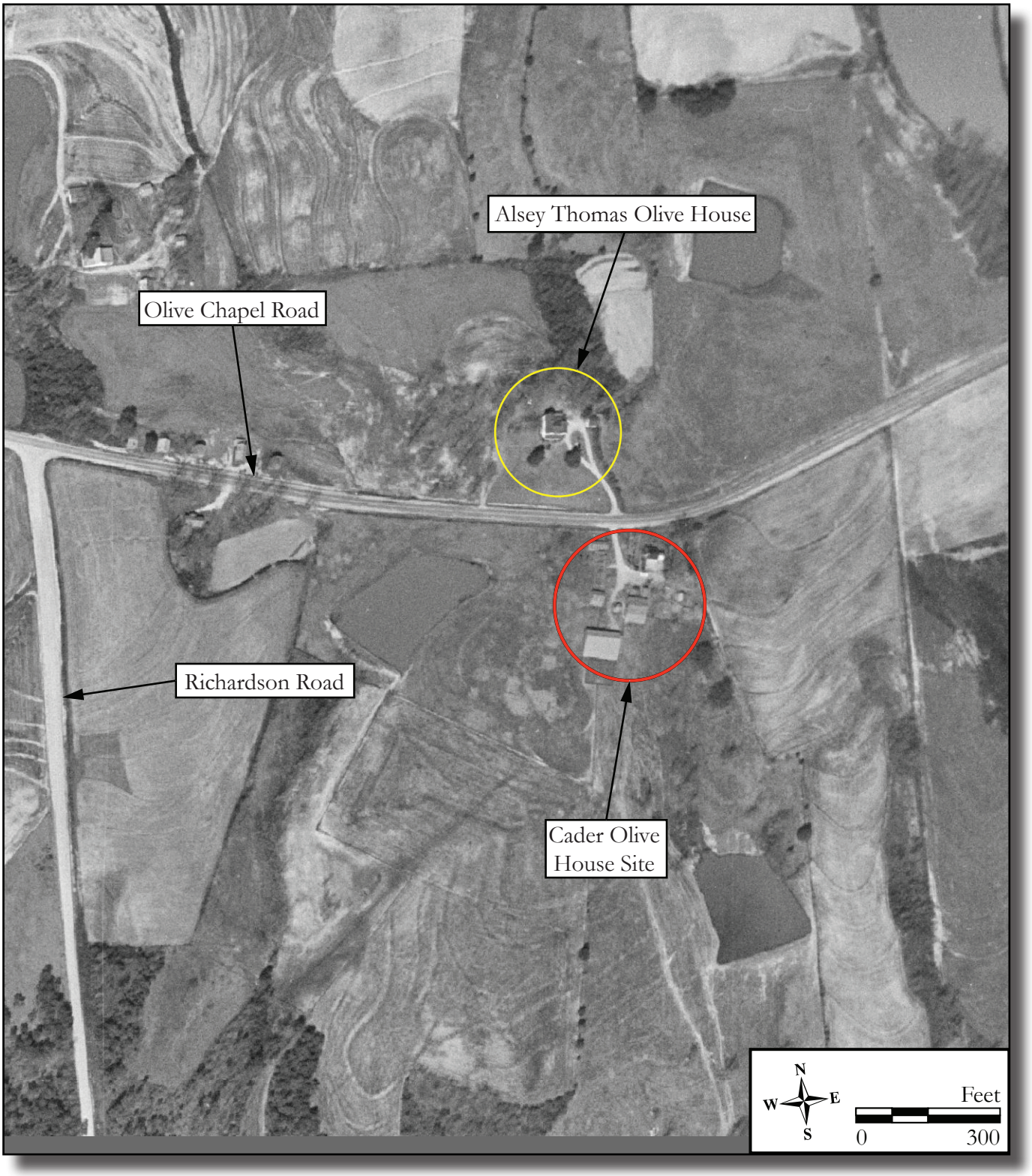

Figure 7.b.4: 1959 aerial photograph of Wake County (Source: USDA Historical Aerial Photos, UNC Libraries).

such as finials, vergeboards, sawn cornice brackets, pendants, and patterned shingles and faux half timbering, were common. An elaborately decorated one-story porch with turned posts and balustrades was often the focal point of the facade. The porch could also feature a punched or spindled frieze, or on more modest houses, sawn brackets or spandrels. Double-leaf entry doors were common, often with frosted or stained-glass windows over raised panels. Window and vent openings were often arched (McAlester and McAlester 2000:263–268).

In Wake County's towns during the early twentieth century, the Queen Anne style was popular as a statement of the taste and affluence of their most prominent residents. However, the style was interpreted vernacularly in rural areas, often as simple, traditional boxy house forms, such as one- and two-story "Triple-A" houses, embellished with mass-produced decorative trims. In Apex, five miles from the Alsey Thomas Olive House, the circa 1889 Baucom-Olive House, a one-story L-plan cottage, has been designated an Apex Historic Landmark as one of the town's "most distinctive" examples of the Queen Anne style" (Capital Area Preservation 2013a)(Figure 7.b.5). Another Apex Historic Landmark is the circa 1909 J.M. Williams House at 4525 Green Level Church Road (Figure 7.b.6). This ornately detailed and turreted house is significant as a "unique high-style late Queen Anne farm house" (Capital Area Preservation 2013b). A third landmark property, the circa 1905 Williams-Upchurch House located at 7312 Roberts Road in Apex, is one of the most similar houses to the Alsey Thomas Olive House (Figure 7.b.7). Built around the same time, both houses possess similar distinctive massing: a transverse main block with twin projecting front gables. The Alsey Thomas Olive House and these three historic landmark properties represent the evolution of the Queen Anne style in western Wake County from its first appearance in the 1880s to its gradual replacement by the Colonial Revival style beginning around 1910. In fact, the Alsey Thomas Olive House is a purer representation of the late vernacular Queen Anne type since its turned porch posts are more Queen Anne in style than that of the Colonial Revival porch columns on the Upchurch-Williams House. As Wake County is currently nearing the end of its transition from an agrarian to a suburban landscape, surviving historic buildings such as the Alsey Thomas Olive House hold even more value for the understanding of life during a particular time and place.

Enna Olive died in 1919. The 1920 census listed Alsey T. Olive as a widowed head of household with four children between the ages of 16 and 26 and his mother-in-law also residing in the home (1920 US Federal Census). Tom supported the family through "general farming" and owned the home and farm outright. Tom married Mattie Overton (1875-1948) sometime after 1920 and died of "myocarditis" at the age of 73 on October 28, 1926 (North Carolina Bureau of Vital Statistics 1926). He was buried in the original Olive family cemetery across from the Olive Chapel Baptist Church. Tom willed one-third of his "real and personal property" to Mattie "for her life or widowhood" (Wake County Will Book J; page 189). Mattie was also to receive one-third of the rents from the farm along with the residence and furniture. Two-thirds of Tom's property was to be divided among his seven surviving children. Mattie's one-third share was to be divided equally among them when she died or remarried.

It is not known if Mattie Olive stayed in the house after Tom's death. She died in 1948 in Richmond, Virginia. In 1928, she and several of Tom's heirs (L.B. Olive [assumed to be Tom's son Lucious Bunyan] and wife Nell, Nellie Goodwin and husband Carl, and Rachel Olive, unmarried) sold 292 acres to Tom's sons Walter and James Gordon Olive for $1,500 (WCDB 541; page 539). Walter and James had been operating a dairy farm near Southern Pines since 1921 but James returned to run the family farm and occupy the house (Belvin and Riggs 1983:371). Walter relinquished his ownership to James via a quit claim proceeding in 1944 (WCDB 913; page 639).

James Gordon Olive and his wife Pauline A. Olive resided in the Alsey Thomas Olive House from about 1930 to the 1980s. The 1940 US Census lists the couple living on the farm with daughters Betty, seven years old, and Sherley (sic) four years old (1940 US Federal Census). Sometime after 1940, a third daughter named Mary was born. The census valued the dwelling at $1,700 and James Olive's farm income from the previous year was $3,000. In addition to farming, James worked for the state



Figure 7.b.5: Baucomb-Olive House, 206 S. Salem Street, Apex
(Courtesy: Capital Area Preservation).



Figure 7.b.6: J.M. Williams House, 4225 Green Level Wert Road, Apex
(Courtesy: Capital Area Preservation).



Figure 7.b.7: Williams-Upchurch House, 7213 Roberts Road, Apex
(Courtesy: Capital Area Preservation).

Soil Conservation Service promoting the construction of farm ponds throughout Wake and Lee counites (Belvin and Riggs 1983:371). The numerous manmade ponds on the north and south sides of Olive Chapel Road are vestiges of his efforts.

James Gordon Olive died in 1969. Beginning around 1980, Pauline began deeding fractional shares of the 186-acre farm to her daughter Shirley Olive Eakes Carraway. Shirley and her second husband Harry F. Carraway eventually occupied the house and about 10 acres. The remainder of the farm acreage was divided among her sons (Smith 2019). In 2017, the developer and homebuilder Lennar Carolinas assembled 225 acres from Shirley Carraway and the Smith family in order to build the 500-home Smith Farms residential subdivision (Hoyle 2017).

In 2019, Mike Ingram purchased the 0.66–acre parcel containing the Alsey Thomas Olive House from Lennar Carolinas. Mr. Ingram has undertaken a full restoration of the house using the Secretary of the Interior's Standards for Rehabilitation and plans by historic preservation architects Maurer Architecture as guides. As part of the project, an addition was added to the north side and the vinyl siding was removed to expose the original weather boards of the exterior. Capital Area Preservation holds a historic preservation easement on the house. The easement will protect its historic character in perpetuity.

7C. SIGNIFICANCE STATEMENT

The circa 1905 Alsey Thomas Olive House, located at 2708 Olive Chapel Road in Apex, Wake County, North Carolina, is locally significant for its Queen Anne architecture. The house is historically associated with the Olive family, a multi-generational family of successful farmers and community leaders in western Wake County. The house possesses architectural significance as one of a dwindling number of surviving and intact rural Queen Anne-style houses in western Wake County. Locally, Queen Anne houses borrowed decorative elements from their high-style, urban counterparts and paired down these elements and applied them to more modest house forms. Key Queen Anne-influenced features of the Alsey Thomas Olive House are its fishtail shingles in the front gables, the sawn brackets and pendants that top the cut-way bays, and a showpiece front porch of turned posts and balusters and arched spandrels. While the house's historic agricultural setting has been compromised by suburban development, it remains on its original site on land that was owned by the Olive family for 171 years, from 1846 to 2017. The dwelling retains excellent overall physical integrity and its exterior largely reflects how the house appeared in circa 1905. The 2019 addition was built on the rear elevation and did alter the facade or obscure any of the house's character defining architectural features. The interior retains its original floor plan and much of the interior finish materials have survived. Its preserved state informs us about popular tastes, vernacular adaptations, and locally available and prevalent building materials and techniques that upper middle-class families used in early twentieth-century western Wake County.

7D. LANDMARK BOUNDARY

The Alsey Thomas Olive House is situated on a 0.66–acre parcel at 2708 Olive Chapel Road in Apex, Wake County, North Carolina. The house, built circa 1905, is the only structure on the parcel and is the key contributing resource to the landmark. The two mature magnolia trees in front of the house on the south side were planted around the time of the house's construction and are categorized as contributing resources to the historic landmark. The landmark boundary is the same as the legal parcel (PIN 0721392386) and encompasses the land around the house, which is all that remains of the Olives' farm, that at one time was over 200 acres.

The landmark designation applies to the above-mentioned parcel and the house's exterior envelope. Interior features are not proposed for landmark designation.

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8. PHOTOGRAPHS



Plate 7.a.1: South elevation, front of the house.

Photo view: North

Photographer: Olivia Heckendorf

Date: October 30, 2019



Plate 7.a.2: East elevation.

Photo view: West

Photographer: Olivia Heckendorf

Date: October 30, 2019



Plate 7.a.3: South elevation.

Photo view: North

Photographer: Olivia Heckendorf

Date: October 30, 2019



Plate 7.a.4: West elevation.

Photo view: East

Photographer: Olivia Heckendorf

Date: October 30, 2019



Plate 7.a.5: Porch detail.

Photo view: North

Photographer: Olivia Heckendorf

Date: October 30, 2019



Plate 7.a.6: Trim detail.

Photo view: North

Photographer: Olivia Heckendorf

Date: October 30, 2019



Plate 7.a.7: Dining room fireplace.

Photo view: North

Photographer: Olivia Heckendorf

Date: October 30, 2019



Plate 7.a.8: First floor bedroom fireplace.

Photo view: South

Photographer: Olivia Heckendorf

Date: October 30, 2019



Plate 7.a.9: Second floor bedroom showing mantel, typical 5-panel door and beadboard wainscot.

Photo view: Northwest

Photographer: Olivia Heckendorf

Date: October 30, 2019

9. FLOOR PLANS

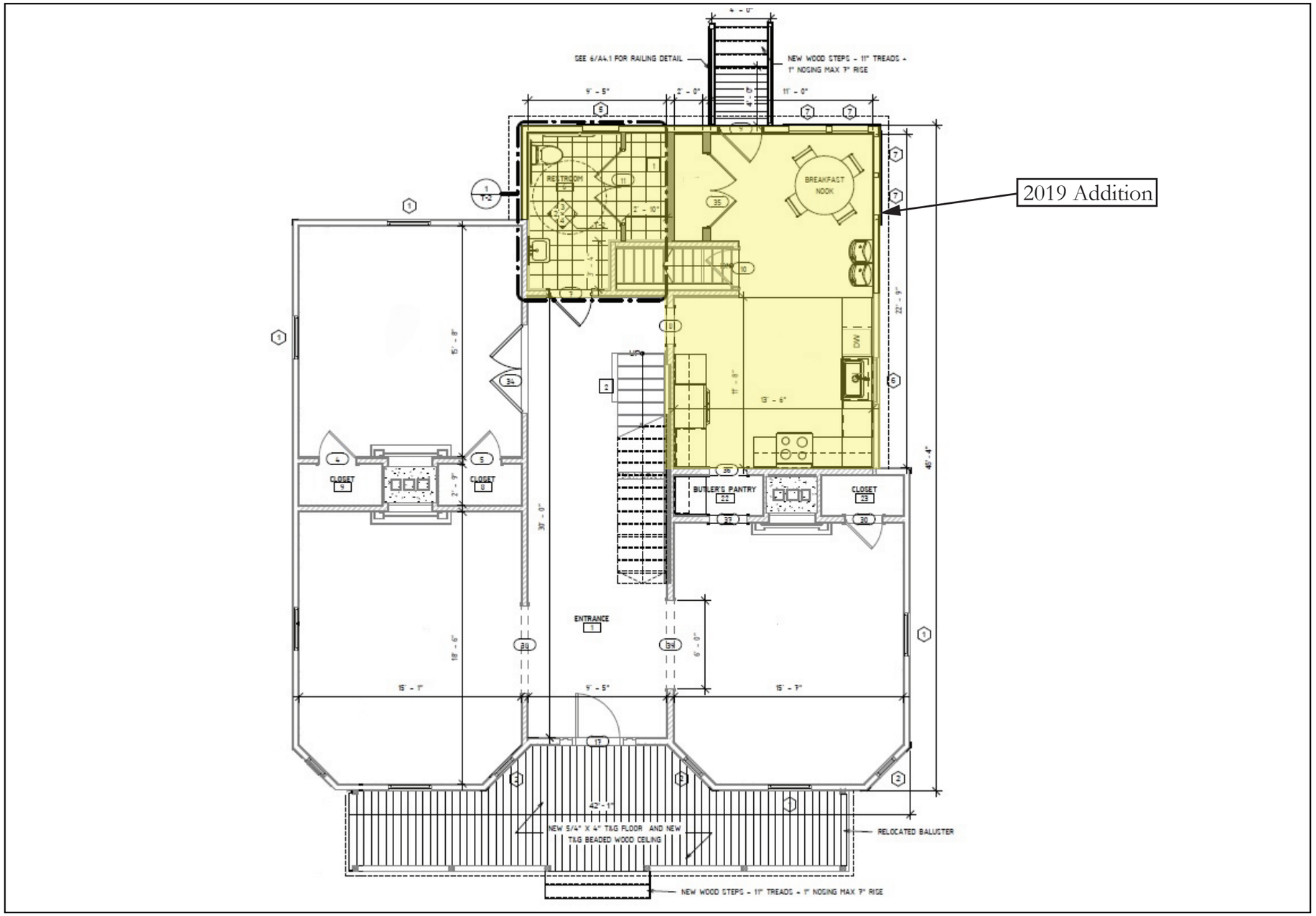

Figure 9.1: First floor plan by Maurer Architecture.

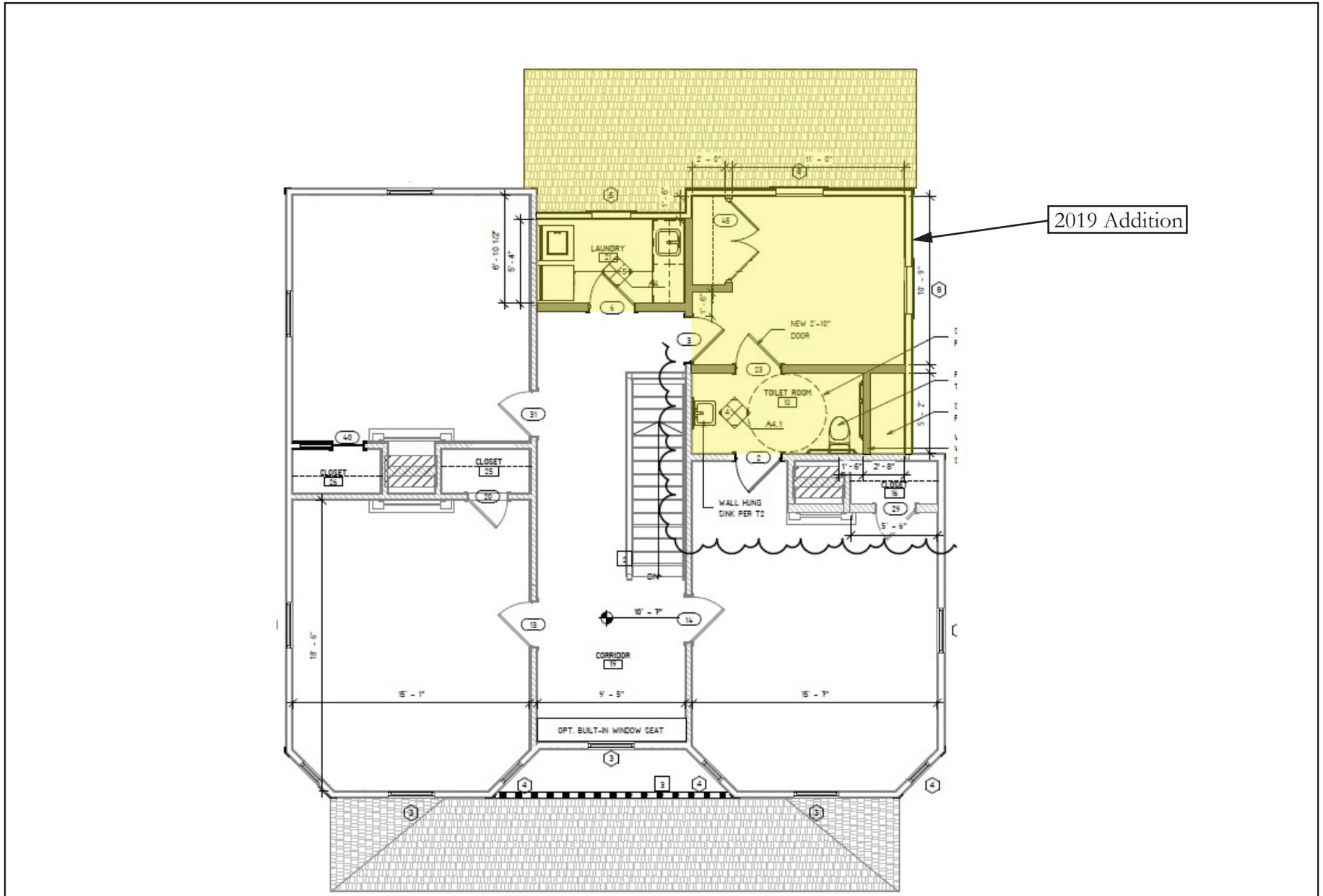

Figure 9.2: Second floor plan by Maurer Architecture.

10. MAPS

SECTION 10

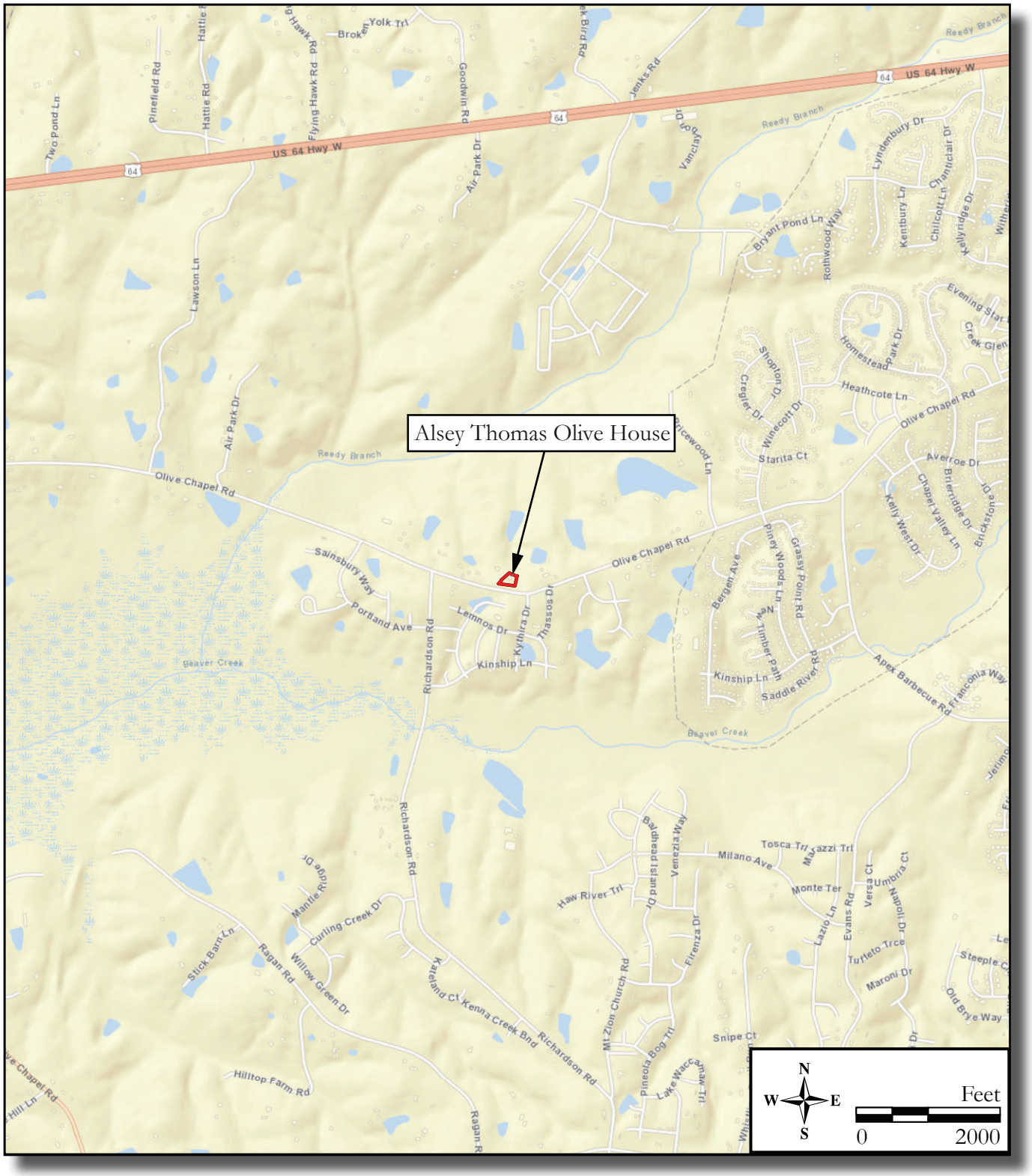

Figure 10.1: Alsey Thomas Olive House location map
(World Street Map, ESRI 2016).

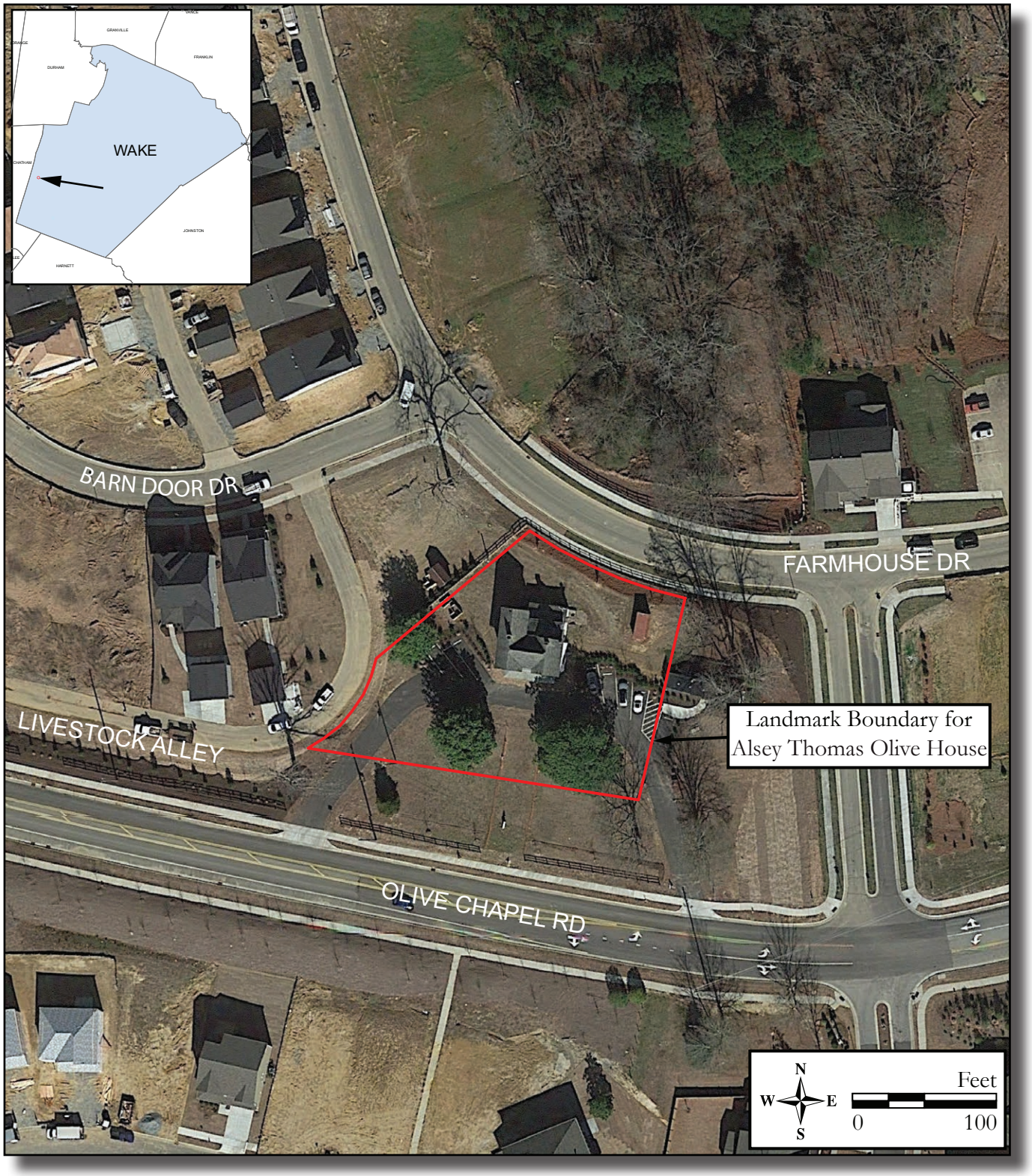

Figure 10.2: Aerial map showing Landmark boundary for Alsey Thomas Olive House (from Google Earth, Imagery date 2/4/2019).

TOWN OF APEX
POST OFFICE BOX 250
APEX, NORTH CAROLINA 27502
PHONE 919-249-3426

PUBLIC NOTIFICATION OF PUBLIC HEARINGS

Historic Landmark Designation
Tom Olive House

Pursuant to the provisions of North Carolina Statutes Section § 160A-400.1. through § 160A-400.15. and to the Town of Apex Unified Development Ordinance (UDO) Section 2.2.11, notice is hereby given of public hearings before the Town Council of the Town of Apex. The purpose of these hearings is to consider the following:

Applicant/Property Owner: Michael A. Ingram
Property Address: 2708 Olive Chapel Road
Acreage: ± .66
Property Identification Number (PIN): 0721392386
2045 Land Use Map Designation: Low Density Residential
Zoning of Property: Planned Unit Development-Conditional Zoning (PUD-CZ #15CZ32)

Public Hearing Location: Apex Town Hall
73 Hunter Street, Apex, North Carolina
Council Chambers, 2nd Floor

Town Council Public Hearing Date and Time: December 17, 2019 7:00 P.M.

Vicinity Map:



All interested parties may appear at the public hearing and be heard with respect to the application. Maps showing the location for the above site(s) to be considered in addition to a copy of the 2045 Land Use Map can be inspected at the Apex Town Hall or call 919-249-3426, Department of Planning and Community Development, for further information. To view the petition and related documents on-line: https://www.apexnc.org/DocumentCenter/View/30055/.

Dianne F. Khin, AICP
Planning Director

Published Dates: November 27, 2019 – December 17, 2019

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Dianne F. Khin, AICP
Planning Director

Published Dates: November 27, 2019 – December 17, 2019

1:25 PM
11/27/2019

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: PUBLIC HEARING

Meeting Date: December 17, 2019

Item Details

Presenter(s): Shelly Mayo, Planner II

Department(s): Planning Department

Requested Motion

Public hearing and possible motion to approve and adopt by resolution the *2020-2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan*.

Approval Recommended?

Planning Staff recommends approval.

Planning Board heard this at the December 9, 2019 meeting and unanimously voted to recommend approval and adoption of the plan.

Item Details

**

Attachments

- Staff Report
- 2020-2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan
- U.S. Department of Homeland Security FEMA Region IV approval letter
- Resolution to Adopt the Wake County Multi-Jurisdictional Hazard Mitigation Plan
- Public Notice

STAFF REPORT
2020 - 2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan Adoption
December 17, 2019 Town Council Meeting

The purpose of this public hearing is to receive public comments and make a recommendation to Town Council on the adoption of the Wake County Multi-Jurisdictional Hazard Mitigation Plan.

Attachments

1. Wake County Multi-Jurisdictional Hazard Mitigation Plan
2. U.S. Department of Homeland Security FEMA Region IV approval letter
3. Resolution to Adopt the Wake County Multi-Jurisdictional Hazard Mitigation Plan

Wake County Multi-Jurisdictional Hazard Mitigation Plan:
In an effort to reduce the nation's mounting natural disaster losses, the U.S. Congress passed two acts, both of which require state and local governments to develop hazard mitigation plans as a condition for federal mitigation grant assistance. The acts are:

- the 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act and
- the Disaster Mitigation Act of 2000 (DMA 2000).

These funds are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security, and include:

- the Hazard Mitigation Grant Program (HMGP),
- the Pre-Disaster Mitigation Program (PDM), and
- the Flood Mitigation Assistance Program (FMA).

DMA 2000 also requires that jurisdictions update their hazard mitigation plans every five years. If the approved hazard mitigation plan expires and a new one is not adopted, that jurisdiction is not eligible for those grants.

The Town of Apex's initial Hazard Mitigation Plan was approved in 2004, and has been updated every 5 years since. The Update Plan includes a review of the last five years to ensure the Hazard Mitigation Action Plan has been completed, a list of any hazard mitigation or issues that have occurred in the last five years, and a plan for the next five years.

In 2014, Wake County and the municipalities within the County joined together to develop the first Wake County Multi-Jurisdictional Hazard Mitigation Plan. Previously, each jurisdiction had developed its own, individual Hazard Mitigation Plan. The 2014 Multi-Jurisdictional Hazard Mitigation Plan will expire in January 2020. In order to remain compliant with federal regulations, the Wood Company was contracted by the North Carolina Division of Emergency Management to complete the 2020 – 2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan.

Who Will Benefit From This Plan?
The citizens and businesses of Apex are the ultimate beneficiaries of the 2020 - 2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan. The plan strives to reduce risk for those who live in, work in, and visit Apex. It provides a viable planning framework for all foreseeable hazards that may impact the Town. Participation in development of the plan by key stakeholders has helped to ensure mutually beneficial outcomes. The resources and background information in the plan are applicable town-wide, and the plan's goals and recommendations lay groundwork for the development and implementation of local mitigation activities and partnerships.

The 2020 - 2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan seeks to reduce the instances where the worlds of violent natural occurrence and the human environment intersect. By reducing the risk of

personal injury and property damage, a community can lessen the effects of a "disaster" when one of these events crosses paths with people.

Town of Apex Hazard Mitigation Plan Members
Each year, the Hazard Mitigation Plan members meet to discuss and review the Hazard Mitigation Plan. To prepare for the updated Wake County Multi-Jurisdictional Hazard Mitigation Plan the members met several times in 2019.

The Hazard Mitigation Plan Members include the following:

Department	Committee Designee
Administration	Drew Havens, Town Manager Shawn Purvis, Assistant Town Manager Marty Stone, Assistant Town Manager (formerly Water Resources Director) David Hughes, Assistant Town Manager (retired)
Electric	Rodney Smith, Technical Services Manager
Finance	Vance Holloman, Director
Fire Department	Keith McGee, Fire Chief Preston Clark, Assistant Chief
Information Technology	Erika Sacco, Director Mike Boyd, Analyst
Parks & Recreation	John Brown, Director
Planning	Amanda Bunce, Current Planning Manager Shelly Mayo, Planner II Will Brown, GIS Analyst
Police	John Letteney, Police Chief Captain Joseph Best
Public Works & Transportation	Jose Martinez, Director Adam Stephenson, Floodplain Administrator Chad Lemasters, Public Works Operations Manager Randy Bennetts, Street Supervisor
Water Resources	Mike Deaton, Stormwater and Utility Engineering Manager

ACTION PLAN
The 2020 - 2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan includes an Action Plan for each jurisdiction; the Town of Apex's Plan is listed in Annex C, which is included in Attachment 1 (starting on page 310). The Action Plan includes action items that reduce the Town of Apex's vulnerability to the effects of natural hazards. The Action Plan is the core of the Hazard Mitigation Plan and includes an outline of mitigation actions by each department, priority, and target date of completion. Many of these items are also listed in the Town's Capital Improvement Plan. The Plan recommends an annual report outlining progress on Mitigation Action Implementation. The annual report ensures that goals and objectives continue to address current and expected conditions.

STATUS
The North Carolina Division of Emergency Management and FEMA have completed a State and Federal review of the Wake County Multi-Jurisdictional Hazard Mitigation Plan Update for compliance with the federal hazard mitigation planning standards (Please see Attachment 2).

In order for the North Carolina Division of Emergency Management and FEMA to issue a formal approval of the

plan, the Town of Apex and other Wake County jurisdictions must submit documentation of the final public meeting and adoption. Upon submittal of these items the State and FEMA will issue formal approval of the Wake County Multi-Jurisdictional Hazard Mitigation Plan.

PLANNING STAFF RECOMMENDATION:
Planning Staff recommends approval and adoption of the 2020 - 2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan.

PLANNING BOARD RECOMMENDATION:
Planning Board heard this proposal at the December 9, 2019 public hearing. They unanimously voted to recommend approval and adoption of the 2020 - 2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan.

WAKE COUNTY
NORTH CAROLINA

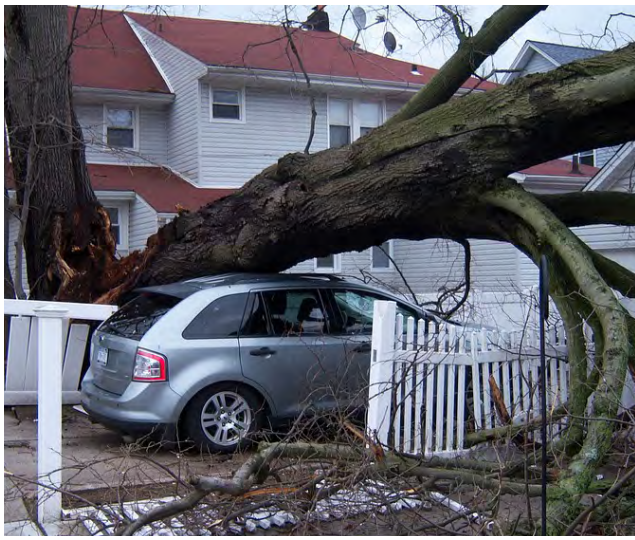
Wake County, North Carolina

Multi-Jurisdictional Hazard Mitigation Plan









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1 Introduction

Section 1 provides a general introduction to hazard mitigation and an introduction to the Wake County Multi-Jurisdictional Hazard Mitigation Plan. This section contains the following subsections:

- 1.1 Background
- 1.2 Purpose and Authority
- 1.3 Scope
- 1.4 References
- 1.5 Plan Organization

1.1 BACKGROUND

This document comprises a Hazard Mitigation Plan for Wake County, North Carolina and its incorporated municipalities.

Each year in the United States, natural and human-caused hazards take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses incurred by insurance companies and non-governmental organizations are not reimbursed by tax dollars. Many natural hazards are predictable, and much of the damage caused by hazard events can be reduced or even eliminated.

Hazards are a natural part of the environment that will inevitably continue to occur, but there is much we can do to minimize their impacts on our communities and prevent them from resulting in disasters. Every community faces different hazards, has different resources to draw upon in combating problems, and has different interests that influence the solutions to those problems. Because there are many ways to deal with hazards and many agencies that can help, there is no one solution for managing or mitigating their effects. Planning is one of the best ways to develop a customized program that will mitigate the impacts of hazards while accounting for the unique character of a community.

A well-prepared hazard mitigation plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and with other goals and activities, preventing conflicts and reducing the costs of implementing each individual activity. This plan provides a framework for all interested parties to work together toward mitigation. It establishes the vision and guiding principles for reducing hazard risk and proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

In an effort to reduce the nation's mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) to invoke new and revitalized approaches to mitigation planning. Section 322 of DMA 2000 emphasizes the need for state and local government entities to closely coordinate on mitigation planning activities and makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation (PDM) program, and the Flood Mitigation Assistance (FMA) Program, all of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

This plan was prepared in coordination with FEMA Region IV and the North Carolina Division of Emergency Management (NCEM) to ensure that it meets all applicable federal and state planning requirements. A Local Mitigation Plan Review Tool, found in Appendix A, provides a summary of FEMA's current minimum standards of acceptability and notes the location within this plan where each planning requirement is met.

1.2 PURPOSE AND AUTHORITY

This plan was developed in a joint and cooperative manner by members of a Hazard Mitigation Planning Committee (HMPC) which included representatives of County, City, and Town departments, federal and state agencies, citizens, and other stakeholders. This plan will ensure Wake County and its incorporated municipalities remain eligible for federal disaster assistance including the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA).

This Plan has been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S.C. 5165, enacted under Section 104 of the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at CFR 201.6 and 201.7 dated October 2007.

This plan will be adopted by each participating jurisdiction in accordance with standard local procedures. Copies of adoption resolutions are provided in Section 9 Plan Adoption.

1.3 SCOPE

This document comprises a Multi-Jurisdictional Hazard Mitigation Plan for Wake County. The planning areas includes all of Wake County's incorporated municipalities and unincorporated areas. All participating jurisdictions are listed in Table 1.1.

Table 1.1 – Participating Jurisdictions in the Wake County Multi-Jurisdictional Hazard Mitigation Plan

Wake County	
Apex	Morrisville
Cary	Raleigh
Fuquay-Varina	Rolesville
Garner	Wake Forest
Holly Springs	Wendell
Knightdale	Zebulon

The focus of this plan is on those hazards deemed "high" or "moderate" priority hazards for the planning area, as determined through the risk and vulnerability assessments. Lower priority hazards will continue to be evaluated but will not necessarily be prioritized for mitigation in the action plan.

Wake County followed the planning process prescribed by the Federal Emergency Management Agency (FEMA), and this plan was developed under the guidance of a Hazard Mitigation Planning Committee (HMPC) comprised of representatives of County, City, and Town departments; citizens; and other stakeholders. The HMPC conducted a risk assessment that identified and profiled hazards that pose a risk to the planning area, assessed the planning area's vulnerability to these hazards, and examined each participating jurisdiction's capabilities in place to mitigate them. The hazards profiled in this plan include:

- Dam Failure
- Drought
- Earthquake
- Extreme Heat
- Flood

- Hurricane and Tropical Storm
- Landslide
- Severe Weather (Thunderstorm Winds, Hail, and Lightning)
- Severe Winter Storm
- Tornado
- Wildfire
- Hazardous Materials Incident
- Radiological Incident
- Terrorism

1.4 REFERENCES

The following FEMA guides and reference documents were used to prepare this document:

- FEMA 386-1: Getting Started. September 2002.
- FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001.
- FEMA 386-3: Developing the Mitigation Plan. April 2003.
- FEMA 386-4: Bringing the Plan to Life. August 2003.
- FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007.
- FEMA 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005.
- FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003.
- FEMA 386-8: Multijurisdictional Mitigation Planning. August 2006.
- FEMA 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008.
- FEMA. Local Mitigation Planning Handbook. March 2013.
- FEMA. Local Mitigation Plan Review Guide. October 1, 2011.
- FEMA National Fire Incident Reporting System 5.0: Complete Reference Guide. January, 2008.
- FEMA Hazard Mitigation Assistance Unified Guidance. June 1, 2010.
- FEMA. Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials. March 1, 2013.
- FEMA. Mitigation Ideas. A Resource for Reducing Risk to Natural Hazards. January 2013.

Additional sources used in the development of this plan, including data compiled for the Hazard Identification and Risk Assessment, are listed in Appendix D.

1.5 PLAN ORGANIZATION

The Wake County Multi-Jurisdictional Hazard Mitigation Plan is organized into the following sections:

- Section 2: Planning Process
- Section 3: Planning Area Profile
- Section 4: Hazard Identification & Risk Assessment
- Section 5: Capability Assessment
- Section 6: Mitigation Strategy
- Section 7: Mitigation Action Plans
- Section 8: Plan Adoption
- Section 9: Plan Implementation and Maintenance
- Appendix A: Local Plan Review Tool
- Appendix B: Planning Process Documentation
- Appendix C: Mitigation Alternatives
- Appendix D: References

2 Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan. To develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
Requirement §201.6(c)(1): The plan shall include the following:
1) Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

This section provides a review of the planning process followed for the development of the Wake County Multi-Jurisdictional Hazard Mitigation Plan. It consists of the following sub-sections:

- 2.1 Purpose and Vision
- 2.2 History of Hazard Mitigation Planning
- 2.3 Preparing the Plan
- 2.4 Hazard Mitigation Planning Committee
- 2.5 Meetings and Workshops
- 2.6 Involving the Public
- 2.7 Outreach Efforts
- 2.8 Involving the Stakeholders
- 2.9 Documentation of Plan Progress

2.1 PURPOSE AND VISION

As defined by FEMA, "hazard mitigation" means any sustained action taken to reduce or eliminate the long-term risk to life and property from a hazard event. Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented.

The purpose of the Wake County Multi-Jurisdictional Hazard Mitigation Plan is to identify, assess, and mitigate hazard risk to better protect the people and property within Wake County from the effects of natural and human-caused hazards. This plan documents progress on existing hazard mitigation planning efforts, updates the previous plan to reflect current conditions in the County including relevant hazards and vulnerabilities, increases public education and awareness about the plan and planning process, maintains grant eligibility for participating jurisdictions, maintains compliance with state and federal requirements for local hazard mitigation plans, and identifies and outlines strategies the County and participating jurisdictions will use to decrease vulnerability and increase resiliency.

The Wake County Hazard Mitigation Planning Committee (HMPC) met in working groups on January 7th and January 9th, 2019; during these meetings, the HMPC discussed their vision for Wake County in terms of hazard mitigation planning. The committee was asked to consider what the successful implementation of the plan would achieve, what outcomes the plan would generate, and what Wake County will look like in five years as a way to brainstorm a vision statement for the plan. The HMPC developed and discussed a list of ideas that were consolidated into the following statement and set of key principles that they agreed should define and guide the planning process and the County's approach to hazard mitigation.

Wake County will build upon the success of its past efforts to become more resilient and adaptable to hazards, embrace the need to manage growth with sustainable practices, and make intentional, coordinated decisions that maximize long-term and shared benefits for all.

The following key principles underpin this vision and describe how the HMPC hopes to characterize the future of Wake County. In many cases, the County and its incorporated jurisdictions already operate with these principles in mind.

Resilient & Adaptable: Wake County will be able to quickly react to and recover from hazard events and will use both the development and post-disaster redevelopment processes to reduce existing vulnerabilities and future potential risk, including through identification and planning for vulnerable populations.

Sustainable: From an environmental mindset, Wake County will protect key ecological resources, and from a resource and efficiency perspective, the county will use administrative and financial resources in ways that maximize and share benefits.

Intentional: Wake County will address growth and development decisions by considering long-term outcomes, seeking opportunities for mitigation, minimizing risk and vulnerability, and implementing mitigation projects that can be scaled up or shared with other jurisdictions, if successful.

Coordinated: Wake County will integrate planning efforts across departments and across incorporated jurisdictions to ensure that goals and decisions reinforce each other. Additionally, jurisdictions will work together to address issues on larger scales, such as a watershed or ecosystem level.

2.2 WHAT'S CHANGED IN THE PLAN

This plan is an update to the 2015 Wake County Multi-jurisdictional Hazard Mitigation Plan, which included participation from all jurisdictions involved in this plan update. The previous plan was approved by FEMA on January 28, 2015.

This hazard mitigation plan update involved a comprehensive review and update of each section of the existing plan and an assessment of the success of the County and participating municipalities in evaluating, monitoring and implementing the mitigation strategy outlined in their existing plans. Only the information and data still valid from the existing plans was carried forward as applicable into this update. The following requirements were addressed during the development of this regional plan:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to inventories; and
- Incorporate new action recommendations or changes in action prioritization.

Section 4.2 provides a comparison of the hazards addressed in the 2018 State of North Carolina HMP and the existing Wake County plan and provides the final decision made by the HMPC as to which hazards should be included in the updated 2020 Wake County Multi-Jurisdictional Plan.

In addition to the specific changes in hazard analyses identified in Section 4.2, the following items were also addressed in this 2020 plan update:

- GIS was used, to the extent data allowed, to analyze the priority hazards as part of the vulnerability assessment.
- Assets at risk to identified hazards were identified by property type and values of properties based on North Carolina Emergency Management's IRISK Database.
- A discussion on climate change and its projected effect on specific hazards was included in each hazard profile in the risk assessment.
- The discussion on growth and development trends was enhanced utilizing 2017 American Community Survey data.
- Enhanced public outreach and agency coordination efforts were conducted throughout the plan update process in order to meet the more rigorous requirements of the 2017 CRS Coordinator's Manual, in addition to DMA requirements.

2.3 PREPARING THE PLAN

The planning process for preparing the Wake County Multi-jurisdictional Hazard Mitigation Plan was based on DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

1) Planning Process;
2) Risk Assessment;
3) Mitigation Strategy; and
4) Plan Maintenance.

Into this process, the planning consultant integrated a more detailed 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program; Pre-Disaster Mitigation Program; Community Rating System; Flood Mitigation Assistance Program; Severe Repetitive Loss Program; and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 2.1 shows how the 10-step CRS planning process aligns with the four phases of hazard mitigation planning pursuant to the Disaster Mitigation Act of 2000.

Table 2.1 – Mitigation Planning and CRS 10-Step Process Reference Table

DMA Process	CRS Process
Phase I – Planning Process	
§201.6(c)(1)	Step 1. Organize to Prepare the Plan
§201.6(b)(1)	Step 2. Involve the Public
§201.6(b)(2) & (3)	Step 3. Coordinate
Phase II – Risk Assessment	
§201.6(c)(2)(i)	Step 4. Assess the Hazard
§201.6(c)(2)(ii) & (iii)	Step 5. Assess the Problem
Phase III – Mitigation Strategy	
§201.6(c)(3)(i)	Step 6. Set Goals
§201.6(c)(3)(ii)	Step 7. Review Possible Activities
§201.6(c)(3)(iii)	Step 8. Draft an Action Plan
Phase IV – Plan Maintenance	
§201.6(c)(5)	Step 9. Adopt the Plan
§201.6(c)(4)	Step 10. Implement, Evaluate and Revise the Plan

In addition to meeting DMA and CRS requirements, this plan also meets the recommended steps for developing a Community Wildfire Protection Plan (CWPP). Table 2.2 below outlines the recommended CWPP process and the CRS step and sections of this plan that meet each step.

Table 2.2 – Community Wildfire Protection Plan Process Reference

CWPP Process	CRS Step	Fulfilling Plan Section
Convene decision makers	Step 1	Section 2 – HMPC
Involve Federal agencies	Step 3	Section 2 – Involving Stakeholders
Engage interested parties (such as community representatives)	Step 1, 2, and 3	Section 2 – HMPC, Involving the Public, Involving Stakeholders
Establish a community base map		Section 4 – Wildfire
Develop a community risk assessment, including fuel hazards, risk of wildfire occurrence, homes, business and essential infrastructure at risk, other community values at risk, local preparedness, and firefighting capability	Step 4 and 5	Section 4 – Wildfire Section 5 – Capability
Establish community hazard reduction priorities and recommendations to reduce structural ignitability	Step 6, 7, and 8	Section 6 – Mitigation Strategy Section 7 – Mitigation Action Plans
Develop an action plan and assessment strategy	Step 8 and 10	Section 7 – Mitigation Action Plans Section 8 – Plan Maintenance
Finalize the CWPP	Step 9	Section 9 – Plan Adoption

The process followed for the preparation of this plan, as outlined in Table 2.1 above, is as follows:

2.3.1 Phase I – Planning Process

Planning Step 1: Organize to Prepare the Plan

With the County's commitment to participate in the DMA planning process, community officials worked to establish the framework and organization for development of the plan. An initial meeting was held with key community representatives to discuss the organizational aspects of the plan development process. The Wake County Emergency Management Deputy Director led the County's effort to reorganize and coordinate for the plan update. Consultants from Wood Environment and Infrastructure Solutions, Inc. assisted by leading the County through the planning process and preparing the plan document.

Planning Step 2: Involve the Public

Public involvement in the development of the plan was sought using various methods, as detailed in Section 2.6.

Planning Step 3: Coordinate

The HMPC formed for development of the 2015 Plan was reconvened for this plan update. More details on the HMPC are provided in Section 1.4. Stakeholder coordination was incorporated into the formation of the HMPC and was sought through additional outreach methods. These efforts are detailed in Section 1.8.

Coordination with Other Community Planning Efforts and Hazard Mitigation Activities

In addition to stakeholder involvement, coordination with other community planning efforts was also seen as paramount to the success of this plan. Mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. Wake County and its participating jurisdictions use a variety of planning mechanisms, such as Comprehensive Plans, subdivision regulations, building codes, and ordinances to guide growth and development. Integrating existing planning efforts, mitigation policies, and action strategies into this plan establishes a credible and

comprehensive plan that ties into and supports other community programs. As detailed in Table 2.3, the development of this plan incorporated information from existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

These and other documents were reviewed and considered, as appropriate, during the collection of data to support the planning process and plan development, including the hazard identification, vulnerability assessment, and capability assessment. Data from these sources was incorporated into the risk assessment and hazard vulnerability sections of the plan as appropriate. The data was also used in determining the capability of each jurisdiction to implement certain mitigation strategies. The Capability Assessment can be found in Section 5.

Table 2.3 – Summary of Existing Studies and Plans Reviewed

Resource Referenced	Use in this Plan
Local Comprehensive Plans (Wake County Comprehensive Plan, City of Raleigh 2030 Comprehensive Plan, etc.)	The Wake County Plan and City of Raleigh Plan were referenced in the Planning Area Profile in Section 3. Other local comprehensive plans were incorporated into Mitigation Action Plans where applicable in Section 7 and referenced in the Capability Assessment in Section 6.
Local Ordinances (Flood Damage Prevention Ordinances, Subdivision Ordinances, Zoning Ordinances, etc)	Local ordinances were referenced in the Capability Assessment in Section 6 and where applicable for updates or enforcement in Mitigation Action Plans in Section 7.
Triangle Regional Resilience Partnership Resilience Assessment	The Technical Report was used in the preparation of the HIRA and referenced in hazard profiles in Section 4.
Wake County and Incorporated Areas Flood Insurance Study (FIS), Revised 11/17/2017	The FIS was referenced in the preparation of flood hazard profile in Section 4.
Wake County Multi-Jurisdictional Hazard Mitigation Plan, 2015	The previous plan was referenced in compiling the Hazard Identification and Risk Assessment in Section 4 and in reporting on implementation status and developing the Mitigation Action Plans in Section 2 and Section 7, respectively.

2.3.2 Phase II – Risk Assessment

Planning Steps 4 and 5: Identify/Assess the Hazard and Assess the Problem

The HMPC completed a comprehensive effort to identify, document, and profile all hazards that have, or could have, an impact on the planning area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. A draft of the risk and vulnerability assessment was made available on the plan website for the HMPC, stakeholders, and the public to review and comment.

The HMPC also conducted a capability assessment to review and document the planning area's current capabilities to mitigate risk from and vulnerability to hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC could assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process and the results are included in Section 4 Risk Assessment.

2.3.3 Phase III – Mitigation Strategy

Planning Steps 6 and 7: Set Goals and Review Possible Activities

Wood facilitated brainstorming and discussion sessions with the HMPC that described the purpose and process of developing a vision for the planning process and setting planning goals and objectives, a

comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Section 6 Mitigation.

Planning Step 8: Draft an Action Plan

A complete first draft of the plan was prepared based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7. This draft was shared for HMPC, stakeholder, and public review and comment via the plan website. HMPC, public, and stakeholder comments were integrated into the final draft for the North Carolina Division of Emergency Management (NCEM) and FEMA Region IV to review and approve, contingent upon final adoption by the County and its participating jurisdictions.

2.3.4 Phase IV – Plan Maintenance

Planning Step 9: Adopt the Plan

To secure buy-in and officially implement the plan, the plan will be reviewed and adopted by all participating jurisdictions. Resolutions will be provided in Section 9.

Planning Step 10: Implement, Evaluate and Revise the Plan

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. Up to this point in the planning process, the HMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Section 8 Plan Maintenance provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The Section also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

2.4 HAZARD MITIGATION PLANNING COMMITTEE

As with the previous plan, this Hazard Mitigation Plan was developed under the guidance of a Hazard Mitigation Planning Committee (HMPC). The Committee's representatives included representatives of Town departments, federal and state agencies, citizens and other stakeholders.

To reconvene the planning committee, a letter was sent via email to all County, City, and Town Hazard Mitigation Planning Committee (HMPC) contacts from the previous planning effort. Each community was asked to designate a primary and secondary contact for the HMPC. Communities were also asked to identify local stakeholder representatives to participate on the HMPC alongside the County, City, and Town officials in order to improve the integration of stakeholder input into the plan.

For the sake of simplifying the planning process and facilitating easier coordination across all the participating jurisdictions, the HMPC was split into two regional working groups. The East Wake Working Group included Knightdale, Rolesville, Wake Forest, Wendell, and Zebulon. The West Wake Working Group included Apex, Cary, Fuquay-Varina, Garner, Holly Springs, and Morrisville. Representatives from Wake County, Raleigh, and RDU were included in both working groups. Table 2.4 details the HMPC members and the agencies and jurisdictions they represented.

The formal HMPC meetings followed the 10 CRS Planning Steps. Agendas, minutes, and sign-in sheets for the HMPC meetings are included in Appendix B. The meeting dates and topics discussed are summarized in Section 2.5 Meetings and Workshops. All HMPC meetings were open to the public.

The DMA planning regulations and guidance stress that to satisfy multi-jurisdictional participation requirements, each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the HMPC;
- Detail where within the planning area the risk differs from that facing the entire area;
- Identify potential mitigation actions; and
- Formally adopt the plan.

For the Wake County HMPC, "participation" meant the following:

- Providing facilities for meetings;
- Attending and participating in the HMPC meetings;
- Collecting and providing requested data (as available);
- Completing the Local Capability Self-Assessment;
- Providing an update on previously adopted mitigation actions;
- Managing administrative details;
- Making decisions on plan process and content;
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts;
- Informing the public, local officials, and other interested parties about the planning process and providing opportunity for them to comment on the plan;
- Coordinating and participating in the public input process; and
- Coordinating the formal adoption of the plan by local governing bodies.

Detailed summaries of HMPC meetings are provided under Meetings and Workshops, including meeting dates, locations, and topics discussed. During the planning process, the HMPC members communicated through face-to-face meetings, email, and telephone conversations. This continued communication ensured that coordination was ongoing throughout the entire planning process despite the fact that not all HMPC members could be present at every meeting. Additionally, draft documents were distributed via the plan website so that the HMPC members could easily access and review them and provide comments.

Table 2.4 – HMPC Members

Jurisdiction	Agency	Representative	Position or Title
City of Raleigh	Emergency Management and Special Events	Kelly Lindsey*	Emergency Management Coordinator
City of Raleigh	Emergency Management and Special Events	Whitney Schoenfeld	Special Events Planner
City of Raleigh	Engineering Services – Stormwater Management	Ben Brown	Stormwater Administrator
City of Raleigh	Office of Sustainability	Megan Anderson	Sustainability Manager
City of Raleigh	Office of Sustainability	Nicole Goddard	Sustainability Analyst
Town of Apex	Planning Department	Shelly Mayo	Planner
Town of Apex	Planning Department	Dianne Khin	Planning Director
Town of Apex	N/A	Jim Scarborough	Citizen Stakeholder
Town of Cary	Town Manager's Office	Emily Barrett	Sustainability Manager
Town of Cary	Water Resources Department	Eric Kulz	Environmental Specialist
Town of Cary	N/A	Tom Hegele	Citizen Stakeholder
Town of Fuquay-Varina	Planning Department	Samantha Smith	Planning Director
Town of Fuquay-Varina	Planning Department	Allyssa Stafford	Planner
Town of Fuquay-Varina	N/A	Ed Ridpath	Citizen Stakeholder
Town of Garner	Planning Department	David Bamford	Planning Services Manager
Town of Garner	Planning Department	Jeff Triezenberg	Planning Director

Jurisdiction	Agency	Representative	Position or Title
Town of Holly Springs	Town of Holly Springs	Kimberly Keyes	Project and Construction Manager
Town of Holly Springs	Engineering Department	Daniel Colavito	Environmental Specialist
Town of Holly Springs	N/A	John Sutherland	Citizen Stakeholder
Town of Knightdale	Development Services Department	Jason Brown	Senior Planner – Long Range
Town of Knightdale	Development Services Department	Chris Hills	Development Services Director
Town of Knightdale	N/A	Ben McDonald	Citizen Stakeholder
Town of Morrisville	Planning Department	Brad West	Planner
Town of Morrisville	Planning Department	Dylan Bruchhaus	Planner
Town of Morrisville	N/A	Steve Botha	Citizen Stakeholder
Town of Rolesville	Planning Department	Danny Johnson	Planning Director
Town of Rolesville	Town of Rolesville	Kelly Arnold	Town Manager
Town of Wake Forest	Town of Wake Forest	Patrick Reidy	Senior Planner – Development Services
Town of Wake Forest	N/A	Grif Bond	Citizen Stakeholder
Town of Wendell	Planning Department	David Bergmark	Planning Director
Town of Wendell	Planning Department	Mackenzie Day	Planner
Town of Wendell	N/A	Jon Olson	Citizen Stakeholder
Town of Zebulon	Public Works Department	Chris Ray	Public Works Director
Town of Zebulon	Town of Zebulon	Joe Moore	Town Manager
Town of Zebulon	Planning Department	Teresa Piner	Interim Planning Director
Town of Zebulon	Planning Department	Meade Bradshaw	Assistant Planning Director
Wake County	Wake County Planning	Sharon Peterson	Long Range Planner
Wake County	Wake County Planning	Bryan Coates	Long Range Planner
Wake County	Wake Soil and Water Conservation District	Teresa Furr	Natural Resource Conservationist
Wake County	N/A	Emma D'Allaird	Citizen Stakeholder
Wake County	RDU	Jason Alvero	Director of Emergency Operations

*Note: Vacated position midway through the planning process. Replaced by Whitney Schoenfeld.

2.5 MEETINGS AND WORKSHOPS

The preparation of this Plan required a series of meetings and workshops for facilitating discussion, gaining consensus, and initiating data collection efforts with local government staff, community officials, and other identified stakeholders. More importantly, the meetings and workshops prompted continuous input and feedback from relevant participants throughout the drafting stages of the Plan.

Table 2.5 summarizes the key meetings and workshops held by the HMPC during the development of the plan. In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency. For example, completing the Local Capability Self-Assessment or seeking approval of specific mitigation actions for their department or agency to undertake and include in their Mitigation Action Plan. These meetings were informal and are not documented here.

Public meetings are summarized in subsection 2.6.

Table 2.5 – Summary of HMPC Meetings

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
HMPC Mtg. #1 – Project Kick-Off	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	November 14, 2018	Wake County Commons Bldg. 4011 Carya Drive, Raleigh
HMPC Mtg. #2 – East Working Group	1) Review and update plan goals 2) Brainstorm a vision statement 3) Report on status of actions from the 2015 plan 4) Complete the capability self-assessment	January 07, 2019	Wake County Eastern Regional Center 1002 Dogwood Drive, Room 157, Zebulon
HMPC Mtg. #2 – West Working Group		January 09, 2019	Page Walker Arts & History Center, 3rd fl., 119 Ambassador Loop, Cary
HMPC Mtg. #3 – East Working Group	1) Review Draft Hazard Identification & Risk Assessment (HIRA) 2) Draft objectives and Mitigation Action Plans	March 04, 2019	Knightdale Fire Dept. Training Rm 979 Steeple Square Ct, Knightdale, NC 27545
HMPC Mtg. #3 – West Working Group		March 08, 2019	Holly Springs Cultural Center, 300 West Ballentine Street, Holly Springs, NC 27540
HMPC Mtg. #4	1) Review the Draft Hazard Mitigation Plan 2) Solicit comments and feedback	April 22, 2019	Wake County Commons Bldg. 4011 Carya Drive, Raleigh

2.6 INVOLVING THE PUBLIC

An important component of any mitigation planning process is public participation. Individual citizen and community-based input provides the entire planning team with a greater understanding of local concerns and increases the likelihood of successfully implementing mitigation actions by developing community "buy-in" from those directly affected by the decisions of public officials. As citizens become more involved in decisions that affect their safety, they are more likely to gain a greater appreciation of the hazards present in their community and take the steps necessary to reduce their impact. Public awareness is a key component of any community's overall mitigation strategy aimed at making a home, neighborhood, school, business, or entire planning area safer from the potential effects of hazards.

Public involvement in the development of the plan was sought using various methods including open public meetings, an interactive plan website, a public participation survey, and by making copies of draft plan documents available for public review online and at government offices. Additionally, all HMPC meetings were made open to the public.

All public meetings were advertised on the plan website, which was shared on local community websites, and on local community websites, where possible. Copies of meeting announcements are provided in Appendix B. The public meetings held during the planning process are summarized in Table 2.6.

Table 2.6 – Summary of Public Meetings

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
Public Meeting #1	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	November 14, 2018	Wake County Commons Bldg. 4011 Carya Drive, Raleigh
Public Meeting #2	1) Review "Draft" Hazard Mitigation Plan 2) Solicit comments and feedback	April 22, 2019	Wake County Commons Bldg. 4011 Carya Drive, Raleigh

2.7 OUTREACH EFFORTS

The HMPC agreed to employ a variety of public outreach methods including established public information mechanisms and resources within the community. The table below details public outreach efforts employed during the preparation of this plan.

Table 2.7 – Public Outreach Efforts

Location	Date	Event/Message
Plan website	Ongoing	Meeting announcements, meeting materials, and description of hazards; contact information provided to request additional information and/or provide comments
Local community websites	11/13/2018	Public Meeting #1 announcements posted
Local community websites	Ongoing	Link to the plan website shared to expand reach
Public survey	Ongoing	Survey hosted online and made available via shareable link
Plan website - HIRA draft	3/4/2019	Draft HIRA made available for review and comment online
Plan website - Draft Plan	4/26/2019	Full draft plan made available for review and comment online

Public involvement activities for this plan update included press releases, creation of a website for the plan, a public survey, and the collection of public and stakeholder comments on the draft plan.

A public outreach survey was made available on November 14, 2018 and remained open for response until February 22, 2019. The public survey requested public input into the Hazard Mitigation Plan planning process and the identification of mitigation activities to lessen the risk and impact of future hazard events. The survey is shown in Appendix B. The survey was available in hard copy at the first public meeting and online on the plan website. In total, 110 survey responses were received, with 66 responses received via direct response on the website and 44 received via the shared web link.

The following is a list of high-level summary results and analysis derived from survey responses:

- 12.7% of respondents say they feel not at all prepared for a hazard event; 69.1% feel somewhat prepared.
- 65.1% of respondents do not know where evacuation centers or storm shelters are located; however, 96.3% of respondents say they are able to evacuate or take shelter if necessary, which indicates that most people manage evacuating or taking shelter through their own resources. It is possible that these results skew toward those with more awareness of hazard risk and resources to respond.
- Over 40% of respondents do not know where to get more information on hazard risk and preparedness.

- Hurricane was rated the most significant hazard, followed by tornado, severe winter storm, and severe weather. Landslide was rated the least significant hazard, followed by dam failure and earthquake.
- Many respondents who reported having taken steps to mitigate risk at home reported preparedness actions such as emergency kits and supplies and evacuation plans. Few respondents noted prevention or property protection actions; therefore, these may be important ideas to promote in outreach.
- Respondents largely favored emergency services projects and structural projects for mitigation.

Detailed survey results are provided in Appendix B.

2.8 INVOLVING THE STAKEHOLDERS

In addition to representatives of each participating jurisdiction, the Hazard Mitigation Planning Committee included a variety of stakeholders. Stakeholders on the HMPC included representatives from Cary CERT and Wake County EMS. Representatives from North Carolina Emergency Management also attended HMPC meetings. Input from additional stakeholders, including neighboring communities, was solicited through invitations to the open public meetings and distribution of the public survey. However, if any additional stakeholders representing other agencies and organizations participated through the public survey, that information is unknown due to the anonymous nature of the survey.

2.9 DOCUMENTATION OF PLAN PROGRESS

Progress on the mitigation strategy developed in the previous plan is documented in this plan update. Table 2.8 below details the status of mitigation actions from the previous plan. More detail on actions being carried forward is provided in Section 7: Mitigation Action Plans.

Table 2.8 – Status of Previous Mitigation Actions

Jurisdiction	Completed	Deleted	Carried Forward
Wake County	2	0	3
City of Raleigh	0	0	12
Town of Apex	4	6	12
Town of Cary	3	4	4
Town of Fuquay-Varina	13	1	25
Town of Garner	5	6	13
Town of Holly Springs	8	1	21
Town of Knightdale	3	7	9
Town of Morrisville	6	0	3
Town of Rolesville	1	1	3
Town of Wake Forest	2	0	9
Town of Wendell	7	0	1
Town of Zebulon	6	0	6
Total	**60**	**26**	**121**

Table 2.9 on the following pages details all completed and deleted actions from the 2015 plan.

Community capability continues to improve with the implementation of new plans, policies, and programs that help to promote hazard mitigation at the local level. The current state of local capabilities for the participating jurisdictions is captured in Section 5: Capability Assessment. The participating jurisdictions continue to demonstrate their commitment to hazard mitigation and have proven this by reconvening the

HMPC to update this multi-jurisdictional plan and by continuing to involve the public in the hazard mitigation planning process.

Moving forward, information in this plan will be used to help guide and coordinate mitigation activities and decisions for local plans and policies in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. This plan identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage.

Table 2.9 – Completed and Deleted Actions from the 2015 Wake County Hazard Mitigation Plan

2015 Action #	Description	2019 Status	Status Comments/Explanation
Wake County			
ES-3	Oversee completion of planned equipment replacements/upgrades for 800 MGHZ emergency communications systems, EMS facilities, and fire/rescue facilities per the approved capital improvement program.	Completed	
PEA-5	Maintain Environmental Network Call Center. Citizens may report flooding problems, pollution issues, erosion problems, infrastructure damage, littering, etc.	Completed	
Raleigh			
n/a	*n/a*	*n/a*	*n/a*
Apex			
P-33	Form a citizen plan implementation steering committee to monitor progress on local mitigation actions. Include a mix of representatives from neighborhoods, local businesses, and local government.	Delete	Updated neighborhood mtg report standards to increase neighbor input on projects before they're approved.
P-35	Encourage the use of porous pavement, vegetative buffers, and islands in large parking areas.	Delete	Considered part of p-34
P-36	Encourage the use of permeable driveways and surfaces to reduce runoff and promote groundwater recharge.	Delete	Considered part of p-34
P-39	Obtain local data including tax parcels, critical facility locations, and other information for use in risk analysis.	Delete	continually being updated - moved to PP-2 & reworded
NRP-10	Adopt erosion and sedimentation control regulations for construction.	Completed	
NRP-11	Use stream restoration to ensure adequate drainage and diversion of stormwater.	Delete	doesn't seem to address the hazard
ES-13	Construct Fire Stations #5 and #6.	Completed	Construction of Fire Station #5 completed. Fire Station #6 targeted under a new action.
PEA-1	Town website - public access, emergency information and contact numbers, link to hurricane and Harris nuclear evacuation route maps and safety information. Revise the Emergency Information Page. Add Ready Wake link.	Completed	
PEA-4	Public Library – Maintain and update hazard information accessible to the public.	Delete	
PEA-8	Include FEMA flood map link on the Town Website on the Engineering page.	Completed	technically under the Planning page….
Cary			
P-4	Land Use Plan An existing tool which guides future development based on available services and existing site features/resources to ensure that future development is meeting the overall vision of the Town while ensuring the safety of the citizens.	Delete	Cary's comprehensive plan, called alternately the Cary Community Plan and the Imagine Cary Plan was finalized on January 24, 2017. Implementation in-process.

2015 Action #	Description	2019 Status	Status Comments/Explanation
P-7	Open Space Preservation – Existing Open Space Plan identifies and evaluates various land and open space resources throughout the ETJ and Urban Services Areas. The plan is used by Town staff to identify properties to be protected from development.	Delete	Comprehensive Plan was completed and implementation is In-Progress. Adaptive stormwater aproach to openspace and green stormwater infrastucuture opportunities.
P-15	If grant application is approved by FEMA, the Town will conduct a detailed study to determine the risk level of each residential structure in the identified floodplain areas and take actions to reduce the risk to those properties.	Delete	Town has spent the last year on a new Adaptive Stormater approach which includes a review and revisions to stormwater ordinances, a pilot dynamic floodplain model in the Walnut Creek Basin that will be expanded to include partners such as the City of Raleigh as well as modoleing of other basins, a proactive approach to maintenance of the Town stormwater infrastructure, using GIS for Condition Assessment and most importantly understanding that our most effective tool for floodplain management is Open Space and exploring ways to continue the development of that very important tool.
SP-2	Replace culverts on Willow Street.	Completed	
SP-3	Replace culverts on Woodland Drive.	Completed	
SP-5	Replace culverts on Kilarney Drive	Completed	
SP-6	Replace culverts on Yubinaranda Circle	Delete	Suspended
Fuquay-Varina			
P-1	Update the Land Use Plan (LUP) update including identification of environmentally sensitive areas for evaluation and protection during development review process.	Completed	New LUP adopted in 2017. Regular updates made to LUP based on zoning map changes and functionality requirements
P-3	Update the Community Transportation Plan including evaluation of stream-crossings to reduce impacts on streams, flood plains and wetlands.	Completed	New CTP adopted 2017
P-4	Update land Development Ordinance (LDO) to incentivize and encourage floodplains, wetlands, riparian buffers to be maintained as open space.	Completed	New LDO adopted 2016. Regular updates made for clarification and functionality
P-5	Add standards to LDO to reduce impervious surface areas as part of landscaping requirements to reduce storm water volume and concentration in nonresidential development.	Completed	Landscaping and stormwater standards were updated as part of new LDO 2016
P-6	Develop Stormwater Management Plan based on NPDES Phase II Stormwater Requirements.	Completed	
P-8	Enforce Wake County Flood Hazard Soils Policy, following and utilizing flood study standards.	Completed	Adopted our own in 2016 w/ LDO update
P-10	Adopt a Land Development Ordinance that will improve the review process, standards and results to reduce the impact of development on the natural environment.	Completed	

2015 Action #	Description	2019 Status	Status Comments/Explanation
P-11	Implement standard for each buildable lot to have a minimum percentage of buildable area outside floodplains, wetlands, riparian buffers as part of the plan review and recording process.	Completed	Adopted standards for max environmental features on lots outside of development standards
P-12	Map storm water drainage system as part of Phase II Stormwater Management Plan.	Completed	regular updates
P-13	Provide for public dissemination building inspections brochures regarding high winds, water damage prevention, and tie downs for accessory structures.	Completed	Same action as 2014
NRP-5	Incorporate regulations for illicit discharge control in Phase II Stormwater Management Plan.	Completed	We now have an illicit discharge ordinance
ES-2	Examine need to evaluate weather radio distribution program (daycares/nursing homes) initiated by Wake County Emergency Management 1999	Delete	County abandoned program
ES-4	Update and implement a Basic Emergency Operations Plan and a Disaster Operations Plan for the Town.	Completed	Regularly updated
ES-11	Examine the feasibility and need to contract/purchase a reverse 911 system to alert citizens of impending danger.	Completed	Reverse 911 program in place
Garner			
P-6	Partner with Wake County and other interested parties to jointly identify and acquire open space lands.	Delete	
P-12	Provide backup power for all critical public facilities (Police, Public Works, and other critical public buildings).	Completed	Completed in 2017
P-28	The Town will seek opportunities to use Federal grant resources to assist private property owners in elevating existing structures located within flood hazard zones.	Delete	we do not have enough properties to have an action item
PP-3	Building Retrofit - The Town is willing to develop a plan to utilize Federal grant resources to assist private property owners in renovating and retrofitting existing structures.	Delete	
PP-6	When feasible, Town of Garner will alleviate flooding into habitable space due to storm water, as consistent with Town Drainage Policy.	Completed	
NRP-4	Continue to work with the U.S. Army Corps of Engineers on wetland protection.	Delete	
NRP-5	Use Open Space Ordinance to protect wildlife habitat.	Delete	Our open space ordinance is geared towards protecting water quality
SP-2	Incorporate on-site retention/detention requirements for Phase II Stormwater Management Plan.	Completed	

2015 Action #	Description	2019 Status	Status Comments/Explanation
ES-3	Emergency Operations Command Post Center – established when natural hazard imminent. Center coordinates evacuations, sheltering, staging areas for equipment, manpower, and needed supplies. Equipment includes internet access, telephone, wireless communications, radio and backup supplied by emergency batteries and/or generators.	Completed	Completed in 2015
ES-8	Mobile Command Post - Available 24 hours a day and equipped to communicate with all agencies in the Triangle including Emergency Management, State agencies, fire departments, etc. The Town will be upgrading this service.	Delete	We partner with Wake County to use theirs.
PEA-2	Town website will be updated to answer citizen questions about flood hazards, flood safety, availability of flood insurance, stormwater regulations, and other information.	Completed	
Holly Springs			
P-12	Unified Development Ordinance (UDO) - The Town has an existing UDO which regulates development to ensure safety from fire, panic and other dangers. The UDO provides for orderly growth and development within the Town and ETJ by determining appropriate land use and development standards.	Completed	Updated in 2018
P-14	Stormwater Management - The Town maintains numerous basin HEC-HMS and HEC-RAZ models to determine the water surface elevation where nuisance flooding is a known problem. To ensure that water surface elevations and velocities in the streams do not get worse, the Town has adopted a policy to require new development, to run the model with the proposed development and to add stormwater BMPs or other measures to make sure that there is not a negative impact downstream.	Completed	
ES-8	Urban Search and Rescue – The Town currently has US&R services provided through the NC US&R team region 4, with backup assistance provided by region 8. Internally, we provide urban search and rescue services consisting of structural collapse and similar emergencies.	Completed	We now have enhanced capabilities with the purchase of a drone. The is funded through the State with a mutual aid agreement.
ES-9	Warning Systems - The Town currently uses Wake County's warning systems. The Town is looking into options for warning systems for the Town of Holly Springs.	Completed	The town currently utilizes Wake County's warning systems in conjunction with mobile applications that are subscription based for citizens and employees alike. In addition, the town has public access channels and access via media outlets through the PIO to disseminate information concerning emergency warnings and other incidents.
ES-10	Warning Barricades - The Town uses visual warning barricades for vehicular and pedestrian traffic to block properties, roadways, etc. for the safety of the general public.	Completed	The town has a collection of cones, traffic barriers, and other mechanisms to block off, re-route, or set detours for vehicular and pedestrian traffic. In the event that these resources are depleted, WCEM will loan resources to the town for the duration of an incident under the current structures of the MOU.

2015 Action #	Description	2019 Status	Status Comments/Explanation
ES-11	Trailer Transportation - Deploy step van and tandem axel trailers for transportation of emergency barricades and other equipment on a large scale.	Completed	The police department and the public works department have access to trailers and trucks to deploy resources as needed throughout town.
ES-16	Emergency Response Plans for the Police Station – Develop plans that address immediate action to be undertaken for all personnel assigned to the district in the event of any large scale emergency. A critique will be completed after each critical incident to document need for improvements.	Completed	Completed and constantly reevaluated. We currently have plans of action in place at the Law Enforcement Center that are implemented in the case of large scale emergency situations and disaster responses. Command and control protocols are in place that outline the framework of our responses to planned and unplanned events which detail which command implements will be mobilized within the Emergency Operations Center. All of our command and supervisory staff undergo FEMA NIMS and ICS training, and our planned actions follow in accordance with the best practices recommended by the Department of Homeland Security. In addition, any of our personnel wishing to promote into supervisory positions are tested through table top scenario exercises intended to ensure their knowledge and capabilities in managing a large-scale event. Partnerships have been established through mutual aid agreements, memorandums of understanding, and other such agreements with the various public sector and private sector stakeholders that would be involved in the mitigation, response to, and recovery from large-scale emergencies and other disasters.
ES-19	Mobile Command Post-Available 24 hours a day and equipped to communicate with all agencies in the Triangle including Emergency Management, State agencies, fire departments, etc.	Delete	Not Completed, but attainable through mutual aid with WCEM. The police department does not have a specifically dedicated mobile command center. However, in circumstances where one would be required, our mutual aid agreement with Wake County Emergency Management authorizes that one be requested for loan and brought to the scene of an incident command situation. In most cases, the initial command field response to a large scale situation would be managed from a command post location operated out of a commander's vehicle. Prolonged incidents may see that command operations remain at the original command post that was established in the field or those operations could be moved back to the Law Enforcement Center's Emergency Operations Center as circumstances dictate.

2015 Action #	Description	2019 Status	Status Comments/Explanation
ES-21	Emergency Response Plans - Emergency response plans are all designed for officers to be assigned for security purposes until owners can take over the responsibility of securing premises.	Completed	Completed and constantly reevaluated. Under our current general orders manual and other established directives, Holly Springs Police Officers would set priority in the event of emergency responses to that of preserving life and mitigating hazards to safety. Once these hazards have been stabilized or mitigated, attention would shift to protecting real and personal properties. Areas of response in order of highest importance to lowest importance have been delineated according to the risk that would occur in allowing the area to be compromised. Town facilities and other critical infrastructure key to response and recovery efforts would take immediate priority. Major business and banking areas likely to be seen as opportunistic targets for persons attempting to exploit situations of mass power outages or civil unrest would be the next priority. Lastly, residential areas (though patrolled throughout a major event) would receive more focused resources to prevent property crime.
Knightdale			
P-1	Adopt Hazard Mitigation Plan & Updates.	Delete	On-Going Task
P-2	Prepare Plan Maintenance Report.	Delete	On-Going Task
P-3	Prepare updates to Plan.	Delete	On-Going Task
P-4	Revise Hazard Mitigation Plan.	Delete	Standard item that must be completed regardless.
P-8	Update Emergency Response Plan.	Completed	The most recent version of the Knightdale EOP was adopted on January 16, 2018.
PEA-1	Distribute “Ready Wake” brochures in libraries, Town Hall, public places and on the Town Web Site.	Delete	On-Going Task
PEA-4	Present Plan at public meeting.	Delete	On-Going Task
PEA-10	Utilize electronic newsletter to keep citizens informed.	Completed	The Town of Knightdale has established an electronic newsletter to distribute information to citizens on a regular basis.
PEA-14	Improve drought monitoring and communication of data to the public by relying less on state and regional data and establishing a local source.	Delete	With new technology available to citizens this project seems unneccessary
PEA-19	Update current approved plant list to add emphasis on drought tolerant species.	Completed	The plant list was updated in 2016 and includes drought tolerant species.
Morrisville			
P-1	Improve road visibility and safety by evaluating existing road conditions and paving and/or placing new reflector tape or paint along road edges and in the divided line on all major Town roads.	Completed	
P-2	Evaluate and update the Town of Morrisville Multi-Hazard Emergency Response Plan on an annual basis.	Completed	

2015 Action #	Description	2019 Status	Status Comments/Explanation
P-4	Maintain all tax parcel information, floodplain locations and frequent flooding areas in Geographic Information Systems (GIS).	Completed	
PEA-1	Disperse via the Morrisville Connection newsletter a posting which provides information regarding natural hazard emergency response and preparedness actions the public can take.	Completed	
PEA-2	Notify citizens of the public hearing on the Hazard Mitigation Plan annual progress report.	Completed	
PEA-3	Continue providing website link to Federal and State Declared Emergencies affecting the Town.	Completed	
Rolesville			
PEA-3	Develop planned park to include nature trails and environmental education center.	Delete	Nature trail constructed, no plans for the environmental education center.
PEA-4	Town Hall – Maintain and update hazard information accessible to the public.	Completed	Copy of most recent hazard mitigation plan is available for public viewing.
Wake Forest			
P-17	Review and revise the existing response plan and call list, as needed	Completed	
ES-6	Coordinate with suppliers and develop a resource list for fuel and power generation.	Completed	This list has been created and is continously updated with suppliers
Wendell			
P-17	Include flood map data on GIS system.	Completed	This data is continually updated by Wake County and we download updated information regularly.
NRP-1	Maintain and expand greenway system, stream buffers.	Completed	Clean Water Management Trust Fund Grant awarded. Park expanded to south (Pin 1783383759) with conservation easements in place to protect stream buffers and floodplain.
ES-5	Review Inclement Weather Policy.	Completed	In Q4 2018, the Town Board passed a Street Clearing Policy as a supplemental document to the Inclement Weather Policy. No further amendments are planned at this time.
PEA-2	Inform public of construction requirements in hazard areas.	Completed	Website updated to reflect information on construction requirements, such as flood elevation certificates.
PEA-4	Make FEMA manuals available to residents.	Completed	Link to FEMA site providing the most recent FEMA manuals added to Wendell Website.
PEA-8	Provide links to flood warnings, hurricane tracks, tornado and severe thunderstorm warnings, winter storm warnings, and drought/heat wave information on website.	Completed	During the hurricane, tropical storm and winter weather, the Alert Box on the Town's website was activated with a link to the National Weather Service – Raleigh Office. Social media was updated also. In addition, the Town shared updates from NCDOT, Wake County, the Attorney General's office, City of Raleigh, and Duke Energy during the hurricane. The winter weather included updates from NCDOT, Wake County and Duke Energy. What is posted depends upon the event.

2015 Action #	Description	2019 Status	Status Comments/Explanation
PEA-12	Inform public about flood mitigation techniques (i.e., remove debris from storm drains prior to large storm event).	Completed	Material has been added to the Public Works webpage to communicate this material to citizens.
Zebulon			
P-21	Prepare and implement debris removal and disposal plan.	Completed	Debris removal plan adopted.
P-23	Include flood map data on GIS system.	Completed	Flood map data is now available on GIS system.
P-24	Tie law enforcement to Statewide 800 megahertz system.	Completed	Public Safety communications has all been moved to Wake County 800 Mhz system.
PEA-1	Provide links to hazard notices on Town website.	Completed	Town provides hazard notices via social media platforms, including preparatory actions.
PEA-4	Public outreach projects.	Completed	Town provides seasonal preparatory actions on social media platforms.
PEA-9	Provide links to flood warnings, hurricane tracking information, tornado and severe thunderstorm warnings, winter storm warnings, wildfire warnings, and any other available hazard warning information on website.	Completed	Town has the ability to alert visitors of the website to provides hazard notices via social media platforms, including preparatory actions.

3 Planning Area Profile

This section provides a general overview of the current conditions in Wake County and its participating municipalities. It consists of the following sub-sections:

- 3.1 Geography and Climate
- 3.2 Population and Demographics
- 3.3 Parcels and Buildings
- 3.4 Historic Properties
- 3.5 Housing
- 3.6 Infrastructure
- 3.7 Current and Future Land Use
- 3.8 Employment and Industry

3.1 GEOGRAPHY AND ENVIRONMENT

Wake County is located in the eastern portion of the Piedmont of North Carolina. It is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. The Planning Area includes Wake County unincorporated areas, Town of Apex, Town of Cary, Town of Fuquay-Varina, Town of Garner, Town of Holly Springs, Town of Knightdale, Town of Morrisville, City of Raleigh, Town of Rolesville, Town of Wake Forest, Town of Wendell, and Town of Zebulon. A location map is provided in Figure 3.1.

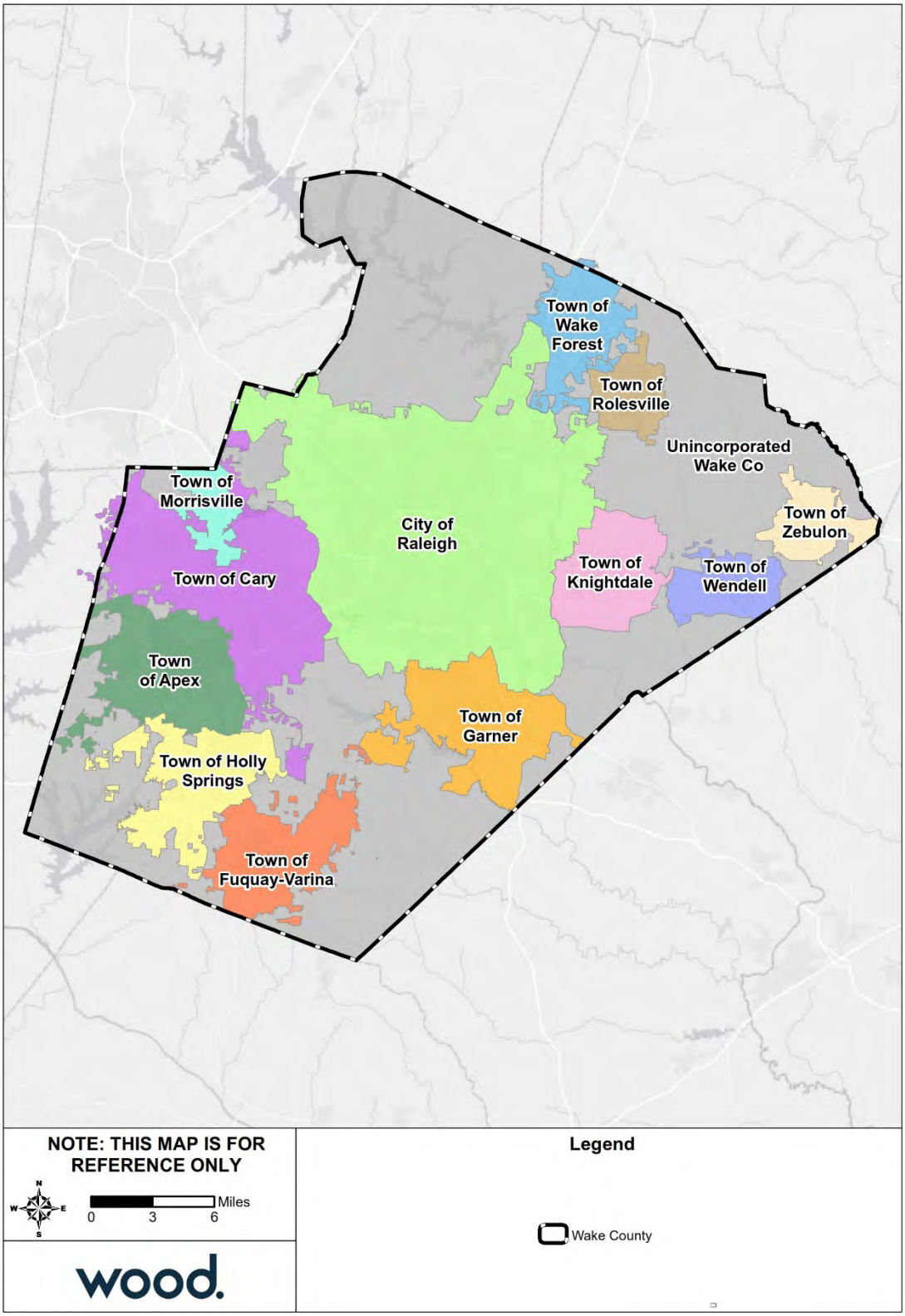
Wake County comprises a total land area of 834 square miles. The total land area of each participating jurisdiction is listed in Table 3.1.

Table 3.1 – Total Land Area of Participating Jurisdictions

Jurisdiction	Total Land Area
Wake County	**827.22 square miles**
Unincorporated areas	537.93 square miles
Apex	23.37 square miles
Cary	54.34 square miles
Fuquay-Varina	12.09 square miles
Garner	14.75 square miles
Holly Springs	15.01 square miles
Knightdale	6.21 square miles
Morrisville	8.26 square miles
Raleigh	142.90 square miles
Rolesville	3.93 square miles
Wake Forest	15.10 square miles
Wendell	5.20 square miles
Zebulon	4.13 square miles

Source: US Census Bureau

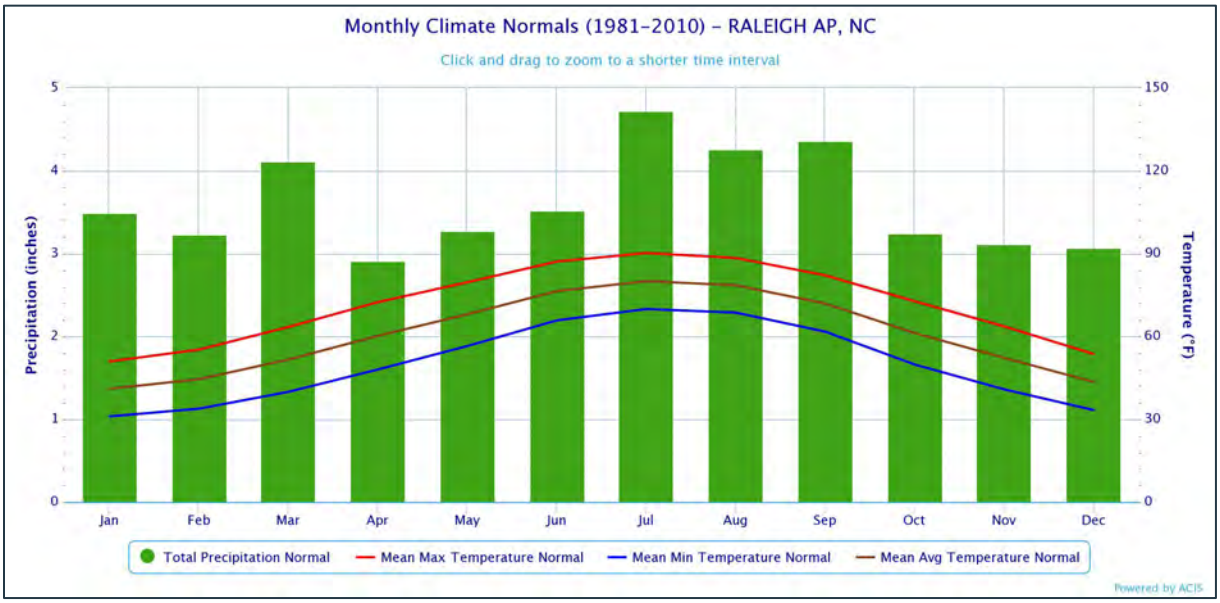
Figure 3.1 – Wake County and Participating Jurisdictions Location Map



Source: Wake County GIS Open Data

According to the Köppen climate classification system, Wake County has a humid subtropical climate characterized by mild winters and hot humid summers with significant precipitation even during the driest month. The county experiences an average annual high temperature of 71.6°F and an average annual low of 49.9°F. Average annual rainfall is approximately 43.3 inches and average annual snowfall is 4.8 inches. Figure 3.2 shows the average monthly precipitation for the Raleigh Airport weather station, which approximates temperature and precipitation of the County.

Figure 3.2 – Average Monthly Precipitation



Source: Northeast RCC CLIMOD 2.

As shown in the map of HUC-8 watersheds in Figure 3.3, most of Wake County falls within the Upper Neuse River watershed. Portions of the east and south of the county are in the Haw River watershed and the Upper Cape Fear River watershed, respectively; an area in the northeast of the county falls in the Contentnea Creek watershed. The Neuse River runs through the county from the northwest border to the southeast central border.

Wetlands

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 49,944 acres of wetlands in the County. Wetlands areas are shown by type in Figure 3.4.

Natural and Beneficial Wetland Functions: The benefits of wetlands are hard to overestimate. They provide critical habitat for many plant and animal species that could not survive in other habitats. They are also critical for water management as they absorb and store vast quantities of storm water, helping reduce floods and recharge aquifers. Not only do wetlands store water like sponges, they also filter and clean water as well, absorbing toxins and other pollutants.

Parks, Preserve, and Conservation

Wake County is home to three state parks: Falls Lake State Recreation Area, William B. Umstead State Park, and Jordan Lake State Recreation Area. There are also a number of county and municipal parks located throughout the jurisdictions, as well as several greenways that traverse the county and connect to surrounding regions.

Threatened and Endangered Species

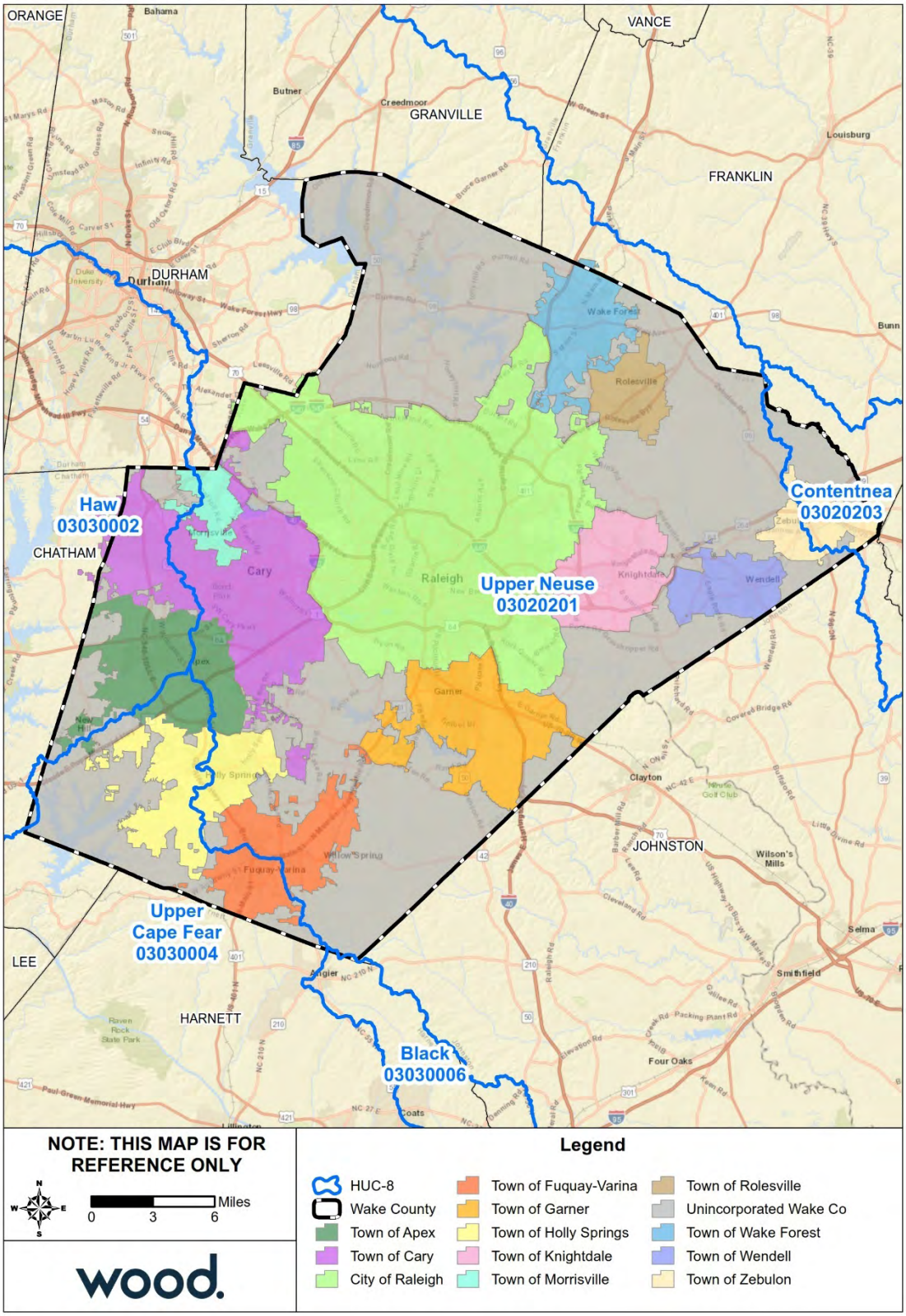
The U.S. Fish and Wildlife Service maintains a regular listing of threatened species, endangered species, species of concern, and candidate species for counties across the United States. Wake County has nine species that are listed with the U.S. Fish and Wildlife Services. Table 3.2 below lists the species identified as threatened, endangered, or other classification.

Table 3.2 – Threatened and Endangered Species

Group	Common Name	Scientific Name	Federal Status
Amphibians	Neuse River waterdog	Necturus lewisi	Under Review
Birds	Red-cockaded woodpecker	Picoides borealis	Endangered
Clams	Tar River spinymussel	Elliptio steinstansana	Endangered
Clams	Dwarf wedgemussel	Alasmidonta heterodon	Endangered
Clams	Yellow lance	Elliptio lanceolata	Threatened
Clams	Atlantic pigtoe	Fusconaia masoni	Proposed Threatened
Fishes	Cape Fear shiner	Notropis mekistocholas	Endangered
Fishes	Carolina madtom	Noturus furiosus	Under Review
Flowering Plants	Michaux's sumac	Rhus michauxii	Endangered

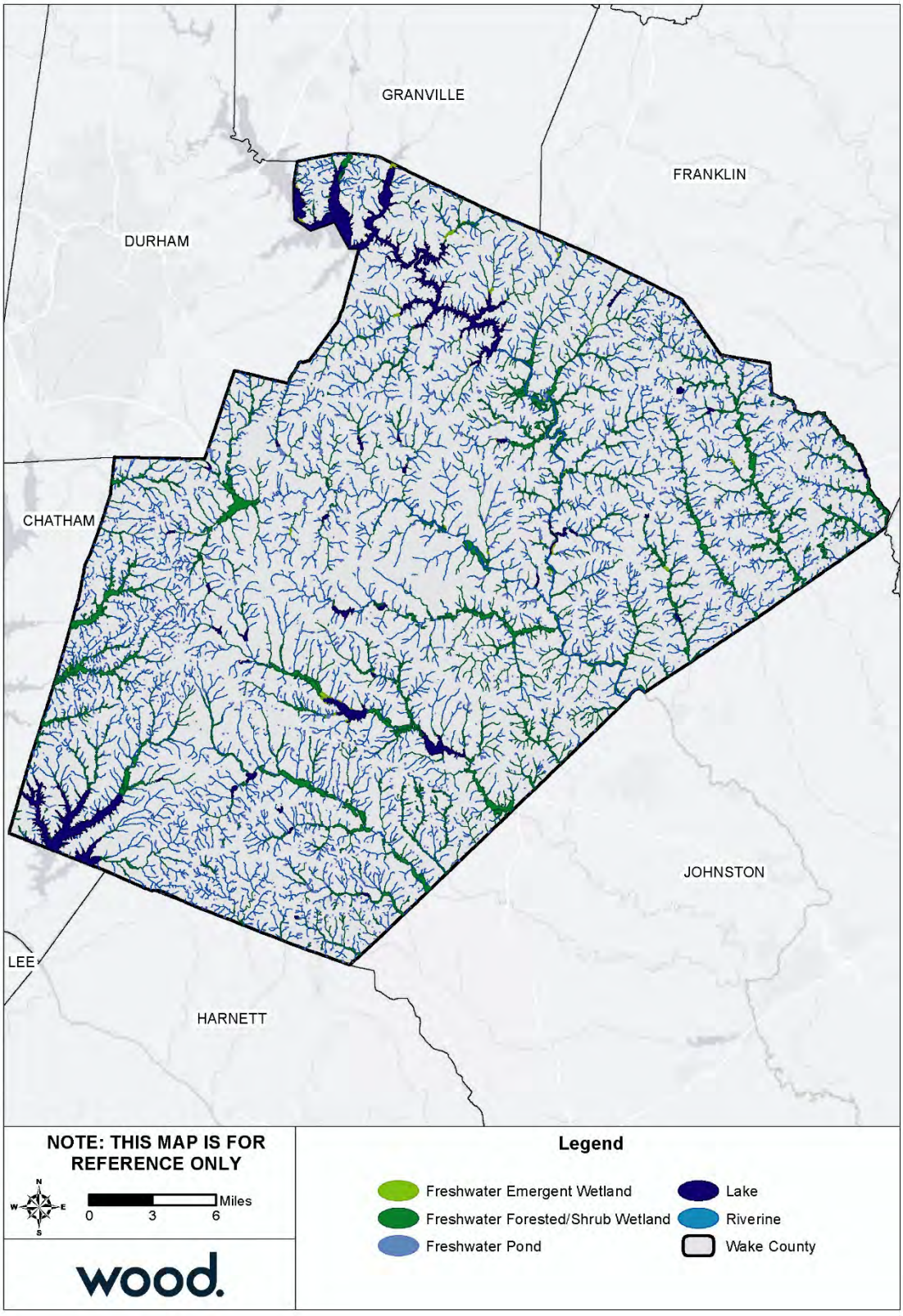
Source: U.S. Fish & Wildlife Service (https://ecos.fws.gov/ecp0/reports/species-by-current-range-county?fips=37183)

Figure 3.3 – HUC-8 Drainage Basins



Source: USDA Natural Resources Conservation Service

Figure 3.4 – Wetlands by Type in Wake County



Source: U.S. Fish & Wildlife Service, National Wetlands Inventory - Version 2

3.2 POPULATION AND DEMOGRAPHICS

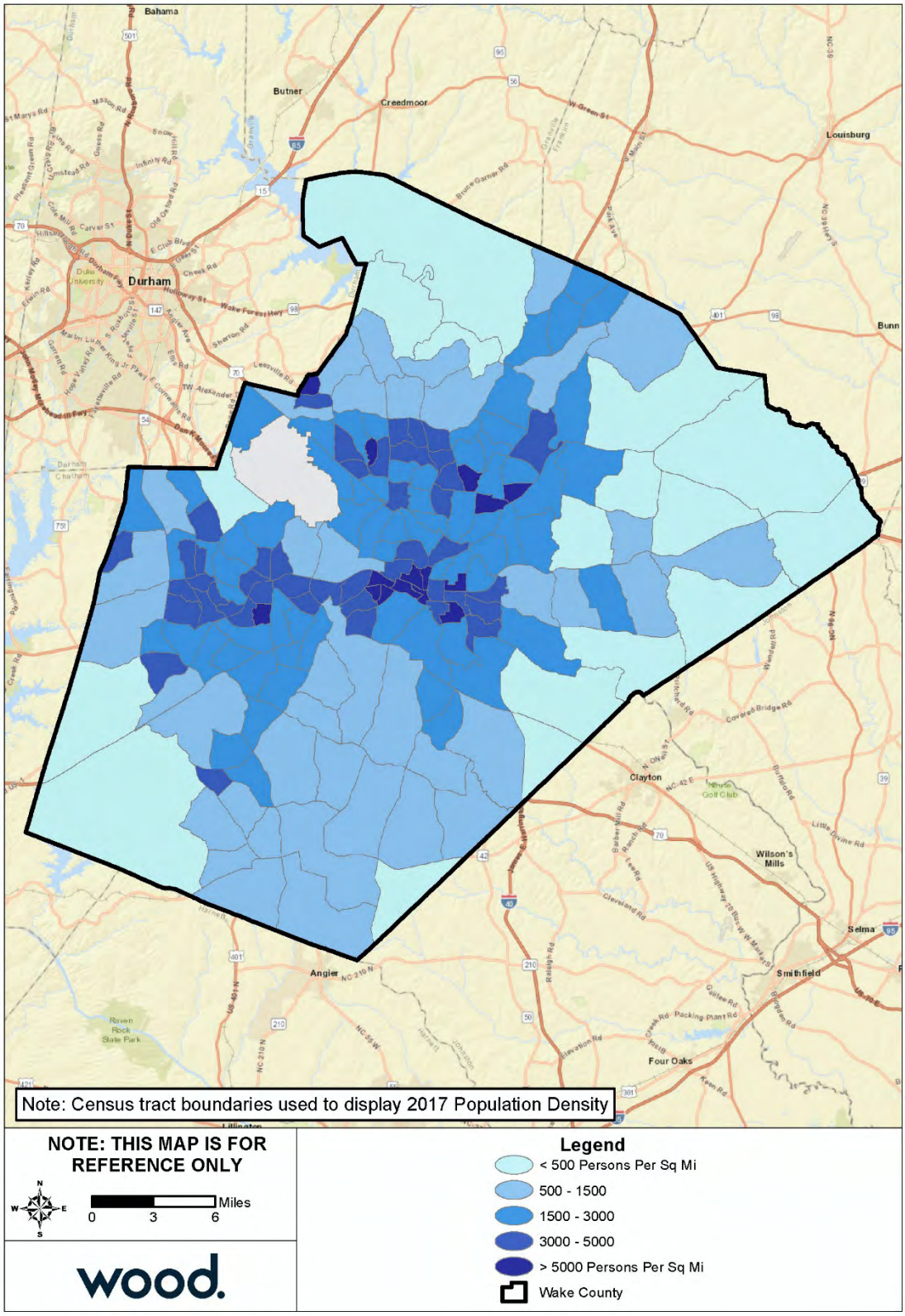
Wake County and its municipalities have experienced significant population growth over the last several decades. From 2000 to 2017, Wake County's population grew by 63 percent, which equates to an average annual growth rate of nearly 3 percent. Overall population density in the County increased from 1,078.8 persons per square mile in 2010 to 1,225.8 persons per square mile in 2017. Trends suggest that this number is likely to continue growing. All jurisdictions experienced growth between 2010 and 2017, with an average population increase across the County of 13.6 percent. The Towns of Fuquay-Varina and Rolesville both grew by more than 30 percent over this period. Table 3.3 provides population counts from 2000, 2010, and 2017 for each of the participating jurisdictions. Figure 3.5 on the following page shows 2017 population density by census tract in persons per square mile.

Table 3.3 – Wake County Population Counts

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Unincorporated areas	169,386	181,890	189,996	8,106	4.5%
Apex	20,212	37,476	45,899	8,423	22.5%
Cary	94,536	135,234	159,715	24,481	15.1%
Fuquay-Varina	7,898	17,937	24,373	6,436	35.9%
Garner	17,575	25,745	28,048	2,303	8.9%
Holly Springs	9,192	24,661	31,827	7,166	29.1%
Knightdale	5,958	11,401	14,363	2,962	26.0%
Morrisville	5,208	18,576	23,873	5,297	28.5%
Raleigh	276,093	403,892	449,477	45,585	11.3%
Rolesville	907	3,786	6,308	2,522	40.0%
Wake Forest	12,588	30,117	38,473	8,356	27.7%
Wendell	4,247	5,845	6,516	671	11.5%
Zebulon	4,046	4,433	4,943	510	11.5%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2017 Annual Estimates
Note: The total population of Cary, Raleigh, and Wake Forest includes population residing in adjacent counties.

Figure 3.5 – Population Density, 2016



Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

According to 2017 American Community Survey 5-Year Estimates, the median age in Wake County was 35.8. Of the population aged 25 years and over, 92.5 percent have a high school degree or higher and 51.0 percent have a bachelor's degree or higher. Approximately 16.8 percent of Wake County residents speak a language other than English at home; of those, 65.1 percent also speak English "very well". The racial characteristics of the participating jurisdictions are presented in Table 3.4. Generally, white persons make up the majority of the population in the county, accounting for over 66 percent of the population in Wake County overall. However, several jurisdictions have much higher minority populations than others including Garner, Knightdale, Morrisville, Raleigh, and Zebulon.

Table 3.4 – Racial Demographics of Wake County Jurisdictions, 2016

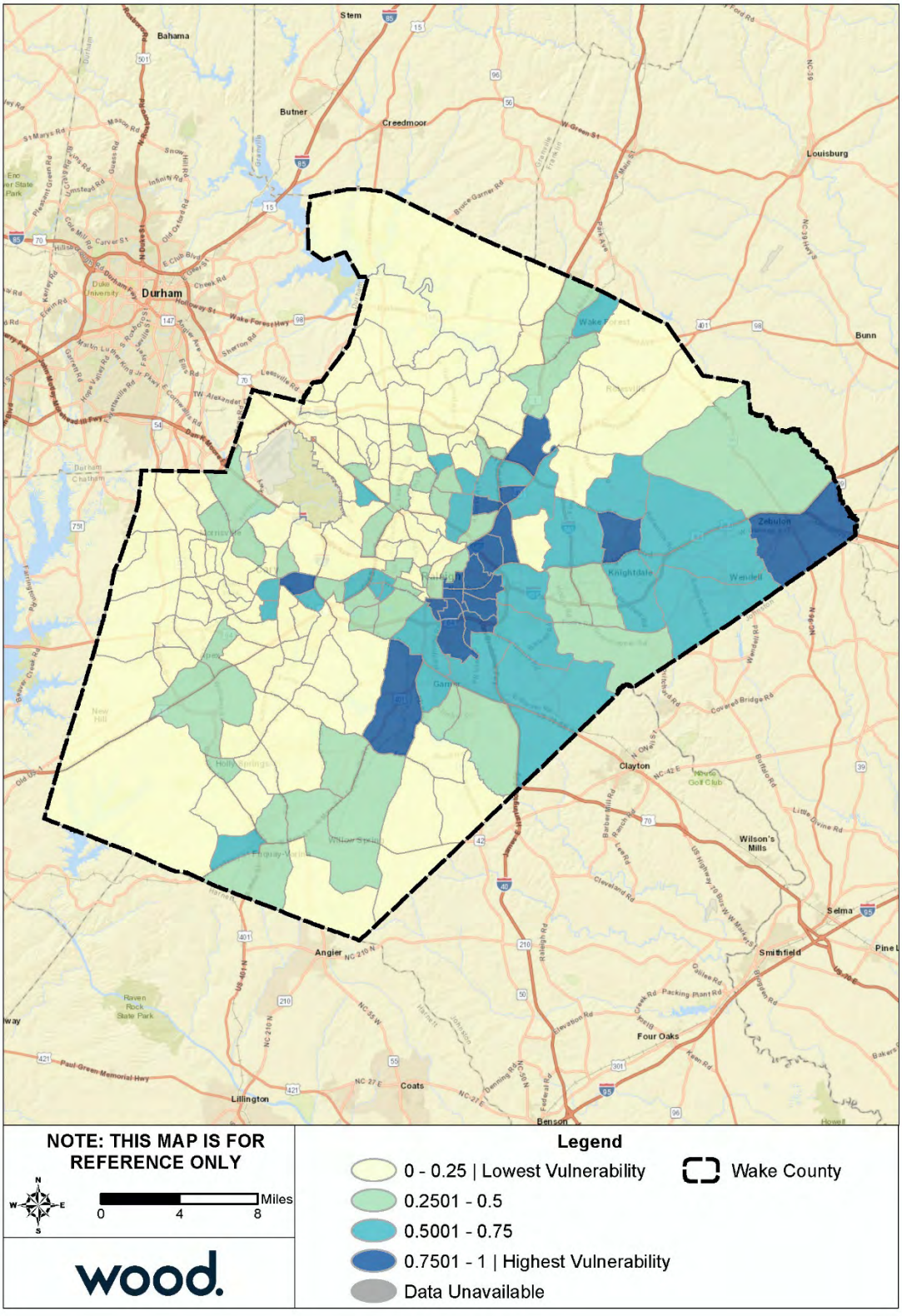
Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Apex	79.3%	8.6%	7.4%	1.5%	2.9%	7.3%
Cary	69.9%	7.9%	16.8%	2.2%	2.8%	8.1%
Fuquay-Varina	77.5%	15.4%	1.6%	2.8%	2.7%	9.4%
Garner	61.9%	32.5%	1.9%	1.4%	2.2%	10.8%
Holly Springs	79.6%	11.9%	2.5%	1.8%	3.8%	6.5%
Knightdale	49.8%	35.9%	4.1%	6.0%	4.1%	15.4%
Morrisville	44.3%	12.1%	37.0%	1.2%	4.8%	4.5%
Raleigh	59.0%	28.9%	4.6%	4.6%	2.6%	11.0%
Rolesville	66.2%	27.1%	3.2%	1.2%	2.4%	3.0%
Wake Forest	78.9%	14.5%	1.5%	0.9%	4.1%	4.8%
Wendell	67.8%	19.4%	1.0%	3.6%	4.3%	12.9%
Zebulon	50.0%	42.1%	1.2%	1.6%	5.1%	13.1%

Source: US Census Bureau

*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Figure 3.6 displays social vulnerability information for Wake County by census tract according to 2016 data and analysis by the Centers for Disease Control and Prevention (CDC). The CDC's Social Vulnerability Index (SVI) indicates the relative vulnerability within census tracts based on 15 social factors: poverty, unemployment, income, education, age, disability, household composition, minority status, language, housing type, and transportation access. Higher social vulnerability is an indicator that a community may be limited in its ability to respond to and recover from hazard events. Therefore, using this SVI information can help the County and jurisdictions to prioritize pre-disaster aid, allocate emergency preparedness and response resources, and plan for the provision of recovery support.

Figure 3.6 – Social Vulnerability Index by Census Tract, 2016



Source: Centers for Disease Control and Prevention (CDC) / Agency for Toxic Substances and Disease Registry (ATSDR) / Geospatial Research, Analysis, and Services Program (GRASP).

3.3 PARCELS AND BUILDINGS

Table 3.5 provides a count of the undeveloped and developed parcels in Wake County by jurisdiction.

Table 3.5 – Parcel Count by Jurisdiction

Jurisdiction	Developed Parcels	Undeveloped Parcels
City of Raleigh	125,227	12,331
Town of Apex	18,060	5,273
Town of Cary	49,067	5,730
Town of Fuquay-Varina	13,194	2,193
Town of Garner	11,977	2,437
Town of Holly Springs	12,695	2,860
Town of Knightdale	7,570	1,207
Town of Morrisville	6,481	1,018
Town of Rolesville	3,186	933
Town of Wake Forest	3,777	1,308
Town of Wendell	13,572	2,676
Town of Zebulon	2,631	905
Wake County	49,760	11,039
Total	**317,197**	**49,910**

Source: Wake County GIS Open Data; April 2019

3.4 HISTORIC PROPERTIES

As of October 17, 2018, Wake County had 224 listings on the National Register of Historic Places, detailed in Table 3.6. This list includes 64 Historic Districts. Listing on the National Register signifies that these structures and districts have been determined to be worthy of preservation for their historical or cultural values. In addition to these properties, there are four National Historic Landmarks in Wake County; all four are located in the City of Raleigh.

Table 3.6 – National Register of Historic Places Listings in Wake County

Ref#	Property Name	Status Date	Category	City
85003077	Apex City Hall	12/5/1985	Building	Apex
88002697	Apex Union Depot	12/1/1988	Building	Apex
94000185	Apex Historic District	3/17/1994	District	Apex
95000210	Apex Historic District (Boundary Increase)	3/10/1995	District	Apex
02000016	Apex Historic District (Boundary Increase)	2/14/2002	District	Apex
07001502	Apex Historic District (Boundary Increase II)	1/31/2008	District	Apex
08000937	Lawrence, Calvin Wray, House	9/23/2008	Building	Apex
03000967	Poole, Wayland E., House	9/25/2003	Building	Auburn
79003339	Page-Walker Hotel	5/29/1979	Building	Cary
84002540	Jones, Nancy, House	3/1/1984	Building	Cary
00000549	Carpenter Historic District	5/26/2000	District	Cary
01000340	Green Level Historic District	4/5/2001	District	Cary
01000425	Cary Historic District	4/25/2001	District	Cary
02000498	Utley--Council House	5/16/2002	Building	Cary
08000414	Ivey--Ellington House	5/15/2008	Building	Cary

Ref#	Property Name	Status Date	Category	City
01000424	Cannady--Brogden Farm	4/25/2001	Building	Creedmoor
74001379	Mangum, James, House	11/18/1974	Building	Creedmoor
99000509	Hood--Anderson Farm	4/29/1999	District	Eagle Rock
83001921	Falls of the Neuse Manufacturing Company	9/19/1983	Building	Falls
84000118	Forestville Baptist Church	10/25/1984	Building	Forestville
14000230	Fuquay Springs Historic District (Boundary Increase)	5/19/2014	District	Fuquay Varina
14001023	Stevens, Wayland H. and Mamie Burt, House	12/10/2014	Building	Fuquay Varina
86003457	Fuquay Mineral Spring	12/4/1986	Site	Fuquay-Varina
89002352	Jones--Johnson--Ballentine Historic District	1/26/1990	District	Fuquay-Varina
89002351	Varina Commercial Historic District	1/31/1990	District	Fuquay-Varina
91001375	Johnson, J. Beale, House	9/5/1991	Building	Fuquay-Varina
97000195	Ben--Wiley Hotel	2/27/1997	Building	Fuquay-Varina
02000495	Fuquay Springs High School	5/16/2002	Building	Fuquay-Varina
07000352	Fuquay-Varina Woman's Club Clubhouse	4/24/2007	Building	Fuquay-Varina
96001398	Fuquay Springs Historic District	11/29/1996	District	Fuquay-Varina
05001028	Johnson, Kemp B., House	9/15/2005	Building	Fuquay-Varina
05001448	Fuquay Springs Teacherage	12/23/2005	Building	Fuquay-Varina
89002157	Downtown Garner Historic District	12/21/1989	District	Garner
93000544	Edenwood	7/2/1993	Building	Garner
09001106	Meadowbrook Country Club	12/16/2009	District	Garner
97000218	Leslie--Alford--Mims House	3/8/1997	Building	Holly Springs
10000164	Holly Springs Masonic Lodge	4/7/2010	Building	Holly Springs
86001631	Walnut Hill Cotton Gin	8/14/1986	Building	Knightdale
86003529	Beaver Dam	1/6/1987	Building	Knightdale
87002234	Knight, Henry H. and Bettie S., Farm	1/12/1988	District	Knightdale
00001183	Walnut Hill Historic District	10/6/2000	District	Knightdale
07000543	Midway Plantation House and Outbuildings	6/15/2007	Building	Knightdale
12000218	Page, Williamson, House	4/16/2012	Building	Morrisville
12000913	Morrisville Christian Church	11/6/2012	Building	Morrisville
14000334	Pugh House	6/19/2014	Building	Morrisville
01000426	New Hill Historic District	4/25/2001	District	New Hill
07001503	Holleman, Samuel Bartley, House	1/30/2008	Building	New Hill
70000475	North Carolina Executive Mansion	2/26/1970	Building	Raleigh
70000476	North Carolina State Capitol	2/26/1970	Building	Raleigh
70000479	Yates Mill	2/26/1970	Building	Raleigh
70000474	Mordecai House	7/1/1970	Building	Raleigh
70000478	State Bank of North Carolina	7/1/1970	Building	Raleigh
70000469	Christ Church	7/28/1970	Building	Raleigh
70000470	Haywood Hall	7/28/1970	Building	Raleigh
70000471	Haywood, Richard B., House	7/28/1970	Building	Raleigh

Ref#	Property Name	Status Date	Category	City
70000472	Lane, Joel, House	7/28/1970	Building	Raleigh
70000477	St. Mary's Chapel	11/20/1970	Building	Raleigh
71000627	White-Holman House	4/16/1971	Building	Raleigh
71000624	Federal Building	5/6/1971	Building	Raleigh
71000626	Seaboard Coast Line Railroad Company Office Building	5/6/1971	Building	Raleigh
71000623	Dodd-Hinsdale House	11/12/1971	Building	Raleigh
71000625	Raleigh Water Tower	12/16/1971	Building	Raleigh
72000998	Andrews-Duncan House	1/20/1972	Building	Raleigh
72001000	Heck-Andrews House	1/20/1972	Building	Raleigh
72000999	Hawkins-Hartness House	2/1/1972	Building	Raleigh
72001001	Lewis-Smith House	12/11/1972	Building	Raleigh
73001375	J. S. Dorton Arena	4/11/1973	Building	Raleigh
73001374	Heck-Lee, Heck-Wynne, and Heck-Pool Houses	4/13/1973	Building	Raleigh
73001373	Estey Hall	5/25/1973	Building	Raleigh
73001376	Jones Jr., Nathaniel, House	6/4/1973	Building	Raleigh
73001377	Peace College Main Building	6/19/1973	Building	Raleigh
73001372	Briggs Hardware Building	10/25/1973	Building	Raleigh
74001380	Oakwood Historic District	6/25/1974	District	Raleigh
75001293	Capehart House	1/17/1975	Building	Raleigh
75001297	Tucker Carriage House	2/13/1975	Building	Raleigh
75001295	Jones, Alpheus, House	7/7/1975	Building	Raleigh
75001294	Elmwood	10/29/1975	Building	Raleigh
76001341	Agriculture Building	6/16/1976	Building	Raleigh
76001343	North Carolina School for the Blind and Deaf Dormitory	8/11/1976	Building	Raleigh
76001344	Pullen Park Carousel	9/8/1976	Structure	Raleigh
76001342	Daniels, Josephus, House	12/8/1976	Building	Raleigh
77001012	Polk, Leonidas L., House	4/13/1977	Building	Raleigh
78001979	Montford Hall	3/8/1978	Building	Raleigh
78001978	Capitol Area Historic District	4/15/1978	District	Raleigh
78001980	Raleigh, Sir Walter, Hotel	8/11/1978	Building	Raleigh
78001981	St. Mary's College	12/19/1978	District	Raleigh
79001759	Rogers-Bagley-Daniels-Pegues House	3/21/1979	Building	Raleigh
79003341	Masonic Temple Building	9/17/1979	Building	Raleigh
80002902	Norburn Terrace	2/1/1980	Building	Raleigh
80002903	St. Augustine's College Campus	3/28/1980	District	Raleigh
77001011	Lane-Bennett House	6/30/1983	Building	Raleigh
83001924	Moore Square Historic District	8/3/1983	District	Raleigh
83001923	Lumsden-Boone Building	9/8/1983	Building	Raleigh
83001925	Professional Building	9/8/1983	Building	Raleigh

Ref#	Property Name	Status Date	Category	City
83004003	Spring Hill	12/29/1983	Building	Raleigh
84002533	Masonic Temple Building	5/3/1984	Building	Raleigh
85001671	Boylan Heights	7/29/1985	District	Raleigh
85001672	Glenwood	7/29/1985	District	Raleigh
85001673	Cameron Park	7/29/1985	District	Raleigh
85003076	Capital Club Building	12/5/1985	Building	Raleigh
86000403	Marshall--Harris--Richardson House	3/5/1986	Building	Raleigh
87000855	North Carolina State Fair Commercial & Education Buildings	6/5/1987	Building	Raleigh
87001787	Oakwood Historic District (Boundary Increase)	10/21/1987	District	Raleigh
80004607	St. Paul A.M.E. Church	11/5/1987	Building	Raleigh
87002597	Christ Episcopal Church	12/23/1987	Building	Raleigh
87002235	Oakwood Historic District (Boundary Increase II)	1/6/1988	District	Raleigh
88003044	Oakwood Historic District (Boundary Increase III)	1/9/1989	District	Raleigh
89000441	Pilot Mill	6/5/1989	District	Raleigh
89001049	Henderson, Isabelle Bowen, House and Gardens	8/7/1989	District	Raleigh
90001030	Wyatt, Leonidas R., House	7/5/1990	Building	Raleigh
90001527	East Raleigh--South Park Historic District	10/11/1990	District	Raleigh
90001638	Dix Hill	11/7/1990	District	Raleigh
91000359	Oak View	4/3/1991	District	Raleigh
92001602	Grosvenor Gardens Apartments	11/12/1992	Building	Raleigh
93000440	Fadum House	6/10/1993	Building	Raleigh
93000543	Raleigh Banking and Trust Company Building	6/17/1993	Building	Raleigh
94001085	Small, G. Milton, and Associates, Office Building	9/21/1994	Building	Raleigh
94001086	Small House	9/21/1994	Building	Raleigh
94001087	Ritcher House	9/21/1994	Building	Raleigh
94001088	Paschal House	9/21/1994	Building	Raleigh
94001089	Matsumoto House	9/21/1994	Building	Raleigh
95000783	Crabtree Creek Recreational Demonstration Area	6/30/1995	District	Raleigh
95001440	Haywood, Dr. Hubert Benbury, House	12/13/1995	Building	Raleigh
96000197	Kamphoefner, Henry L., House	3/12/1996	Building	Raleigh
97000022	Raleigh National Cemetery	1/31/1997	Site	Raleigh
97001304	Carolina Power and Light Company Car Barn and Automobile Garage	10/30/1997	Building	Raleigh
97001305	Raleigh Electric Company Power House	10/30/1997	Building	Raleigh
97001498	Odd Fellows Building	12/1/1997	Building	Raleigh
97001499	Pine Street Creamery, (Former)	12/1/1997	Building	Raleigh
97001593	Royal Baking Company	12/30/1997	Building	Raleigh
97001668	Mordecai Place Historic District	2/4/1998	District	Raleigh
99001392	Pope, Dr. M.T., House	11/22/1999	Building	Raleigh

Ref#	Property Name	Status Date	Category	City
99001452	Raleigh Water Works and E.B. Bain Water Treatment Plant	11/22/1999	Building	Raleigh
00000457	Mahler and Carolina Trust Buildings	11/29/2000	Building	Raleigh
00001570	Mordecai Place Historic District (Boundary Increase)	12/28/2000	Building	Raleigh
01000416	St. Matthews School	4/25/2001	Building	Raleigh
01000421	Panther Branch School	5/8/2001	Building	Raleigh
01000557	Caraleigh Mills	5/25/2001	Building	Raleigh
01001112	North Carolina Agricultural Experiment Station Cottage	10/15/2001	Building	Raleigh
02000058	Glenwood--Brooklyn Historic District (Boundary Increase and Decrease)	2/20/2002	District	Raleigh
02000165	Penny, Jesse, House and Outbuildings	3/13/2002	Building	Raleigh
02000499	Turner, John T. and Mary, House	5/16/2002	Building	Raleigh
02000500	Graves, Willis M., House	5/16/2002	Building	Raleigh
02000501	Hall, Rev. Plummer T., House	5/16/2002	Building	Raleigh
02000502	Latta, Rev. M.L., House	5/16/2002	Building	Raleigh
02000496	Hayes Barton Historic District	5/16/2002	District	Raleigh
02000497	Bloomsbury Historic District	5/16/2002	District	Raleigh
02000946	Depot Historic District	9/6/2002	District	Raleigh
03000389	Roanoke Park Historic District	5/9/2003	District	Raleigh
03000391	Vanguard Park Historic District	5/9/2003	District	Raleigh
03000929	Occidental Life Insurance Company Building	9/11/2003	Building	Raleigh
03000930	Green, Herman, House	9/11/2003	Building	Raleigh
03001300	West Raleigh Historic District	12/18/2003	District	Raleigh
04001584	Washington Graded and High School	2/2/2005	Building	Raleigh
05000321	Rothstein, Mae and Philip, House	4/15/2005	Building	Raleigh
05000320	Lawrence, Dr. Elmo N., House	4/20/2005	Building	Raleigh
05001449	Blalock, Dr. Nathan M., House	12/23/2005	Building	Raleigh
06000223	Ivey, Rufus J., House	4/5/2006	Building	Raleigh
06000338	Maiden Lane Historic District	5/3/2006	District	Raleigh
06000790	Raleigh Bonded Warehouse	8/24/2006	Building	Raleigh
06000789	Pine Hall	9/6/2006	Building	Raleigh
06001109	Adams--Edwards House	12/6/2006	Building	Raleigh
07000902	Boylan Apartments	9/5/2007	Building	Raleigh
07001412	Fayetteville Street Historic District	2/27/2008	District	Raleigh
08000888	Free Church of the Good Shepherd	9/10/2008	Building	Raleigh
08000889	City Cemetery	9/12/2008	District	Raleigh
08000939	Curtis, William A., House	9/24/2008	Building	Raleigh
08001292	Mount Hope Cemetery	1/8/2009	District	Raleigh
08001388	Welles, Paul and Ellen, House	1/29/2009	Building	Raleigh
08001415	Mary Elizabeth Hospital	2/5/2009	Building	Raleigh

Ref#	Property Name	Status Date	Category	City
09000661	Carolina Coach Garage and Shop	8/27/2009	Building	Raleigh
10000632	Madonna Acres Historic District	9/1/2010	District	Raleigh
10001098	Harris, Harwell Hamilton and Jean Bangs, House and Office	12/28/2010	Building	Raleigh
10001111	Battery Heights Historic District	1/3/2011	District	Raleigh
10001112	Capitol Heights Historic District	1/3/2011	District	Raleigh
10001113	Longview Gardens Historic District	1/3/2011	District	Raleigh
11000484	Hi-Mount Historic District	7/29/2011	District	Raleigh
11000892	Arndt, G. Dewey and Elma, House	12/7/2011	Building	Raleigh
11000893	Rochester Heights Historic District	12/7/2011	District	Raleigh
11000956	Cameron Village Historic District	12/22/2011	District	Raleigh
14000523	Merrimon--Wynne House	8/25/2014	Building	Raleigh
14001024	Tucker, Garland Scott and Toler Moore, House	12/10/2014	Building	Raleigh
14001025	Wachovia Building Company Contemporary Ranch House	12/10/2014	Building	Raleigh
16000188	Chavis, John, Memorial Park	4/19/2016	District	Raleigh
100000941	O'Kelly, Berry, Historic District	5/11/2017	District	Raleigh
100001634	Depot Historic District (Boundary Increase)	9/21/2017	District	Raleigh
100002930	Oak Grove Cemetery	9/14/2018	Site	Raleigh
100002931	Oberlin Cemetery	9/14/2018	Site	Raleigh
94001025	Perry Farm	8/26/1994	Building	Riley Hill
89002158	Green--Hartsfield House	12/21/1989	Building	Rolesville
02001728	Heartsfield--Perry Farm	1/23/2003	Building	Rolesville
03000966	Young, Dr. Lawrence Branch, House	9/25/2003	Building	Rolesville
93001021	Oaky Grove	9/30/1993	Building	Shotwell
85002418	Rogers--Whitaker--Haywood House	9/19/1985	Building	Wake Crossroads
74001381	Powell House	10/15/1974	Building	Wake Forest
74001378	Wakefields	10/16/1974	Building	Wake Forest
75001298	Lea Laboratory	5/29/1975	Building	Wake Forest
88000238	Purefoy--Dunn Plantation	3/24/1988	District	Wake Forest
91001504	Royall Cotton Mill Commissary	10/16/1991	Building	Wake Forest
93000998	DuBois, W. E. B., School	10/5/1993	Building	Wake Forest
97000788	Purefoy--Dunn Plantation (Boundary Decrease)	7/25/1997	District	Wake Forest
98000689	Oakforest	6/11/1998	Building	Wake Forest
99001046	Glen Royall Mill Village Historic District	8/27/1999	District	Wake Forest
02000059	Downtown Wake Forest Historic District	2/20/2002	District	Wake Forest
02001719	Wakefield Dairy Complex	1/15/2003	Building	Wake Forest
03001301	Wake Forest Historic District	12/18/2003	District	Wake Forest
05001030	Thompson House	9/15/2005	Building	Wake Forest
07000879	Rock Cliff Farm	8/29/2007	District	Wake Forest

Ref#	Property Name	Status Date	Category	City
08001016	Purefoy-Chappell House and Outbuildings	10/22/2008	Building	Wake Forest
10001097	Bailey--Estes House	12/28/2010	Building	Wake Forest
14000265	South Brick House	5/27/2014	Building	Wake Forest
16000880	Jones, Dr. Calvin, House	12/22/2016	Building	Wake Forest
98000947	Wendell Commercial Historic District	7/31/1998	District	Wendell
01000415	Riley Hill School	4/25/2001	Building	Wendell
01001113	Sunnyside	10/15/2001	Building	Wendell
03000928	Avera, Dr. Thomas H., House	9/11/2003	Building	Wendell
07001504	Harmony Plantation	1/29/2008	Building	Wendell
09000382	Wendell Boulevard Historic District	6/3/2009	District	Wendell
06000788	Davis--Adcock Store	9/6/2006	Building	Wilbon
03000931	Smith, Frank and Mary, House	9/11/2003	Building	Willow Spring
05000549	Smith, Turner and Amelia, House	6/10/2005	Building	Willow Spring
76001345	Wakelon School	5/13/1976	Building	Zebulon
86000157	Bunn, Bennett, Plantation	2/4/1986	Building	Zebulon
07000881	Barbee, George and Neva, House	8/28/2007	Building	Zebulon

Source: National Parks Service, National Register of Historic Places, October 2018

3.5 HOUSING

According to the 2012-2016 ACS 5-Year Estimates, there are 411,632 housing units in Wake County, of which 92.8 percent are occupied. Approximately 35.9% of occupied units are renter-occupied. A high percentage of renters is an indicator of higher pre- and post-disaster vulnerability because, according to Cutter, et al. (2003), renters often do not have the financial resources of homeowners, are more transient, are less likely to have information about or access to recovery aid following a disaster, and are more likely to require temporary shelter following a disaster. Higher rates of home ownership in some jurisdictions, including Fuquay-Varina, Holly Springs, Rolesville, and Wake Forest may indicate that more residents in these areas are able to implement certain types of mitigation in their homes.

Median home value in Wake County is $250,700. Of the County's owner-occupied housing units, 77.2 percent have a mortgage. More than 49 percent of householders moved into their current homes since the year 2010, and another 31 percent moved in between 2000 and 2009, which is indicative of the extreme growth the area has been experiencing and could indicate that many residents may be new to the area they live in. Householders of 4.1 percent of occupied housing units have no vehicle available to them; these residents may have difficulty in the event of an evacuation.

Over 60 percent of housing units in Wake County are detached single family homes, and another 10.4 percent are attached single family homes. Approximately 3.4 percent of units are mobile homes, which can be more vulnerable to certain hazards, such as tornadoes and wind storms, especially if they aren't secured with tie downs.

The County's housing stock is relatively new, with over 36 percent of all units built since 2000. Age can indicate the potential vulnerability of a structure to certain hazards. For example, Wake County first entered the National Flood Insurance Program in 1978. Therefore, based on housing age estimates at least 23 percent of housing in the County was built before any floodplain development restrictions were

required. Several jurisdictions did not enter the NFIP until years later; therefore, the actual percent of housing built without floodplain development restrictions may be higher.

Table 3.7 – Housing Characteristics

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, Percent (2017)	Vacant Units, Percent (2017)	Median Home Value (2017)
Wake County	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Apex	13,922	16,883	21.3%	68.9%	4.2%	$289,300
Cary	55,303	63,008	13.9%	66.0%	4.4%	$323,000
Fuquay-Varina	7,325	8,626	17.8%	69.8%	4.1%	$221,000
Garner	10,993	11,633	6.4%	60.5%	7.5%	$167,700
Holly Springs	8,658	10,425	20.4%	82.2%	3.0%	$264,500
Knightdale	4,723	5,559	17.7%	64.6%	4.4%	$176,600
Morrisville	8,357	9,365	12.1%	45.8%	6.0%	$304,400
Raleigh	176,124	194,768	10.6%	47.2%	9.2%	$225,000
Rolesville	1,341	2,355	75.6%	73.1%	12.6%	$273,900
Wake Forest	11,370	13,888	22.1%	67.2%	4.7%	$278,600
Wendell	2,430	2,691	10.7%	64.8%	8.8%	$145,900
Zebulon	1,862	1,790	-3.9%	52.1%	6.8%	$145,000

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2012-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

3.6 INFRASTRUCTURE

3.6.1 Transportation

There are several major roadways that cross Wake County. The most prominent is Interstate 40 which runs through the county on an east-west track. It has two spurs that more or less encompass the city of Raleigh and provide access to many of the outlying municipalities. In conjunction with I-40, I-440 makes up the "Beltline" that encircles most of central Raleigh. Additionally, I-540/NC-540 is a partly completed loop that is outside the beltline that currently connects many of the northern and western municipalities. In addition to the Interstate, there are many major highways that traverse the county. Federal highways of note are US-1, US-64, US-264, US-70, and US-401, while state highways in the county include NC-39, NC-42, NC-50, NC-54, NC-55, NC-96, NC-98, and NC-231.

Raleigh-Durham International Airport (RDU) is the primarily commercial airport in the region. It is one of the largest airports in the state and serves more than 35 international and domestic locations and over 9 million passengers a year.

There are two Amtrak railway facilities in Wake County, located in Raleigh and Cary.

The Triangle Transit authority operates a bus system that connects Raleigh, Durham, and Chapel-Hill and there are also several intra-county bus lines that provide service between Wake County municipalities.

3.6.2 Utilities

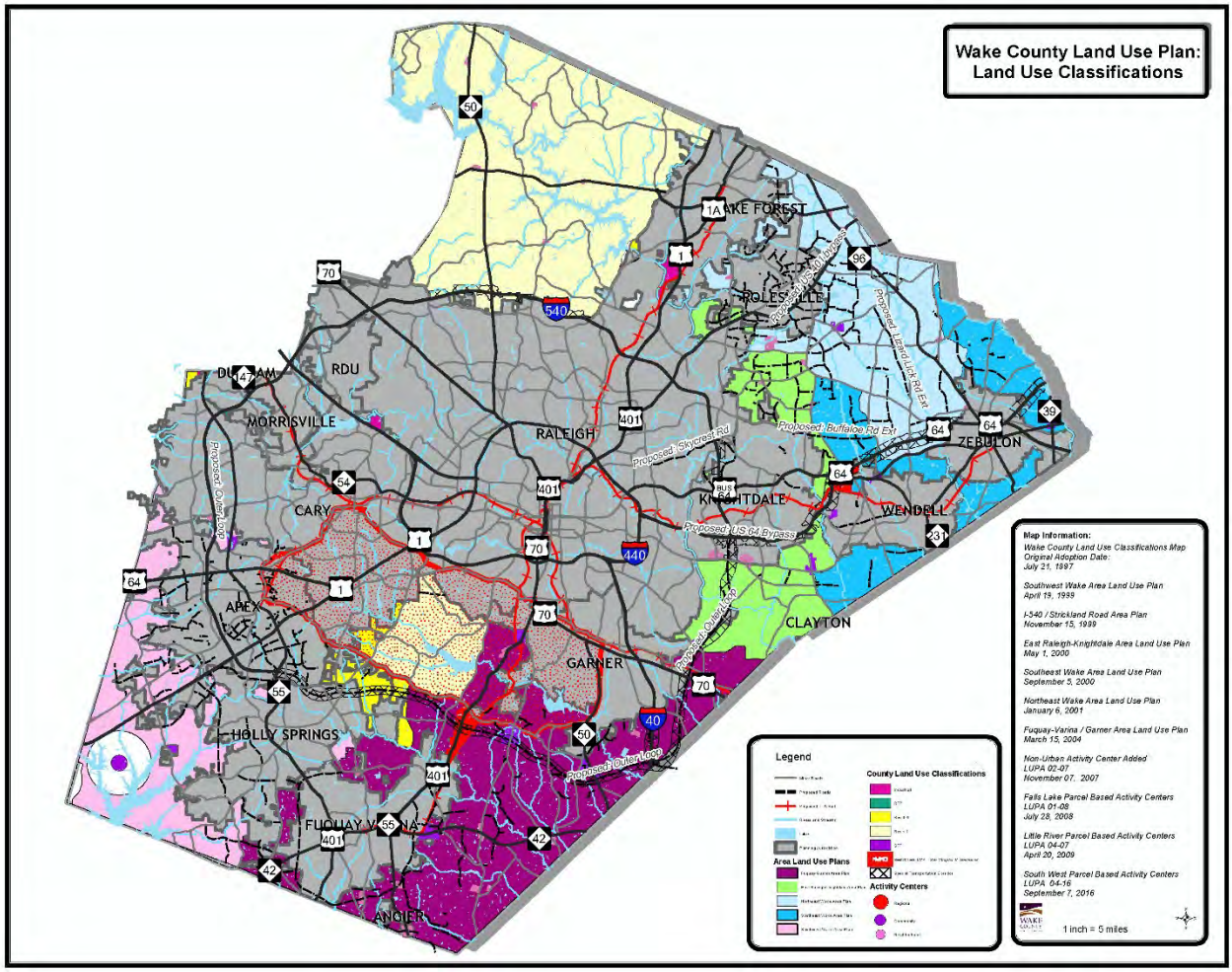
Electric power for the county is provided by Duke Energy and Wake Electric Membership Corporation, with Duke Energy providing service to a majority of the county. Water and sewer service is provided by the City of Raleigh Public Utilities and Western Wake Partners. Natural gas is provided by PSNC Energy.

3.7 CURRENT AND FUTURE LAND USE

Current and future land use in Wake County are predominantly regulated at the jurisdictional level. The Wake County Planning department provides public planning services to the unincorporated areas of Wake County. They plan for general land use classifications, water supply watersheds, and create small area land use plans. Figure 3.7 below shows these general classifications along with the areas planned for in more detail. Further information on land use planning in Wake County is available on the County's website.

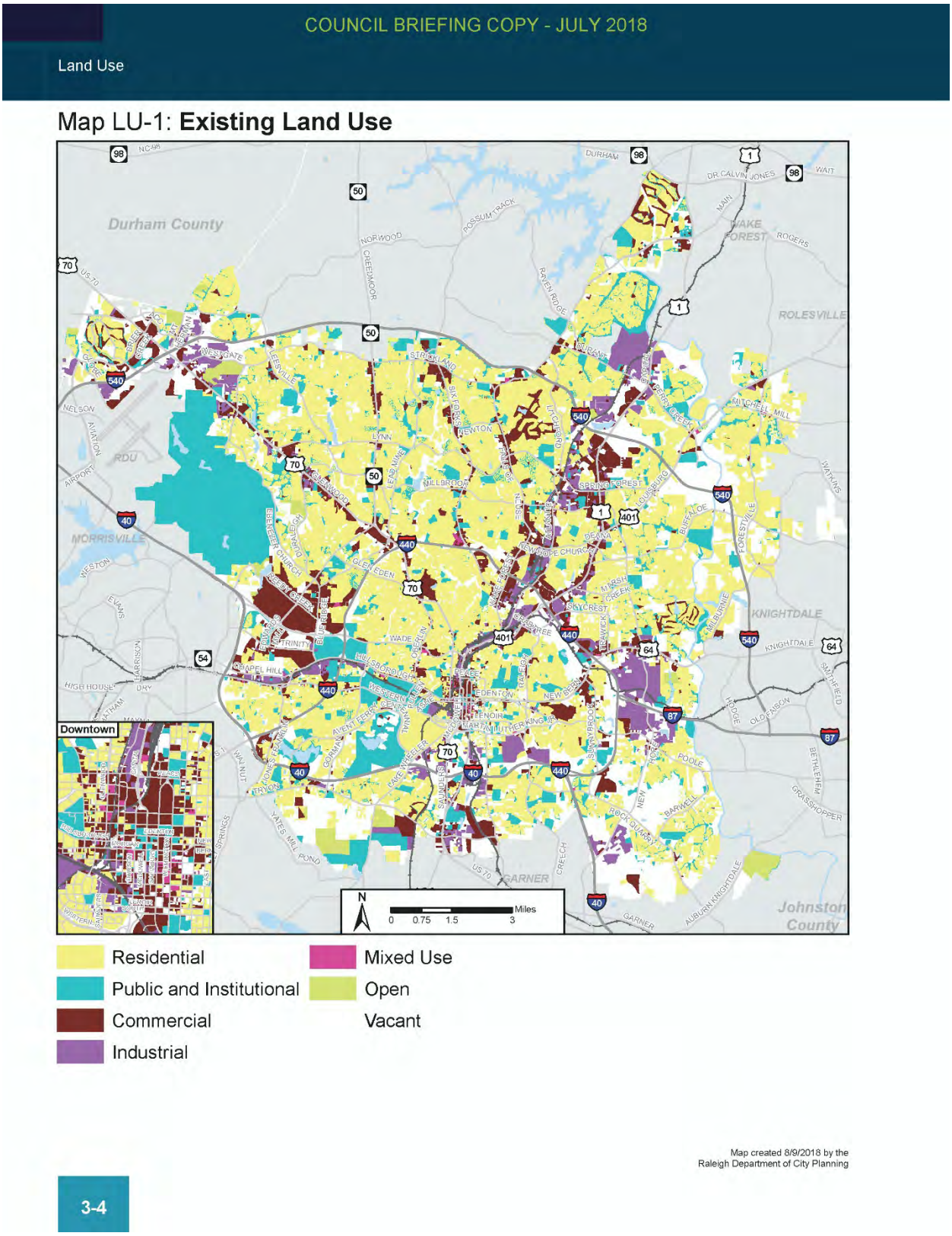
The City of Raleigh is Wake County's largest municipality and can be accessed by multiple major interstates and federal highways. 34.4% of the City's acreage, or 34,409 acres, was developed as residential single-family use as of 2016. Most existing retail and office space is located along major transportation corridors, and makes up just over 6 percent of the City's total acreage. Figure 3.8, from the 2030 Comprehensive Plan, shows the existing land use in the City of Raleigh. The most updated plan for 2030 proposes 19 different future land-use categories, including five different mixed-use categories, many of which propose increased density and walkability. Section 5 of the City of Raleigh 2030 Comprehensive Plan lays out the City's programs and initiatives that protect and enhance natural resources. These include policies for flood reduction and preparedness as well as open space preservation.

Figure 3.7 – Wake County Land Use



Source: Wake County Planning, Land Use & Zoning

Figure 3.8 – City of Raleigh Land Use



Source: City of Raleigh 2030 Comprehensive Plan

3.8 EMPLOYMENT AND INDUSTRY

Wake County is best known as being home of the capital of North Carolina, Raleigh, and is home to many government agencies and functions. Many state agencies are located in Wake County as are many federal agencies.

Wake County is one of three counties that comprise the Research Triangle metropolitan region, named for the Research Triangle Park (RTP) which encompasses the three major metropolitan areas of Chapel-Hill, Durham, and Raleigh. Each of these metropolitan areas is home to a major research university (UNC-Chapel Hill, Duke, and NC State University, respectively) and RTP draws on these universities for its workforce. The Research Triangle Park is a hub of high-tech and biotech research and is a defining feature of the economy in Wake County.

The early modern economy Wake County was built around agriculture and government, as the state capital of Raleigh was established in 1793. Since that time, much of the growth and economic well-being of the county has been linked to the county's status as a hub of government. While the county's position as home to the state capital remains important, in recent decades, the county's economic focus has shifted towards the fields of information technology and health care. The Research Triangle Park, located between Raleigh and Durham, is home to more than 250 companies that employ more than 50,000 people.

3.8.1 Wages and Employment

Per the 2012-2016 American Community Survey 5-Year Estimates, the median household income for the Wake County was $73,577, which is over 46 percent higher than the state's median household income ($50,320). However, approximately 10.1% of the population is considered to be living below the poverty level. Moreover, 13.4 percent of people under 18 years of age are living below the poverty level.

Table 3.7 shows employment statistics for all participating jurisdictions. Table 3.8 shows occupation statistics for all participating jurisdictions.

Table 3.8 – Employment Statistics for Wake County

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Apex	25,403	72.5	3.0	24.5	3.9
Cary	88,040	68.8	2.7	28.5	3.8
Fuquay-Varina	12,407	65.9	3.9	29.9	5.6
Garner	15,338	64.6	4.1	31.2	6.0
Holly Springs	16,121	69.4	2.6	27.7	3.6
Knightdale	8,274	70.8	3.4	25.7	4.5
Morrisville	13,403	73.9	3.0	23.0	3.9
Raleigh	257,228	67.5	3.6	28.8	5.0
Rolesville	3,334	67.3	8.0	24.7	10.6
Wake Forest	19,229	65.6	3.8	30.5	5.4
Wendell	2,939	60.5	1.7	37.9	2.7
Zebulon	2,169	57.2	3.8	39.0	6.2

Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table 3.9 – Percent of Employed Population by Occupation for Wake County

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Apex	57.2	11.4	22.6	4.8	4.0
Cary	61.8	10.4	19.7	3.9	4.3
Fuquay-Varina	47.3	16.7	22.4	5.3	8.3
Garner	42.2	15.8	24.9	8.3	8.8
Holly Springs	54.8	9.3	24.3	3.7	7.9
Knightdale	49.6	15.6	22.4	6.7	5.8
Morrisville	65.5	8.1	17.6	3.0	5.8
Raleigh	46.2	15.7	24.6	6.0	7.4
Rolesville	54.0	15.8	22.8	1.6	5.8
Wake Forest	53.4	13.2	25.0	4.0	4..4
Wendell	39.5	10.7	35.0	4.6	10.3
Zebulon	35.0	22.9	20.9	8.4	12.7

Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

Across the County as a whole, major industry sectors include educational services, and health care and social assistance (21.0 percent of employment in 2017); professional, scientific, and management, and administrative and waste management services (18.4 percent of employment in 2017); and retail trade (10.1 percent of employment in 2017).

Wake County accounts for the majority of its own employment, as approximately 82.3 percent of workers worked in their county of residence as of 2016. Much of the employment outside the County is likely accounted for by the other cities of the Research Triangle, Durham in Durham County and Chapel Hill in Orange County.

Table 3.9 summarizes the major employers with 5,000 employees or more in Wake County according to Wake County Economic Development.

Table 3.10 – Major Employers in Wake County

Employer	Estimated Employees
Duke University and Health System	38,591
State of North Carolina	24,083
Wake County Public School System	19,845
Wal-Mart	16,135
IBM Corporation	10,000
WakeMed Health & Hospitals	9,105
North Carolina State University	9,069
Target	8,000
UNC Rex Healthcare	7,400
SAS Institute, Inc.	5,632
Cisco Systems, Inc.	5,000
Harris Teeter	5,000

Source: Wake County Economic Development

4 Risk Assessment

Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.
Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdiction.

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

44 CFR Subsection D §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. Plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:
A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

(B): An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; and

(C): Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

4.1 OVERVIEW

This section describes the Hazard Identification and Risk Assessment process for the development of the Wake County Multi-Jurisdictional Hazard Mitigation Plan. It describes how the County met the following requirements from the 10-step planning process:

- Planning Step 4: Assess the Hazard
- Planning Step 5: Assess the Problem

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. "It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage."

This hazard risk assessment covers all of Wake County, including the unincorporated County and all incorporated jurisdictions participating in this plan. It should be noted that the City of Durham, the Town of Clayton, and the Town of Angier each have a small area of land that crosses into Wake County; however, risk was not assessed for these communities as they are not participants of this plan. Population and building counts presented in this risk assessment do not include these communities. Instead, these communities are addressed in full in their own respective hazard mitigation plans.

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of the potential risk to natural hazards in the county and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events. This risk assessment followed the

methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (FEMA 386-2, 2002), which breaks the assessment down to a four-step process:



Data collected through this process has been incorporated into the following sections of this plan:

- **Section 4.2**: **Hazard Identification** identifies the natural and human-caused hazards that threaten the planning area.
- **Section 4.3: Risk Assessment Methodology and Assumptions**
- **Section 4.4: Asset Inventory** details the population, buildings, and critical facilities at risk within the planning area.
- **Section 4.5**: **Hazard Profiles, Analysis, and Vulnerability** discusses the threat to the planning area, describes previous occurrences of hazard events and the likelihood of future occurrences, and assesses the planning area's exposure to each hazard profiled; considering assets at risk, critical facilities, and future development trends.
- **Section 4.6: Conclusions on Hazard Risk** summarizes the results of the Priority Risk Index and defines each hazard as a Low, Medium, or High Risk hazard.

4.2 HAZARD IDENTIFICATION

To identify hazards relevant to the planning area, the HMPC began with a review of the list of hazards identified in the 2018 State Hazard Mitigation Plan and the 2015 Wake County Multi-Jurisdictional Hazard Mitigation Plan as summarized in Table 4.1. The HMPC used these lists to identify a full range of hazards for potential inclusion in this plan update and to ensure consistency across these planning efforts. All hazards on the below list were evaluated for inclusion in this plan update.

Table 4.1 – Full Range of Hazards Evaluated

Hazard	Included in 2018 State HMP?	Included in 2015 Wake County HMP?
Flooding	Yes	Yes
Hurricanes and Coastal Hazards	Yes	Yes
Severe Winter Weather (Freezing Rain, Snowstorms, Blizzards, Wind Chill, Extreme Cold)	Yes	Yes
Extreme Heat	Yes	Yes
Earthquake	Yes	Yes
Wildfire	Yes	Yes
Dam Failure	Yes	Yes
Levee Failure	No	Yes
Drought	Yes	Yes
Severe Thunderstorm (Tornado, Hailstorm, Torrential Rain, High Wind, Thunderstorm Wind, Lightning)	Yes	Yes (Hailstorm and Lightning evaluated as separate hazards)
Landslide	Yes	Yes
Sinkholes	Yes	No
Erosion	Yes	Yes
Hazardous Materials Incident	Yes	Yes

Hazard	Included in 2018 State HMP?	Included in 2015 Wake County HMP?
Radiological Emergency	Yes	Yes
Terrorism	Yes	Yes
Infectious Disease	Yes	No
Cyber Threat	Yes	No
Electromagnetic Pulse	Yes	No

The HMPC evaluated the above list of hazards using existing hazard data, past disaster declarations, local knowledge, and information from the 2018 State Plan and the 2015 Wake County Plan to determine the significance of these hazards to the planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage.

One significant resource in this effort was the National Oceanic and Atmospheric Administration's National Center for Environmental Information (NCEI), which has been tracking various types of severe weather since 1950. Their Storm Events Database contains an archive by county of destructive storm or weather data and information which includes local, intense and damaging events. NCEI receives storm data from the National Weather Service (NWS). The NWS receives their information from a variety of sources, which include but are not limited to: county, state and federal emergency management officials, local law enforcement officials, SkyWarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public, among others. The NCEI database contains 783 records of severe weather events that occurred in Wake County in the 20-year period from 1998 through 2017. Table 4.2 summarizes these events.

Table 4.2 – NCEI Severe Weather Reports for Wake County, 1998 – 2017

Type	# of Events	Property Damage	Crop Damage	Deaths	Injuries
Cold/Wind Chill	0	$0	$0	0	0
Drought	0	$0	$0	0	0
Extreme Cold/Wind Chill	0	$0	$0	0	0
Excessive Heat	0	$0	$0	0	0
Flash Flood	117	$68,651,000	$0	0	0
Flood	7	$60,000	$0	0	0
Hail	209	$10,000,000	$0	0	0
Heat	2	$0	$0	0	1
Heavy Rain	5	$0	$0	0	0
Heavy Snow	2	$0	$0	0	0
High Wind	5	$135,000	$0	0	0
Hurricane	6	$910,000	$0	0	0
Ice Storm	1	$0	$0	0	0
Lightning	33	$2,417,000	$0	3	0
Strong Wind	12	$958,000	$5,000	1	0
Thunderstorm Wind	324	$2,956,250	$4,000	1	12
Tornado	12	$116,028,000	$25,000	4	70
Tropical Storm	2	$20,000	$0	0	0
Wildfire	1	$1,000,000	$0	0	0
Winter Storm	25	$1,000,000	$0	0	0
Winter Weather	19	$40,000	$0	0	0
Total:	**782**	**$204,175,250**	**$34,000**	**9**	**83**

Source: National Center for Environmental Information Events Database, June 2018
Note: Losses reflect totals for all impacted areas for each event.

The HMPC also researched past events that resulted in a federal and/or state emergency or disaster declaration for Wake County in order to identify significant hazards. Federal and/or state disaster declarations may be granted when the Governor certifies that the combined local, county and state resources are insufficient and that the situation is beyond their recovery capabilities. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state government capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

Records of designated counties for FEMA major disaster declarations start in 1964. Since then, Wake County has been designated in 11 major disaster declarations, as detailed in Table 4.3.

Table 4.3 – FEMA Major Disaster Declarations, Wake County

Disaster #	Dec. Date	Incident Type	Event Title
4285	10/10/2016	Hurricane	Hurricane Matthew
1969	4/19/2011	Severe Storm(s)	Severe Storms, Tornadoes, And Flooding
1490	9/18/2003	Hurricane	Hurricane Isabel
1448	12/12/2002	Severe Ice Storm	Severe Ice Storm
1312	1/31/2000	Severe Storm(s)	Severe Winter Storm
1292	9/16/1999	Hurricane	Hurricane Floyd Major Disaster Declarations
1211	3/22/1998	Severe Storm(s)	Severe Storms Tornadoes, And Flooding
1134	9/6/1996	Hurricane	Hurricane Fran
1087	1/13/1996	Snow	Blizzard Of 96
818	12/2/1988	Tornado	Severe Storms & Tornadoes
234	2/10/1968	Severe Ice Storm	Severe Ice Storm

Source: FEMA Disaster Declarations Summary, October 16, 2018

Using the above information and additional discussion, the HMPC evaluated each hazard's significance to the planning area in order to decide which hazards to include in this plan update. Some hazard titles have been updated either to better encompass the full scope of a hazard or to assess closely related hazards together. Table 4.4 summaries the determination made for each hazard.

Table 4.4 – Hazard Evaluation Results

Hazard	Included in this plan update?	Explanation for Decision
Natural Hazards		
Dam Failure	Yes	The 2015 Wake County plan addressed this hazard.
Drought	Yes	The 2015 Wake County plan addressed this hazard. The State Hazard Mitigation Plan lists drought as a hazard for the Piedmont region which includes Wake County.
Earthquake*	Yes	The 2015 Wake County plan and the State HMP addressed this hazard. Wake County could be impacted by the New Madrid fault and the Charleston fault.
Extreme Heat	Yes	The 2015 Wake County plan addressed this hazard. NCEI reports 2 heat events for Wake County. The State HMP includes Excessive Heat as a moderate hazard.
Flood	Yes	The 2015 Wake County plan addressed this hazard. Multiple disaster declarations for the County are related to flooding. NCEI reports 130 flood-related events.

Hazard	Included in this plan update?	Explanation for Decision
Hurricane & Tropical Storm	Yes	Wake County is not exposed to coastal hazards; therefore storm surge, coastal flooding, and coastal erosion will not be assessed. However, past disaster declarations and NCEI storm reports indicate hurricane wind and rain are still a significant hazard for the County. The State HMP lists hurricane as a top hazard in the Piedmont region which includes Wake County. The 2015 Wake County plan addressed this hazard.
Landslide*	Yes	The 2015 Wake County plan and 2018 State HMP addressed this hazard.
Severe Winter Weather (Freezing Rain, Snowstorms, Blizzards, Wind Chill, Extreme Cold)	Yes	The 2015 Wake County plan and 2018 State plan addressed this hazard. Several past disaster and emergency declarations relate to this hazard.
Severe Weather (Thunderstorm Wind, Lightning, Hail)	Yes	The 2015 Wake County plan addressed these hazard. NCEI reports 341 wind events, 33 lightning events, and 209 hail events in the past 20 years. Given this frequency, analysis is warranted.
Tornado	Yes	The 2015 Wake County plan addressed this hazard. NCEI reports 12 previous tornado events. Per the State HMP, vulnerability to tornado is high. Wake County has previously received a major disaster declaration for tornado.
Wildfire	Yes	The 2015 Wake County plan addressed this hazard. There are areas of the County with high burn probability and moderate potential fire intensity.
Erosion	No	The 2015 Wake County plan addressed this hazard but did not find any historical occurrences and assigned a low probability of future occurrence. Erosion will be discussed as a subset of wind and flood hazards.
Levee Failure	No	The 2015 Wake County plan addressed this hazard in conjunction with dam failure but did not list any levees or historical levee failures in the County. The USACE's National Levee Database does not identify any USACE or non-USACE levees in Wake County.
Sinkholes	No	The 2015 Wake County plan did not address this hazard. Per the State HMP, vulnerability to sinkhole is low in the Piedmont region.
Technological Hazards & Threats		
Hazardous Materials Incident	Yes	The 2015 Wake County plan addressed this hazard and found it to be a moderate priority hazard to the planning area.
Radiological Emergency	Yes	The 2015 Wake County plan addressed this hazard and found it to be a moderate priority hazard to the planning area.
Terrorism	Yes	The 2015 Wake County plan addressed this hazard and found it to be a moderate priority hazard to the planning area.
Cyber Threat	No	The 2015 Wake County plan did not address this threat. The County considers this threat more appropriately addressed at the State level.
Electromagnetic Pulse	No	The 2015 Wake County plan did not address this threat. The County considers this threat more appropriately addressed at the State level.
Infectious Disease	No	The 2015 Wake County plan did not address this hazard. The State HMP reports the entire State is equally at risk, but vulnerability is low across all but one impact category.

*These hazards were found to be low-risk hazards through the risk assessment process; therefore, they are not prioritized for mitigation actions.

4.3 RISK ASSESSMENT METHODOLOGY AND ASSUMPTIONS

The Disaster Mitigation Act of 2000 requires that the HMPC evaluate the risks associated with each of the hazards identified in the planning process. Each hazard was evaluated to determine its probability of future occurrence and potential impact. A vulnerability assessment was conducted for each hazard using either quantitative or qualitative methods depending on the available data, to determine its potential to cause significant human and/or monetary losses. A consequence analysis was also completed for each hazard.

Each hazard is profiled in the following format:

Hazard Description

This section provides a description of the hazard, including discussion of its speed of onset and duration, as well as any secondary effects followed by details specific to the Wake County planning area.

Location

This section includes information on the hazard's physical extent, with mapped boundaries where applicable.

Extent

This section includes information on the hazard extent in terms of magnitude, describe how the severity of the hazard can be measured. Where available, the most severe event on record used as a frame of reference.

Past Occurrences

This section contains information on historical events, including the location and consequences of all past events on record within or near the Wake County planning area.

Probability of Future Occurrence

This section gauges the likelihood of future occurrences based on past events and existing data. The frequency is determined by dividing the number of events observed by the number of years on record and multiplying by 100. This provides the percent chance of the event happening in any given year according to historical occurrence (e.g. 10 winter storm events over a 30-year period equates to a 33 percent chance of experiencing a severe winter storm in any given year). The likelihood of future occurrences is categorized into one of the classifications as follows:

- ***Highly Likely*** – Near or more than 100 percent chance of occurrence within the next year
- ***Likely*** – Between 10 and 100 percent chance of occurrence within the next year (recurrence interval of 10 years or less)
- ***Possible*** – Between 1 and 10 percent chance of occurrence within the next year (recurrence interval of 11 to 100 years)
- ***Unlikely*** – Less than 1 percent chance or occurrence within the next 100 years (recurrence interval of greater than every 100 years)

Climate Change

Where applicable, this section discusses how climate change may or may not influence the risk posed by the hazard on the planning area in the future.

Vulnerability Assessment

This section quantifies, to the extent feasible using best available data, assets at risk to natural hazards and potential loss estimates. People, properties and critical facilities, and environmental assets that are vulnerable to the hazard are identified. Future development is also discussed in this section, including how exposure to the hazard may change in the future or how development may affect hazard risk.

The vulnerability assessments followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (August 2001). The vulnerability assessment first describes the total vulnerability and values at risk and then discusses vulnerability by hazard. Data used to support this assessment included the following:

- Geographic Information System (GIS) datasets, including building footprints, topography, aerial photography, and transportation layers;
- Hazard layer GIS datasets from state and federal agencies;
- Written descriptions of inventory and risks provided by the State Hazard Mitigation Plan; and
- Written descriptions of inventory and risks provided by the previous Wake County Multi-Jurisdictional Hazard Mitigation Plan.
- Exposure and vulnerability estimates provided by the North Carolina Emergency Management IRISK database.
- Crop insurance claims by cause from USDA's Risk Management Agency

NCEM's IRISK database incorporates county building footprint and parcel data. Footprints with an area less than 500 square feet were excluded from the analysis. To determine if a building is in a hazard area, the building footprints were intersected with each of the mapped hazard areas. If a building intersects two or more hazard areas (such as the 1-percent-annual-chance flood zone and the 0.2-percent-annual-chance flood zone), it is counted as being in the hazard area of highest risk. The parcel data provided building value and year built. Building value was used to determine the value of buildings at risk. Year built was used to determine if the building was constructed prior to or after the community had joined the NFIP and had an effective FIRM and building codes enforced.

Census blocks and Summary File 1 from the 2010 Census were used to determine population at risk. This included the total population, as well as the vulnerable elderly and children age groups. To determine population at risk, the census blocks were intersected with the hazard area. To better determine the actual number of people at risk, the intersecting area of the census block was calculated and divided by the total area of the census block to determine a ratio of area at risk. This ratio was applied to the population of the census block. For example, a census block has a population of 400 people. Five percent of the census block intersects the 1-percent-annual-chance flood hazard area. The ratio estimates that 20 people are then at risk within the 1-percent-annual-chance flood hazard area (5% of the total population for that census block).

Two distinct risk assessment methodologies were used in the formation of the vulnerability assessment. The first consists of a ***quantitative*** analysis that relies upon best available data and technology, while the second approach consists of a ***qualitative*** analysis that relies on local knowledge and rational decision making. The quantitative analysis involved the use of NCEM's IRISK database, which provides modeled damage estimates for flood, wind, and wildfire hazards.

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and types of buildings subject to the identified hazard can be counted and their values tabulated. Where hazard risk cannot be distinctly quantified and modeled, other information can be collected in regard to the hazard area, such as the location of critical

facilities, historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat). Together, this information conveys the vulnerability of that area to that hazard.

Certain assumptions are inherent in any risk assessment. For the Wake County Multi-Jurisdictional HMP, three primary assumptions were discussed by the HMPC from the beginning of the risk assessment process: (1) that the best readily available data would be used, (2) that the hazard data selected for use is reasonably accurate for mitigation planning purposes, and (3) that the risk assessment will be regional in nature with local, municipal-level data provided where appropriate and practical.

Key methodologies and assumptions for specific hazards analysis are described in their respective profiles.

Priority Risk Index

The conclusions drawn from the hazard profiling and vulnerability assessment process can be used to prioritize all potential hazards to the Wake County planning area. The Priority Risk Index (PRI) was applied for this purpose because it provides a standardized numerical value so that hazards can be compared against one another (the higher the PRI value, the greater the hazard risk). PRI values are obtained by assigning varying degrees of risk to five categories for each hazard (probability, impact, spatial extent, warning time, and duration). Each degree of risk was assigned a value (1 to 4) and a weighting factor as summarized in Table 4.5.

The results of the risk assessment and PRI scoring are provided in Section 4.6 Conclusions on Hazard Risk.

Table 4.5 – Priority Risk Index

RISK ASSESSMENT CATEGORY	LEVEL	DEGREE OF RISK CRITERIA	INDEX	WEIGHT
PROBABILITY What is the likelihood of a hazard event occurring in a given year?	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY	**1**	**30%**
	POSSIBLE	BETWEEN 1 & 10% ANNUAL PROBABILITY	**2**	
	LIKELY	BETWEEN 10 &100% ANNUAL PROBABILITY	**3**	
	HIGHLY LIKELY	100% ANNUAL PROBABILTY	**4**	
IMPACT In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	**1**	**30%**
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR > 1 DAY	**2**	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR > 1 WEEK.	**3**	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES > 30 DAYS.	**4**	
SPATIAL EXTENT How large of an area could be impacted by a hazard event? Are impacts localized or regional?	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	**1**	**20%**
	SMALL	BETWEEN 1 & 10% OF AREA AFFECTED	**2**	
	MODERATE	BETWEEN 10 & 50% OF AREA AFFECTED	**3**	
	LARGE	BETWEEN 50 & 100% OF AREA AFFECTED	**4**	
WARNING TIME Is there usually some lead time associated with the hazard event? Have warning measures been implemented?	**MORE THAN 24 HRS**	SELF DEFINED	**1**	**10%**
	12 TO 24 HRS	SELF DEFINED	**2**	
	6 TO 12 HRS	SELF DEFINED	**3**	
	LESS THAN 6 HRS	SELF DEFINED	**4**	
DURATION How long does the hazard event usually last?	**LESS THAN 6 HRS**	SELF DEFINED	**1**	**10%**
	LESS THAN 24 HRS	SELF DEFINED	**2**	
	LESS THAN 1 WEEK	SELF DEFINED	**3**	
	MORE THAN 1 WEEK	SELF DEFINED	**4**	

The sum of all five risk assessment categories equals the final PRI value, demonstrated in the equation below (the highest possible PRI value is 4.0).

PRI = [(PROBABILITY x .30) + (IMPACT x .30) + (SPATIAL EXTENT x .20) + (WARNING TIME x .10) + (DURATION x .10)]

The purpose of the PRI is to categorize and prioritize all potential hazards for the Wake County planning area as high, moderate, or low risk. The summary hazard classifications generated through the use of the PRI allows for the prioritization of those high and moderate hazard risks for mitigation planning purposes. Mitigation actions are not developed for hazards identified as low risk through this process.

4.4 ASSET INVENTORY

North Carolina Emergency Management's (NCEM) IRISK database provided the asset inventory used for this vulnerability assessment. Population data in IRISK is pulled from the 2010 Census and includes a breakdown of population into two subpopulations considered to be a greater risk than the general population, the elderly and children. Table 4.6 details the population counts by jurisdiction used for the vulnerability assessment.

Table 4.6 – Population Counts by Jurisdiction, 2010

Jurisdiction	2010 Census Population	Elderly (Age 65 and Over)	Children (Age 5 and Under)
Raleigh	419,053	35,611	30,469
Apex	41,724	3,546	3,034
Cary	136,260	11,579	9,907
Fuquay-Varina	25,023	2,126	1,819
Garner	30,981	2,633	2,253
Holly Springs	25,790	2,192	1,875
Knightdale	18,501	1,572	1,345
Morrisville	18,655	1,585	1,356
Rolesville	5,199	442	378
Wake Forest	30,382	2,582	2,209
Wendell	7,889	670	574
Zebulon	6,102	519	444
Unincorporated Wake County	135,124	11,483	9,825
Total	**900,683**	**76,540**	**65,488**

Source: NCEM IRISK Database; 2010 Decennial Census

Building counts were also provided by the IRISK database. These values were generated using locally-provided building footprint and parcel data. The methodology for generating the building asset inventory is described in greater detail in Section 4.3. Note that these building counts were provided in 2010, and Wake County has since experienced a substantial amount of growth and new development. Therefore, the exposure reflected in the following tables is an underestimate of actual present-day exposure. Section 3 Planning Area Profile describes the growth that has occurred since 2010 and provides a means of estimating the degree to which exposure and vulnerability may have increased.

Table 4.7 – Building Counts and Values by Jurisdiction, 2010

Jurisdiction	Building Count	Building Value
Raleigh	128,076	$36,932,753,604
Apex	14,554	$3,308,524,073
Cary	45,306	$14,607,342,852
Fuquay-Varina	10,244	$2,075,445,520
Garner	11,975	$2,243,212,305
Holly Springs	9,178	$2,304,103,554
Knightdale	7,144	$1,240,283,673
Morrisville	5,181	$2,166,113,564

Jurisdiction	Building Count	Building Value
Rolesville	2,103	$388,407,100
Wake Forest	10,547	$2,829,746,009
Wendell	3,728	$483,437,990
Zebulon	3,074	$580,245,547
Unincorporated Wake County	59,373	$13,446,080,728
Total	**310,483**	**$82,605,696,519**

Source: NCEM IRISK Database

Table 4.8 provides an estimate of the number of pre-FIRM buildings in each jurisdiction. This analysis was prepared using NCEM's IRISK database and comparing the year built for each structure to the corresponding community's initial Flood Insurance Rate Map (FIRM) date. The pre-FIRM building counts include all building constructed prior to the year of the initial FIRM.

Table 4.8 – Pre-FIRM Buildings by Jurisdiction

Jurisdiction	Pre-FIRM Building Count	Date of Initial FIRM
Wake County	11,483	11/15/1978
Raleigh	44,658	8/15/1978
Apex	3,769	3/3/1992
Cary	7,616	7/17/1978
Fuquay-Varina	2,181	11/1/1978
Garner	5,561	7/3/1978
Holly Springs	1,532	3/3/1992
Knightdale	1,698	8/1/1978
Morrisville	287	11/1/1978
Rolesville	817	3/3/1992
Wake Forest	1,469	7/3/1978
Wendell	1,597	6/1/1978
Zebulon	1,552	7/3/1978

Source: NCEM IRISK Database; GIS analysis performed by Wood
Note: These estimates do not account for any historical changes in jurisdictional boundaries. Buildings were classified based on the Initial FIRM date for the current jurisdictional boundaries.

The IRISK database also identifies Critical Infrastructure and Key Resources (CIKR) buildings as well as High Potential Loss Properties. These properties were also identified in 2010 and are likely an underestimate of the exposure of current CIKR and High Potential Loss Properties. These properties are detailed in Table 4.9 and Table 4.10, respectively.

Table 4.9 – Critical Infrastructure and Key Resources by Type and Jurisdiction

Jurisdiction	Food and Agriculture	Banking and Finance	Chemical & Hazardous	Commercial	Communications	Critical Manufacturing	EM	Healthcare	Government Facilities	Defense Industrial Base	National Monuments and Icons	Nuclear Reactors, Materials and Waste	Postal and Shipping	Transportation Systems	Energy	Emergency Services	Water	Total
Raleigh	166	164	1	3,653	8	1,678	2	1,643	457	0	0	2	0	739	13	40	12	**8,578**
Apex	75	14	0	302	0	225	1	91	27	0	0	0	0	59	0	2	0	**796**
Cary	91	55	0	1,259	5	270	1	334	98	0	0	1	0	203	4	12	27	**2,360**
Fuquay-Varina	136	17	0	275	0	150	1	69	27	0	0	0	0	37	0	3	5	**720**
Garner	67	19	0	297	0	309	0	110	23	0	0	0	0	27	1	3	4	**860**
Holly Springs	68	6	0	118	0	42	0	37	3	0	0	0	0	9	0	5	3	**291**
Knightdale	68	10	0	120	0	64	0	46	8	0	0	0	0	12	1	5	0	**334**
Morrisville	2	5	0	162	1	142	1	31	2	0	0	0	0	40	0	2	0	**388**
Rolesville	43	1	0	37	0	11	0	20	2	0	0	0	0	4	0	2	0	**120**
Wake Forest	8	12	0	315	0	199	0	93	23	0	0	0	0	36	0	4	3	**693**
Wendell	72	4	0	132	0	75	0	37	6	0	0	0	0	22	0	2	0	**350**
Zebulon	60	8	0	151	0	85	0	52	18	0	0	0	0	19	0	2	2	**397**
Unincorporated Wake County	1,902	0	0	574	0	621	0	198	27	0	0	0	0	186	28	14	43	**3,593**
Total	**2,758**	**315**	**1**	**7,395**	**14**	**3,871**	**6**	**2,761**	**721**	**0**	**0**	**3**	**0**	**1,393**	**47**	**96**	**99**	**19,480**

Source: NCEM Risk Management Tool

Table 4.10 – High Potential Loss Properties by Use and Jurisdiction

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Total
Raleigh	1,284	1,359	338	505	1	170	13	**3,670**
Apex	71	76	50	19	0	16	0	**232**
Cary	437	519	65	87	0	48	26	**1,182**
Fuquay-Varina	19	52	16	15	1	17	5	**125**
Garner	69	84	59	23	0	17	2	**254**
Holly Springs	14	26	14	14	0	5	2	**75**
Knightdale	40	37	4	19	0	8	1	**109**
Morrisville	148	100	59	10	0	7	0	**324**
Rolesville	4	8	1	4	0	1	0	**18**
Wake Forest	44	70	21	21	0	15	3	**174**
Wendell	2	13	3	6	0	10	0	**34**

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Total
Zebulon	3	21	15	16	0	5	2	**62**
Unincorporated Wake County	432	84	26	44	1	36	66	**689**
Total	**2,567**	**2,449**	**671**	**783**	**3**	**355**	**120**	**6,948**

Source: NCEM Risk Management Tool

In addition to examining CIKR overall, the following critical facilities and assets were examined against known hazard areas, where possible, in this risk assessment. These facilities are those that could severely disrupt emergency operations or response and recovery efforts should they be damaged by a hazard event. Note that these facilities are a subset of the CIKR inventory; critical facility exposure and risk is accounted for in the exposure and vulnerability of CIKR.

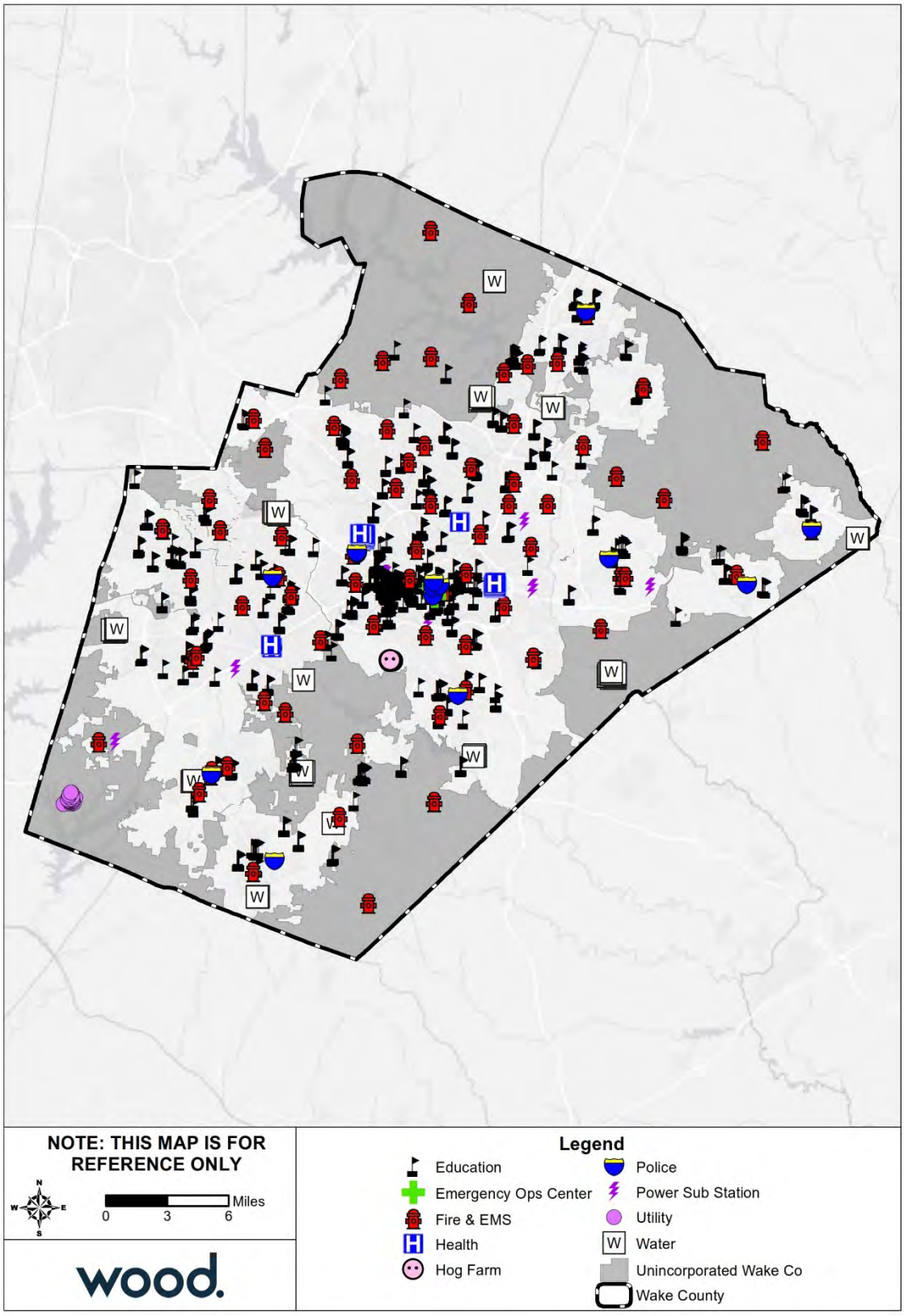
Critical facilities are summarized in Table 4.11 and shown in Figure 4.1.

Table 4.11 – Critical Facilities, Wake County

Sector	Asset	Count	Value
Emergency Management	EOC	2	$44,920,851
	Fire	79	$55,948,431
	Police	15	$212,372,157
Healthcare and Public Health	Hospital	23	$783,859,956
Government	School	79	$177,931,942
	School	1,067	$2,628,151,033
	University	257	$700,146,739
Energy	Utility	24	$499,999,999
	Substation	12	$90,898,660
Water	Treatment Plant	98	$1,413,119,006
Agriculture and Food Distribution	Hog Farm	6	$943,387

Source: NCEM IRISK Database; GIS analysis

Figure 4.1 – Wake County Critical Facilities



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in Wake County, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions. This information is presented by individual jurisdiction in each jurisdiction's respective annex of this plan.

Table 4.12 provides a summary by land class of parcel development from January 2011 to April 2019.

Table 4.12 – Parcels Developed 2011 or Later

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	77	$ 33,301,960
Agriculture	30	$ 10,187,595
Apartment	165	$ 2,555,109,339
Commercial	536	$ 2,225,302,523
Condo Complex	18	$ -
EXEMPT	225	$ 805,213,500
Forestry	8	$ 3,987,003
Golf Course	1	$ 76,222
HOA	56	$ 3,206,102
Horticulture	2	$ 757,361
Industrial	83	$ 224,883,337
Mobile Home Park	1	$ 137,073
Part Exempt	278	$ 526,385,636
Residential Less Than 10 Acres	42,488	$ 12,026,043,100
Retirement Home	9	$ 54,011,162
State Assessed	1	$ 4,890,225
Grand Total	**43,978**	**$ 18,473,492,138**

Source: Wake County Open Data; retrieved April 8, 2019

4.5 HAZARD PROFILES, ANALYSIS, AND VULNERABILITY

4.5.1 Dam Failure

Hazard Background

A dam is a barrier constructed across a watercourse that stores, controls, or diverts water. Dams are usually constructed of earth, rock, concrete, or mine tailings. The water impounded behind a dam is referred to as the reservoir and is measured in acre-feet. One acre-foot is the volume of water that covers one acre of land to a depth of one foot. Dams can benefit farm land, provide recreation areas, generate electrical power, and help control erosion and flooding issues. A dam failure is the collapse or breach of a dam that causes downstream flooding. Dam failures may be caused by natural events, manmade events, or a combination. Due to the lack of advance warning, failures resulting from natural events, such as earthquakes or landslides, may be particularly severe. Prolonged rainfall and subsequent flooding is the most common cause of dam failure.

Dam failures usually occur when the spillway capacity is inadequate and water overtops the dam or when internal erosion in dam foundation occurs (also known as piping). If internal erosion or overtopping causes a full structural breach, a high-velocity, debris-laden wall of water is released and rushes downstream, damaging or destroying anything in its path. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can also result from any one or a combination of the following:

- Prolonged periods of rainfall and flooding;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross-section of the dam and abutments, or maintain gates, valves, and other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including the failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway; or
- High winds, which can cause significant wave action and result in substantial erosion.

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. Dam failures are generally catastrophic if the structure is breached or significantly damaged. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major casualties and loss of life could result, as well as water quality and health issues. Potentially catastrophic effects to roads, bridges, and homes are also of major concern. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

Dam failure can occur with little warning. Intense storms may produce a flood in a few hours or even minutes for upstream locations. Flash floods occur within six hours of the beginning of heavy rainfall, and dam failure may occur within hours of the first signs of breaching. Other failures and breaches can take much longer to occur, from days to weeks, as a result of debris jams or the accumulation of melting snow.

Dam failures are of particular concern because the failure of a large dam has the potential to cause more death and destruction than the failure of any other manmade structure. This is because of the destructive power of the flood wave that would be released by the sudden collapse of a large dam. Dams are innately hazardous structures. Failure or poor operation can result in the release of the reservoir contents—this can include water, mine wastes, or agricultural refuse–causing negative impacts upstream or downstream or at locations far from the dam. Negative impacts of primary concern are loss of human life, property damage, lifeline disruption, and environmental damage.

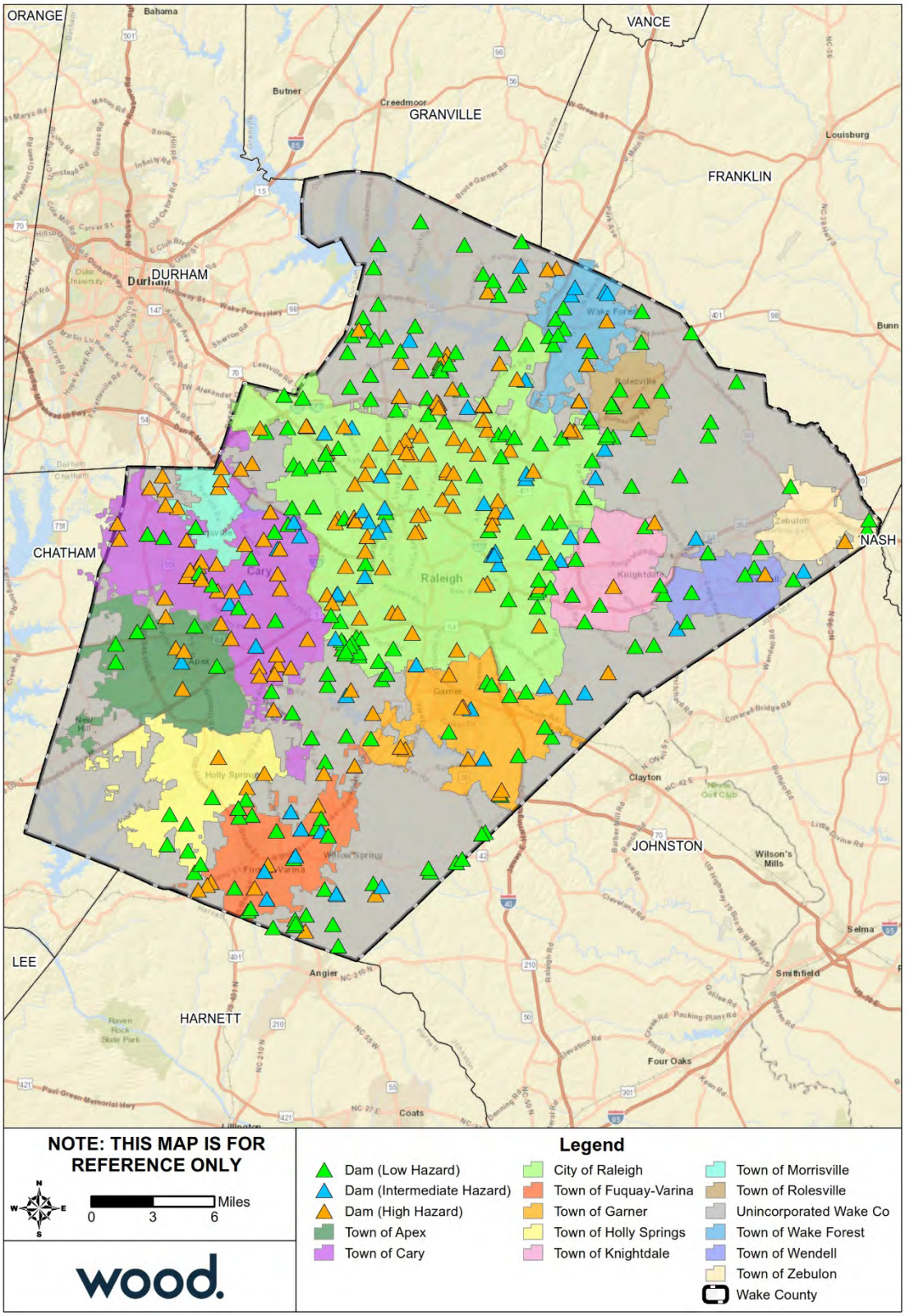
Warning Time: 4 – Less than 6 hours

Duration: 3 – Less than 1 week

Location

The North Carolina Dam Inventory, maintained by North Carolina Department of Environmental Quality, provides a detailed inventory of all dams in the state. As of July 2018, there are 422 dams in Wake County, of which 204 are rated low hazard, 59 are rated intermediate hazard, and 159 are rated high hazard. Figure 4.2 shows the location of all dams in Wake County. Table 4.13 lists all dams with high hazard potential in the county.

Figure 4.2 – Dam Locations in Wake County



Source: North Carolina Dam Inventory, July 2018

Table 4.13 – High Hazard Dams in Wake County

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Downstream Location
Wake County				
Johnson Pond Dam	NC00163	Satisfactory	95	Lillington
Crossgate Lake Dam #1	NC00850	Fair	207	Raleigh
Crossgate Dam #2	NC04437	Fair	40	Raleigh
Lake Benson Dam	NC00861	Satisfactory	7200	Smithfield (Benson Rd near Dam
Lake Wheeler Dam	NC00864	Satisfactory	10800	Smithfield (See Comments)
Mason Lake Dam	NC00865	Fair	52	Milburnie
Panther Lake Dam	NC00876	Fair	253	Smithfield
Rdu Wastewater Dam	NC04443		22.5	N/A
Rtp South Dam	NC04444	Satisfactory	708	Apex
Pendleton Lake	NC04450	Satisfactory	10	Swan Mill Crossing Rd
Crabtree Dam 20-A	NC04456	Satisfactory	2500	John Brantley Blvd
Johnson Pond Dam	NC00845	Poor	5	NC-39
Coachman Trail Lake Dam Lower	NC01461	Fair	93	Falls (CoachmanWay@Dam)
Falls Of The Neuse Dam	NC01713		1128100	Falls (OldFallOfNeuseRd-Dam)
Stonebridge Lake Dam	NC01664	Fair	45	Falls
Coachman Trail Lake Dam Upper	NC04531	Fair	180	Coachman's Way Rd
Byrd Dam	NC04532	Fair	10	Baird Drive
Crabtree Creek Dam 5-A	NC04536	Fair	3010	Raleigh (I-40 @ Dam)
Bailey Dam	NC04563	Fair	76	Six Forks Road
Marshall Pond #2	NC04576	Unsatisfactory	59	Forestville Road
Howell Dam	NC04621	Fair	36	
Manchester Dam	NC04964	Fair	88	Enderbury Drive
Rtp W-1	NC05193	Satisfactory	327	
Crossgate Dam #3	NC05068	Fair	12	White Chapel Way
Chateau Lapointe Dam H	NC05069	Satisfactory	90	White Chapel Way
Cozart Pond Dam	NC05065	Not Rated		
Underwood Pond Dam	NC05218	Fair	27	
Betts Pond Dam	NC05036	Fair	40	
Hasentree Golf Communtiy Dam	NC05685	Satisfactory	139	Hasentree Club Drive
Neuse River Waste Water Treatment Plant Equalization Basin	NC05686	Satisfactory	114	Mai Plantation Road
RTP W-5 Dam	NC05795	Satisfactory	700	Jordan Reservoir
Burnside Drive Dam	NC05802	Fair	12	Burnside Drive
Rosewood Subdivision Dam	NC05877	Satisfactory	6	MacTavish Way
McCullers Pond Dam	NC06160	Not Rated		
Raleigh				
Hedingham Dam #1	NC00794	Fair	152	Raleigh
Gresham Lake Dam	NC00795	Satisfactory	1755	Milburnie (at Dam US-1 and I-5

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Downstream Location
Shaw Lake Dam	NC00851	Fair	55	Raleigh
Dunnaway Lake Dam	NC00858	Satisfactory	290	Raleigh
Lake Johnson Dam	NC00862	Fair	3090	Raleigh (Lake Dam Rd at Dam)
Lake Raleigh Dam	NC00863	Fair	781	Raleigh (Main Camp. Dr @ Dam)
Baker Lake Dam	NC00885	Satisfactory	60	Raleigh
Turfgrass Lake Dam #3	NC00994	Satisfactory	85	Smithfield
Lakes Apartment Dam	NC00376	Satisfactory	21.6	Raleigh
Raintree Lake	NC00383			
Brentwood Today Lake Dam	NC01200	Not Rated	12	Raleigh
NCSU Centennial Campus Farm Pond Dam	NC01283	Fair	20	Raleigh
Em Johnson Alum Sludge Lagoon Dam	NC04460	Fair	108.3	Raleigh (FallsOfNeuseRd @ dam)
Alyson Pond	NC04462	Fair	40	Yucca Trail Dr.
Heathrow Dam	NC04466	Fair	26	Cub Trail Road
Shelley Lake	NC01452	Satisfactory	4269	Raleigh (W.MillbrookRd.@Dam)
Lake Lynn	NC01454	Satisfactory	2292	Raleigh (Lynn Rd near dam)
Lakemont Dam	NC01455		91	Raleigh
Cedar Hills Lake Dam	NC04482	Fair	20	E. Millbrook Rd
Eastgate Park Dam	NC04490	Satisfactory	27	Raleigh
Mallard Pond Dam	NC05154	Fair	8	Buck Jones Rd.
Northshore Lake Dam	NC01231	Satisfactory	63	Raleigh
Bullard And Patterson Dam	NC04504	Fair	2.5	Walnut Crk Trail Rd
White Oak Lake Dam	NC04516	Unsatisfactory	20	US-1 (Cliff Benson Beltline
Camp Pond Dam	NC04519	Poor	24	Raleigh
Wooten Pond Dam	NC04520	Unsatisfactory	40	Raleigh
Ammons Lake Dam Upper	NC04527	Poor	50	Raleigh
Ammons Lake Dam Lower	NC04528	Satisfactory	352	Raleigh
Longview Lake Dam Lower	NC01627	Not Rated	143	Raleigh
Longview Lake Upper Dam	NC04529	Fair	44	Raleigh
Springdale Estates Upper Dam	NC01665	Fair	75	Raleigh
North Ridge Lake Dam Upper	NC01711	Satisfactory	168	Raleigh
North Ridge Lake Dam Lower	NC01712	Satisfactory	161	Raleigh
Crabtree Creek W/S Structure #11a	NC01720	Satisfactory	3327	Raleigh-EbenezerChRd (.78 mi)
North Blvd Comm Center Dam	NC04533	Fair	20	Waterbury Road
Fuller Lake Dam	NC01719	Satisfactory	70	Sawmill Road
Hart-George Pond	NC04535	Fair	18	Raleigh
Williams-Johnson Pond Dam	NC04537	Poor	44	Raleigh
The Lakes Lower Dam	NC04538	Satisfactory	41	Shanda Drive
State Fair H & L Dam	NC04539	Fair	78	Raleigh
Summer Lake Dam	NC04545	Fair	18	West Millbrook Rd

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Downstream Location
Meredith College Dam	NC04546	Poor	34	Faircloth Street
Underwood Dam	NC04547	Poor	30	Seabrook Road
Ward Transformer Dike	NC04548	Satisfactory	13	Glenwood Ave (US-70)
Martin Marietta #1 Dam	NC04549	Satisfactory	59	Raleigh
Lakeside Dam	NC04955		23	Raleigh
Leadmine Lake Dam	NC05142	Fair	92	Raleigh
Delta Lake	NC04910	Fair	42	Raleigh
Olde Raleigh Dam #3	NC05176	Fair	24	Raleigh
Olde Raleigh Dam #1	NC05174	Fair	19.7	Raleigh
Olde Raleigh Dam #2	NC05175	Fair	25.1	Raleigh
Landmark Apts. Dam	NC04632	Satisfactory	18	Raleigh
Remington Park Dam	NC04979	Fair	84	I-540 (Northern Wake Expresswa
Carolina Country Club Dam	NC05053	Poor	32	Scotland Street
Newton Commons Dam	NC05170		8.6	Raleigh
E.M. Johnson Water Plant B	NC05078	Satisfactory	383	Raleigh (Raven Ridge Road)
Lake Plaza Dam	NC05133	Fair	18.4	Raleigh
E.M. Johnson Plant A Dam	NC05077	Satisfactory	110	Raleigh (FallsofNeuseRd@Dam)
Art Museum Dam	NC05026	Fair	10	Nancy Ann Drive
Brier Creek Village Center Dam	NC05737	Fair		
Carolina Pines Dam	NC05753	Satisfactory	53	Raleigh
Bedford at Falls River Dam #1	NC06066		4	
Pine Knoll Dam	NC06093	Poor		Raleigh
Chavis Dam	NC06107	Satisfactory	4	
Carolina Country Club Water Harvesting Pond Dam	NC06108	Satisfactory		Raleigh
Highland Creek SWF # 1	NC06148	Satisfactory		
Highland Creek SWF # 2	NC06149	Satisfactory		
Highland Creek SWF # 10	NC06150	Satisfactory		
Apex				
Lake Pine Dam	NC00933	Fair	163	Cary
Haddon Hall Dam	NC05102	Fair	42	
Haddon Hall Upper Dam	NC05779	Poor	0	
Seymour Farms Pond Dam	NC05870	Satisfactory	7	Apex
Cary				
Jack Rigsbee Dam	NC04438	Satisfactory	20	Cary
Preston Crossings Dam	NC00877	Satisfactory	18.8	Cary
Fred G Bond Dam	NC00926	Fair	666	Morrisville (SE CaryPkwy .48 m
Riggsbee Dam	NC04442	Satisfactory	24	Apex
Barbee Dam	NC04445	Satisfactory	12	Council Gap Ct. (homes before)
Blackhawk Dam	NC01451	Fair	26	Cary
Panther Creek Dam	NC05177	Satisfactory	202	

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Downstream Location
Herndon Pond Dam	NC05108	Not Rated	22	
Crabtree Crk. W/S Structure #2	NC01450	Satisfactory	409	Davis Drive
Adams Dam	NC04550		17	
Coronado Lake Dam	NC04616	Fair	26	Cary
Hobby Dam	NC05111	Satisfactory	16	
Regency Park Dam	NC04624	Satisfactory	350	Ederlee Drive
Lochmere Lake Dam #2	NC05146	Satisfactory	196	Lochmere Drive
Loch Highlands Dam	NC05145	Fair	59	Loch Highlands Drive
Kildaire Farms Dam	NC04949	Satisfactory	420	Cary
Lochmere Dam	NC04961	Fair	728	Lochmere Drive
Lake Crabtree	NC04952	Satisfactory	8950	Raleigh (OldReedyCrRd.is.15 mi
Audubon Parc Dam	NC05028	Satisfactory	8.1	Cary
Lake Amberly Dam	NC05644	Satisfactory	0	
Huggins Glen Dam	NC05658	Satisfactory	80	Castalia Drive
Searstone	NC05695	Satisfactory	9	Cary
Powell Tract Dam	NC05707	Satisfactory	9999	Millens Bay Court
Tryon Road Dam	NC05894	Fair		Tryon Rd (NC-1009)
Woolner Dam	NC06089	Fair	11	Cary
Kera Gardens Dam	NC06135	Fair		Raleigh
Silverton Dam	NC06171	Satisfactory		Cary
Fuquay-Varina				
Parker Lake Dam	NC00849	Satisfactory	75	
Crooked Creek	NC04446	Fair	40	Bushy Meadow Drive
Jones Pond Dam	NC04946	Poor	19	
Garner				
Weston #1	NC05235	Poor	10.8	Aversboro Road
Weston #2	NC05236	Poor	10	Aversboro and Lakeside Rd (int
Massengill Dam	NC04626	Fair	82	Walerville Street
Garner Ww Lagoon #1	NC04917	Satisfactory	394	I-40 (James E. Harrison Freewa
Garner Ww Lagoon #2	NC04918	Satisfactory	306	I-40 (James E. Harrison Freewa
Eagle Ridge Golf Course Dam	NC05626	Satisfactory	0	Smithfield
Holly Springs				
Sunset Lake Dam	NC00880	Fair	750	Holly Springs (Sunset Lake Rd)
Bass Lake Dam	NC00934	Fair	910	Holly Springs (BassLakeRd@dam)
Windcrest	NC05683	Fair	42	Amacord Way
Knightdale				
Robertson Pond Dam	NC04481	Fair	20	Smithfield
Myrick Lake Dam	NC01656	Poor	5	Knightdale
Morrisville				
Perimeter Park West Dam	NC05180	Satisfactory	10	Marcom Dr

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Downstream Location
Crabtree Creek W/S #1 (PL-566)	NC01449	Satisfactory	480	Raleigh
Crabtree Creek W/S Dam #18	NC01453	Satisfactory	661	Morrisville
Breckenridge Recreation Center Dam	NC05622	Satisfactory	38	Cary
Breckenridge Tract 9 & 10 Dam	NC05623	Satisfactory	83	Cary
Rolesville				
none				
Wake Forest				
Brown Lake Dam (AKA St. Andrews Plantation WAKE-268)	NC00859	Fair	52	Milburnie
Holding Lake Dam	NC00873	Satisfactory	145	Milburnie (S. Franklin St @ Dam
Lewis Dam	NC04439	Not Rated	80	Wake Forest
Wake Forest Water Supply Dam	NC00995	Satisfactory	945	Milburnie (WaitAve(NC-98)(.12)
St. Andrews Plantation Dam	NC04579	Fair	23	Coach Lantern Ave
Wendell				
Timberlake Dam	NC05843	Fair	9999	Cedarmere Drive
Zebulon				
none				

Source: North Carolina Dam Inventory, July 2018

Extent

Each state has definitions and methods to determine the hazard potential of a dam. In North Carolina, dams are regulated by the state if they are 25 feet or more in height and impound 50 acre-feet or more. Dams and impoundments smaller than that may fall under state regulation if it is determined that failure of the dam could result in loss of human life or significant damage to property. The height of a dam is from the highest point on the crest of the dam to the lowest point on the downstream toe, and the storage capacity is the volume impounded at the elevation of the highest point on the crest of the dam.

Dam Safety Program engineers determine the "hazard potential" of a dam, meaning the probable damage that would occur if the structure failed, in terms of loss of human life and economic loss or environmental damage. Dams are assigned one of three classes based on the nature of their hazard potential:

- Class A (Low Hazard) includes dams located where failure may damage uninhabited low value non-residential buildings, agricultural land, or low volume roads.
- Class B (Intermediate Hazard) includes dams located where failure may damage highways or secondary railroads, cause interruption of use or service of public utilities, cause minor damage to isolated homes, or cause minor damage to commercial and industrial buildings. Damage to these structures will be considered minor only when they are located in backwater areas not subjected to the direct path of the breach flood wave; and they will experience no more than 1.5 feet of flood rise due to breaching above the lowest ground elevation adjacent to the outside foundation walls or no more than 1.5 feet of flood rise due to breaching above the lowest floor elevation of the structure.
- Class C (High Hazard) includes dams located where failure will likely cause loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, primary highways, or major railroads.

Table 4.14 – Dam Hazard Classifications

Hazard Classification	Description	Quantitative Guidelines
Low	Interruption of road service, low volume roads	Less than 25 vehicles per day
	Economic damage	Less than $30,000
Intermediate	Damage to highways, interruption of service	25 to less than 250 vehicles per day
	Economic damage	$30,000 to less than $200,000
	Loss of human life*	Probable loss of 1 or more human lives
High	Economic damage	More than $200,000
	*Probable loss of human life due to breached roadway or bridge on or below the dam	250 or more vehicles per day

Source: NCDEQ

The most recent failure of a high hazard dam occurred in 1996 with the failure of the Lake Raleigh dam following Hurricane Fran.

Based on classification criteria, a high hazard dam failure could cause death and/or injury as well as severe property damage and economic impacts within the affected area. Therefore, though the affected area would be negligible in size relative to the entire planning area, the potential impact of a high hazard dam failure is critical.

Impact: 3 – Critical

Spatial Extent: 1 – Negligible

Historical Occurrences

The following table details the historical occurrences of dam failure reported in the 2015 Wake County Hazard Mitigation Plan. No additional failures are known to have occurred in the County since 2015.

Dam Name	Location	Class at Time of Failure	Year of Failure	Cause of Failure
Cedar Hills*	Wake County	Intermediate*	mid 1970s	Heavy rain
Coachman's Trail Lower	Wake County	High	late 1970s	Heavy rain
Beaman's Lake	Wake County	Intermediate	late 1980s	Heavy rain
Bass Lake*	Holly Springs	Low*	1996	Hurricane Fran
Lake Raleigh	Raleigh	High	1996	Hurricane Fran
Penny Hill Lake	Zebulon	Low	1996	Hurricane Fran
Silver Lake*	Raleigh	Intermediate*	1996	Hurricane Fran
Yates Mill Pond	Wake County	Intermediate	1996	Hurricane Fran

*These dams are now classified as high hazard due to downstream development and/or increased downstream traffic.
Source: 2015 Wake County Multi-Jurisdictional Hazard Mitigation Plan

Probability of Future Occurrence

Given the significant presence of high hazard dams in Wake County, failure of a dam is possible. Dam failure has not occurred in the county since 1996, however historical events alone do not provide an adequate estimate of potential future occurrence. With heavy rain events becoming more frequent and intense, conditions conducive to dam failure may occur more frequently as well.

Probability: 2 – Possible

Climate Change

Studies have been conducted to investigate the impact of climate change scenarios on dam safety. The safety of dams for the future climate can be based on an evaluation of changes in design floods and the freeboard available to accommodate an increase in flood levels. The results from the studies indicate that the design floods with the corresponding outflow floods and flood water levels will increase in the future, and this increase will affect the safety of the dams in the future. Studies concluded that the total hydrological failure probability of a dam will increase in the future climate and that the extent and depth of flood waters will increase by the future dam break scenario.

Vulnerability Assessment

Methodologies and Assumptions

Dam inundation areas were not available for the identified dams; therefore, a quantitative vulnerability assessment could not be completed. Vulnerability discussed below is based on anecdotal evidence and theoretical understanding of potential risks.

People

A person's immediate vulnerability to a dam failure is directly associated with the person's distance downstream of the dam as well as proximity to the stream carrying the floodwater from the failure. For dams that have an Emergency Action Plan (EAP), the vulnerability of loss of life for persons in their homes or on their property may be mitigated by following the EAP evacuation procedures; however, the displaced persons may still incur sheltering costs. For persons located on the river (e.g. for recreation) the vulnerability of loss of life is significant.

People are also vulnerable to the loss of the uses of the lake upstream of a dam following failure. Several uses are minor, such as aesthetics or recreational use. However, some lakes serve as drinking water supplies and their loss could disrupt the drinking water supply and present a public health problem.

Property

Vulnerability of the built environment includes damage to the dam itself and any man-made feature located within the inundation area caused by the dam failure. Downstream of the dam, vulnerability includes potential damage to homes, personal property, commercial buildings and property, and government owned buildings and property; destruction of bridge or culvert crossings; weakening of bridge supports through scour; and damage or destruction of public or private infrastructure that cross the stream such as water and sewer lines, gas lines and power lines. Water dependent structures on the lake upstream of the dam, such as docks/piers, floating structures or water intake structures, may be damaged by the rapid reduction in water level during the failure.

Environment

Aquatic species within the lake will either be displaced or destroyed. The velocity of the flood wave will likely destroy riparian and instream vegetation and destroy wetland function. The flood wave will like cause erosion within and adjacent to the stream. Deposition of eroded deposits may choke instream habitat or disrupt riparian areas. Sediments within the lake bottom and any low oxygen water from within the lake will be dispersed, potentially causing fish kills or releasing heavy metals found in the lake sediment layers.

Consequence Analysis

Table 4.15 summarizes the potential negative consequences of dam failure.

Table 4.15 – Consequence Analysis – Dam Failure

Category	Consequences
Public	Localized impact expected to be severe for inundation area and moderate to light for other adversely affected areas.
Responders	Localized impact expected to limit damage to personnel in the inundation area at the time of the incident.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized disruption of roads and/or utilities may postpone delivery of some services. Regulatory waivers may be needed locally. Fulfillment of some contracts may be difficult. Impact may reduce deliveries.
Property, Facilities and Infrastructure	Localized impact to facilities and infrastructure in the inundation area of the incident. Some severe damage possible.
Environment	Localized impact expected to be severe for inundation area and moderate to light for other adversely affected areas. Consequences include erosion, water quality degradation, wildlife displacement or destruction, and habitat destruction.
Economic Condition of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damage and length of investigation.
Public Confidence in the Jurisdiction's Governance	Localized impact expected to primarily adversely affect only the dam owner and local entities.

Hazard Summary by Jurisdiction

The following table summarizes dam failure hazard risk by jurisdiction. Warning time and duration are inherent to the hazard and remain constant across jurisdictions. Spatial extent of any dam failure will be negligible relative to the planning area. Jurisdictions with high hazard dams within their boundaries were assigned a probability rating of possible and an impact score of critical. Jurisdictions with no high hazard dams were assigned a probability rating of unlikely and an impact rating of limited.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	2	3	1	4	3	2.4	M
Apex	2	3	1	4	3	2.4	M
Cary	2	3	1	4	3	2.4	M
Fuquay-Varina	2	3	1	4	3	2.4	M
Garner	2	3	1	4	3	2.4	M
Holly Springs	2	3	1	4	3	2.4	M
Knightdale	2	3	1	4	3	2.4	M
Morrisville	2	3	1	4	3	2.4	M
Raleigh	2	3	1	4	3	2.4	M
Rolesville	1	2	1	4	3	1.8	L
Wake Forest	2	3	1	4	3	2.4	M
Wendell	2	3	1	4	3	2.4	M
Zebulon	1	2	1	4	3	1.8	L

4.5.2 Drought

Hazard Background

Drought is a deficiency in precipitation over an extended period. It is a normal, recurrent feature of climate that occurs in virtually all climate zones. The duration of a drought varies widely. There are cases when drought develops relatively quickly and lasts a very short period of time, exacerbated by extreme heat and/or wind, and there are other cases when drought spans multiple years, or even decades. Studying the paleoclimate record is often helpful in identifying when long-lasting droughts have occurred. Common types of drought are detailed below in Table 4.16.

Table 4.16 – Types of Drought

Type	Details
Meteorological Drought	Meteorological Drought is based on the degree of dryness (rainfall deficit) and the length of the dry period.
Agricultural Drought	Agricultural Drought is based on the impacts to agriculture by factors such as rainfall deficits, soil water deficits, reduced ground water, or reservoir levels needed for irrigation.
Hydrological Drought	Hydrological Drought is based on the impact of rainfall deficits on the water supply such as stream flow, reservoir and lake levels, and ground water table decline.
Socioeconomic Drought	Socioeconomic drought is based on the impact of drought conditions (meteorological, agricultural, or hydrological drought) on supply and demand of some economic goods. Socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related deficit in water supply.

The wide variety of disciplines affected by drought, its diverse geographical and temporal distribution, and the many scales drought operates on make it difficult to develop both a definition to describe drought and an index to measure it. Many quantitative measures of drought have been developed in the United States, depending on the discipline affected, the region being considered, and the particular application. Several indices developed by Wayne Palmer, as well as the Standardized Precipitation Index, are useful for describing the many scales of drought.

The U.S. Drought Monitor provides a summary of drought conditions across the United States and Puerto Rico. Often described as a blend of art and science, the Drought Monitor map is updated weekly by combining a variety of data-based drought indices and indicators and local expert input into a single composite drought indicator.

The **Palmer Drought Severity Index** (PDSI) devised in 1965, was the first drought indicator to assess moisture status comprehensively. It uses temperature and precipitation data to calculate water supply and demand, incorporates soil moisture, and is considered most effective for unirrigated cropland. It primarily reflects long-term drought and has been used extensively to initiate drought relief. It is more complex than the Standardized Precipitation Index (SPI) and the Drought Monitor.

The **Standardized Precipitation Index** (SPI) is a way of measuring drought that is different from the Palmer Drought Severity Index (PDSI). Like the PDSI, this index is negative for drought, and positive for wet conditions. But the SPI is a probability index that considers only precipitation, while Palmer's indices are water balance indices that consider water supply (precipitation), demand (evapotranspiration) and loss (runoff).

The State of North Carolina has a Drought Assessment and Response Plan as an Annex to its Emergency Operations Plan. This plan provides the framework to coordinate statewide response to a drought incident.

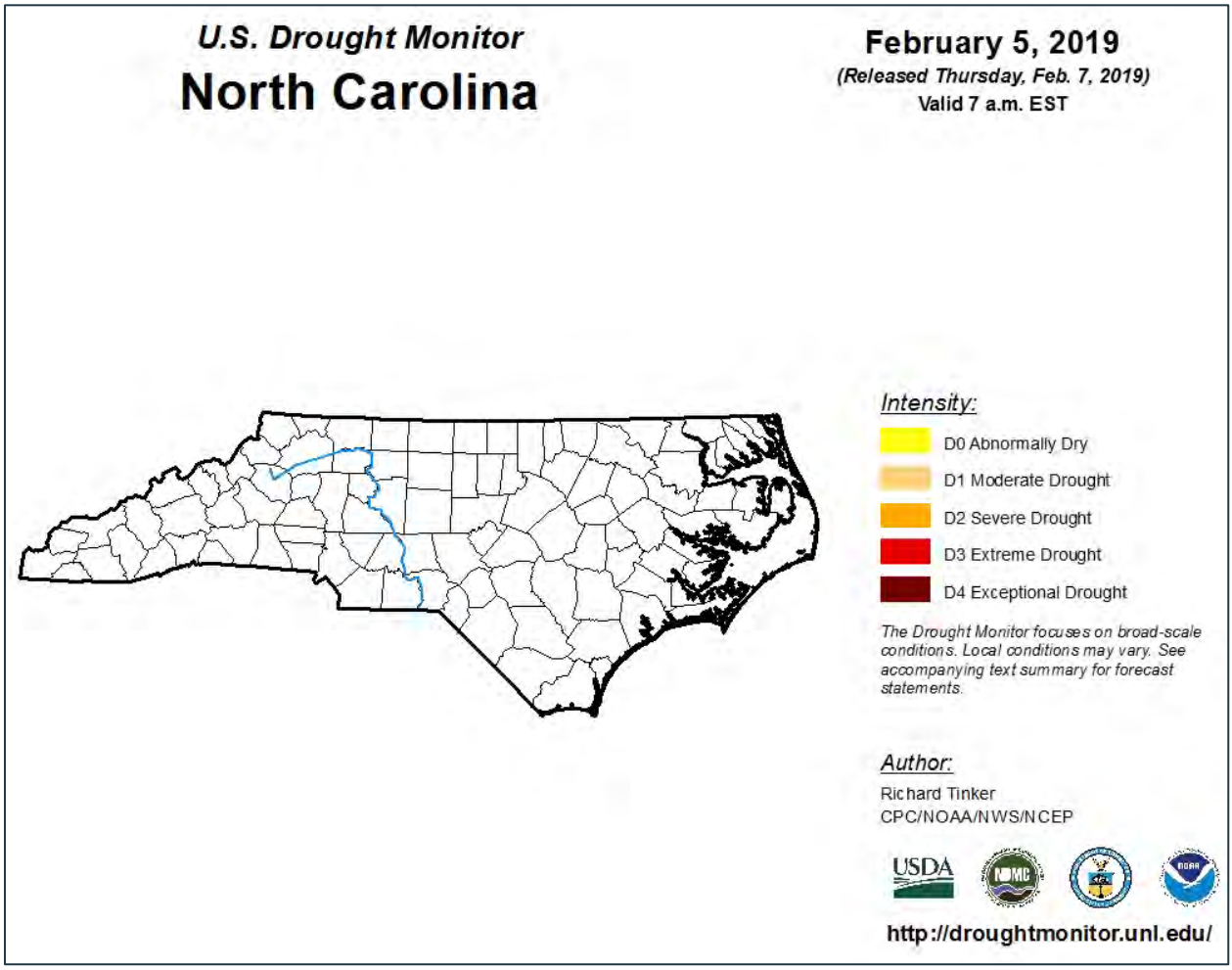
Warning Time: 1 – More than 24 hours

Duration: 4 – More than one week

Location

Drought is a regional hazard that can cover an entire the entire planning area, and in some cases the entire state. The figure below notes the U.S. Drought Monitor's drought ratings for North Carolina as of February 5, 2019; as of that date, Wake County was experiencing no impacts of drought.

Figure 4.3 – US Drought Monitor for Week of February 5, 2019



Source: U.S. Drought Monitor

Extent

Drought extent can be defined in terms of intensity, using the U.S. Drought Monitor scale. The Drought Monitor Scale measures drought episodes with input from the Palmer Drought Severity Index, the Standardized Precipitation Index, the Keetch-Byram Drought Index, soil moisture indicators, and other inputs as well as information on how drought is affecting people. Figure 4.4 details the classifications used by the U.S. Drought Monitor. A category of D2 (severe) or higher on the U.S. Drought Monitor Scale can typically result in crop or pasture losses, water shortages, and the need to institute water restrictions.

Figure 4.4 – US Drought Monitor Classifications

			Ranges				
Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: ▪ short-term dryness slowing planting, growth of crops or pastures Coming out of drought: ▪ some lingering water deficits ▪ pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	▪ Some damage to crops, pastures ▪ Streams, reservoirs, or wells low, some water shortages developing or imminent ▪ Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	▪ Crop or pasture losses likely ▪ Water shortages common ▪ Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	▪ Major crop/pasture losses ▪ Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	▪ Exceptional and widespread crop/pasture losses ▪ Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Source: US Drought Monitor

The most severe drought to impact Wake County within the past 20 years occurred when the county spent 54 weeks in drought from May 2007 to May 2008. At the drought's peak from October 2, 2007 through March 4, 2008, the entirety of the county was considered in D4 (Exceptional) drought.

Impact: 1 – Minor

Spatial Extent: 4 – Large

Historical Occurrences

Table 4.17 summarizes the drought events reported by the U.S. Drought Monitor for Wake County from 1998 through 2018.

Table 4.17 – Recorded Instances of Drought in Wake County, 1998-2018

Start Date	End Date	Duration (Weeks)	Details
10/31/2000	11/11/2002	106	At the drought's peak from August 13 through August 19, 51.27% of Wake County was considered in a D4 drought (Exceptional)
4/6/2004	4/19/2004	2	At the drought's peak, 100% of the County was considered in a D0 drought (Abnormally Dry)
6/21/2005	6/27/2005	1	At the drought's peak, 100% of the County was considered in a D0 drought (Abnormally Dry)
9/6/2005	11/28/2005	12	At the drought's peak from November 1 through November 21, 28.99% of the County was considered in a D2 drought (Severe)
1/31/2006	6/19/2006	20	At the drought's peak from April 11 through May 1, 100% of the County was considered in a D2 drought (Severe)
8/22/2006	9/11/2006	3	At the drought's peak from August 29 through September 4, 64.94% of the County was considered in D1 drought (Moderate)
3/13/2007	4/16/2007	5	At the drought's peak from March 13 through April 16, 100% of the County was considered in D0 drought (Abnormally Dry)
5/8/2007	5/19/2008	54	At the drought's peak from October 2, 2007 through March 4, 2008, 100% of the County was considered in D4 drought (Exceptional)

Start Date	End Date	Duration (Weeks)	Details
6/10/2008	9/8/2008	13	At the drought's peak from July 1 to July 7, 99% of the County was considered in D2 drought (Severe)
2/10/2009	3/16/2009	5	At the drought's peak from February 10 to March 16, 100% of the County was considered in D0 drought (Abnormally Dry)
7/14/2009	11/16/2009	18	At the drought's peak from October 20 through October 26, 75% of the County was considered in D1 drought (Moderate)
5/4/2010	5/17/2010	2	At the drought's peak from May 4 through May 17, 100% of the County was considered in D0 drought (Abnormally Dry)
7/6/2010	8/2/2010	4	At the drought's peak from July 27 through August 2, 34% of the County was considered in D1 drought (Moderate)
9/14/2010	10/4/2010	3	At the drought's peak from September 21 through September 27, 0.5% of the County was considered in D2 drought (Severe)
11/16/2010	8/29/2011	41	At the drought's peak from February 1 through April 4, 100% of the County was considered in D2 drought (Severe)
10/11/2011	6/4/2012	34	At the drought's peak, 100% of the County was considered in D1 drought (Moderate)
6/26/2012	7/30/2012	5	At the drought's peak from July 17 through July 23, 99% of the County was considered in D1 drought (Moderate)
11/13/2012	5/6/2013	25	At the drought's peak from December 4 through February 25, 100% of the County was considered in D1 drought (Moderate)
11/19/2013	12/30/2013	6	At the drought's peak from November 19 through December 30, 100% of the County was considered in D1 drought (Moderate)
6/16/2015	6/29/2015	2	At the drought's peak from June 16 through June 29, 100% of the County was considered in D1 drought (Moderate)
8/4/2015	10/5/2015	9	At the drought's peak from September 15 through September 28, 100% of the County was considered in D1 drought (Moderate)
12/20/2016	1/2/2017	2	At the drought's peak from December 20 through January 2, 100% of the County was considered in D0 drought (Abnormally Dry)
2/14/2017	3/13/2017	4	At the drought's peak from February 14 through March 12, 100% of the County was considered in D0 drought (Abnormally Dry)
3/28/2017	4/3/2017	1	At the drought's peak from March 28 through April 3, 13% of the County was considered in D1 drought (Moderate)
8/1/2017	8/14/2017	2	At the drought's peak from August 1 through August 14, 100% of the County was considered in D0 drought (Abnormally Dry)
10/3/2017	12/31/2017	13	At the drought's peak from October 24 through October 30, 96% of the County was considered in D1 drought (Moderate)

Source: US Drought Monitor

The National Drought Mitigation Center (NDMC), located at the University of Nebraska in Lincoln, provides a clearinghouse for information on the effects of drought, based on reports from media, observers, impact records, and other sources.

According to the National Drought Mitigation Center's Drought Impact Reporter, during the 10-year period from January 2009 through December 2018, 289 drought impacts were noted for the State of North Carolina, of which 24 were reported to affect Wake County. Table 4.18 summarizes the number of impacts reported by category and the years impacts were reported for each category. Note that the Drought Impact Reporter assigns multiple categories to each impact.

Table 4.18 – Drought Impacts Reported for Wake County, January 2009 through December 2018

Category	Impacts	Years Reported
Agriculture	2	2016, 2012
Fire	2	2018, 2011
Plants & Wildlife	13	2018, 2017, 2010
Relief, Response & Restrictions	7	2017, 2016, 2012, 2011
Society & Public Health	1	2018
Water Supply & Quality	13	2018, 2017, 2012, 2011

Source: Drought Impact Reporter, http://droughtreporter.unl.edu

Probability of Future Occurrence

Probability: 3 – Likely

Over the 20-year (1,040 week) period from 1998 through 2017, Wake County experienced 392 weeks of drought conditions ranging from abnormally dry to exceptional drought. This equates to a 38 percent chance of drought in any given week. Of this time, approximately 114 weeks were categorized as a severe (D2) drought or greater; which equates to an 11 percent chance of severe drought in any given week.

Climate Change

The Fourth National Climate Assessment reports that average and extreme temperatures are increasing across the country and average annual precipitation is decreasing in the Southeast. Heavy precipitation events are becoming more frequent, meaning that there will likely be an increase in the average number of consecutive dry days. As temperature is projected to continue rising, evaporation rates are expected to increase, resulting in decreased surface soil moisture levels. Together, these factors suggest that drought will increase in intensity and duration in the Southeast.

Vulnerability Assessment

Methodologies and Assumptions

Vulnerability to drought in Wake County is based on historical occurrences of drought in the planning area and generalized concerns regarding potential drought consequences. Agricultural vulnerability was estimated using data from the 2012 Census of Agriculture and a review of past claims related to drought.

People

Drought can affect people's physical and mental health. For those economically dependent on a reliable water supply, drought may cause anxiety or depression about economic losses, reduced incomes, and other employment impacts. Conflicts may arise over water shortages. People may be forced to pay more for water, food, and utilities affected by increased water costs.

Drought may also cause health problems due to poorer water quality from lower water levels. If accompanied by extreme heat, drought can also result in higher incidents of heat stroke and even loss of human life.

Property

Drought is unlikely to cause damages to the built environment. However, in areas with shrinking and expansive soils, drought may lead to structural damages. Drought may cause severe property loss for the agricultural industry in terms of crop and livestock losses. The USDA's Risk Management Agency (RMA) maintains a database of all paid crop insurance claims. Between 2007-2017, the sum of claims paid for crop damage as a result of drought in Wake County was $7,083,164, or an average of $643,924 in losses

every year. Losses were greatest in 2007 when 12,460 acres of soybeans, flue cured tobacco, and corn were affected, resulting in $1,684,909 in crop losses. Table 4.19 summarizes the crop losses due to drought in reported in the RMA system.

Table 4.19 – Crop Losses Resulting from Drought, 2007-2017

Year	Determined Acres	Indemnity Amount
2007	12459.84	$1,684,909
2008	4727.20	$506,630
2009	2858.15	$282,486
2010	8186.53	$1,202,328
2011	3473.58	$656,081
2012	685.28	$91,120
2013	160.07	$8,811
2014	605.03	$123,391.1
2015	4375.86	$1,152,001.62
2016	968.63	$682,636
2017	1767.51	$692,770.7
Total	**40,267.67**	**$7,083,164.42**

Source: USDA Risk Management Agency

Environment

Drought can affect local wildlife by shrinking food supplies and damaging habitats. Sometimes this damage is only temporary, and other times it is irreversible. Wildlife may face increased disease rates due to limited access to food and water. Increased stress on endangered species could cause extinction.

Drought conditions can also provide a substantial increase in wildfire risk. As plants and trees die from a lack of precipitation, increased insect infestations, and diseases—all of which are associated with drought—they become fuel for wildfire. Long periods of drought can result in more intense wildfires, which bring additional consequences for the economy, the environment, and society. Drought may also increase likelihood of wind and water erosion of soils.

Consequence Analysis

Table 4.20 summarizes the potential negative consequences of drought.

Table 4.20 – Consequence Analysis - Drought

Category	Consequences
Public	Can cause anxiety or depression about economic losses, conflicts over water shortages, reduced incomes, fewer recreational activities, higher incidents of heat stroke, and fatality.
Responders	Impacts to responders are unlikely. Exceptional drought conditions may impact the amount of water immediately available to respond to wildfires.
Continuity of Operations (including Continued Delivery of Services)	Drought would have minimal impacts on continuity of operations due to the relatively long warning time that would allow for plans to be made to maintain continuity of operations.
Property, Facilities and Infrastructure	Drought has the potential to affect water supply for residential, commercial, institutional, industrial, and government-owned areas. Drought can reduce water supply in wells and reservoirs. Utilities may be forced to increase rates.
Environment	Environmental impacts include strain on local plant and wildlife; increased probability of erosion and wildfire.

Economic Condition of the Jurisdiction	Farmers may face crop losses or increased livestock costs. Businesses that depend on farming may experience secondary impacts. Extreme drought has the potential to impact local businesses in landscaping, recreation and tourism, and public utilities.
Public Confidence in the Jurisdiction's Governance	When drought conditions persist with no relief, local or State governments must often institute water restrictions, which may impact public confidence.

Hazard Summary by Jurisdiction

The following table summarizes drought hazard risk by jurisdiction. Drought risk is uniform across the planning area. Warning time, duration, and spatial extent are inherent to the hazard and remain constant across jurisdictions. The majority of damages that result from drought are to crops and other agriculture-related activities as well as water-dependent recreation industries. The magnitude of the impacts is typically greater in unincorporated areas, however Wake County is highly developed. In developed areas, the magnitude of drought is less severe, with lawns and local gardens affected and potential impacts on local water supplies during severe, prolonged drought.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	3	1	4	1	4	2.5	H
Apex	3	1	4	1	4	2.5	H
Cary	3	1	4	1	4	2.5	H
Fuquay-Varina	3	1	4	1	4	2.5	H
Garner	3	1	4	1	4	2.5	H
Holly Springs	3	1	4	1	4	2.5	H
Knightdale	3	1	4	1	4	2.5	H
Morrisville	3	1	4	1	4	2.5	H
Raleigh	3	1	4	1	4	2.5	H
Rolesville	3	1	4	1	4	2.5	H
Wake Forest	3	1	4	1	4	2.5	H
Wendell	3	1	4	1	4	2.5	H
Zebulon	3	1	4	1	4	2.5	H

4.5.3 Earthquake

Hazard Background

An earthquake is a movement or shaking of the ground. Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth's outer crust. These fault planes are typically found along borders of the Earth's 10 tectonic plates. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, generating an earthquake.

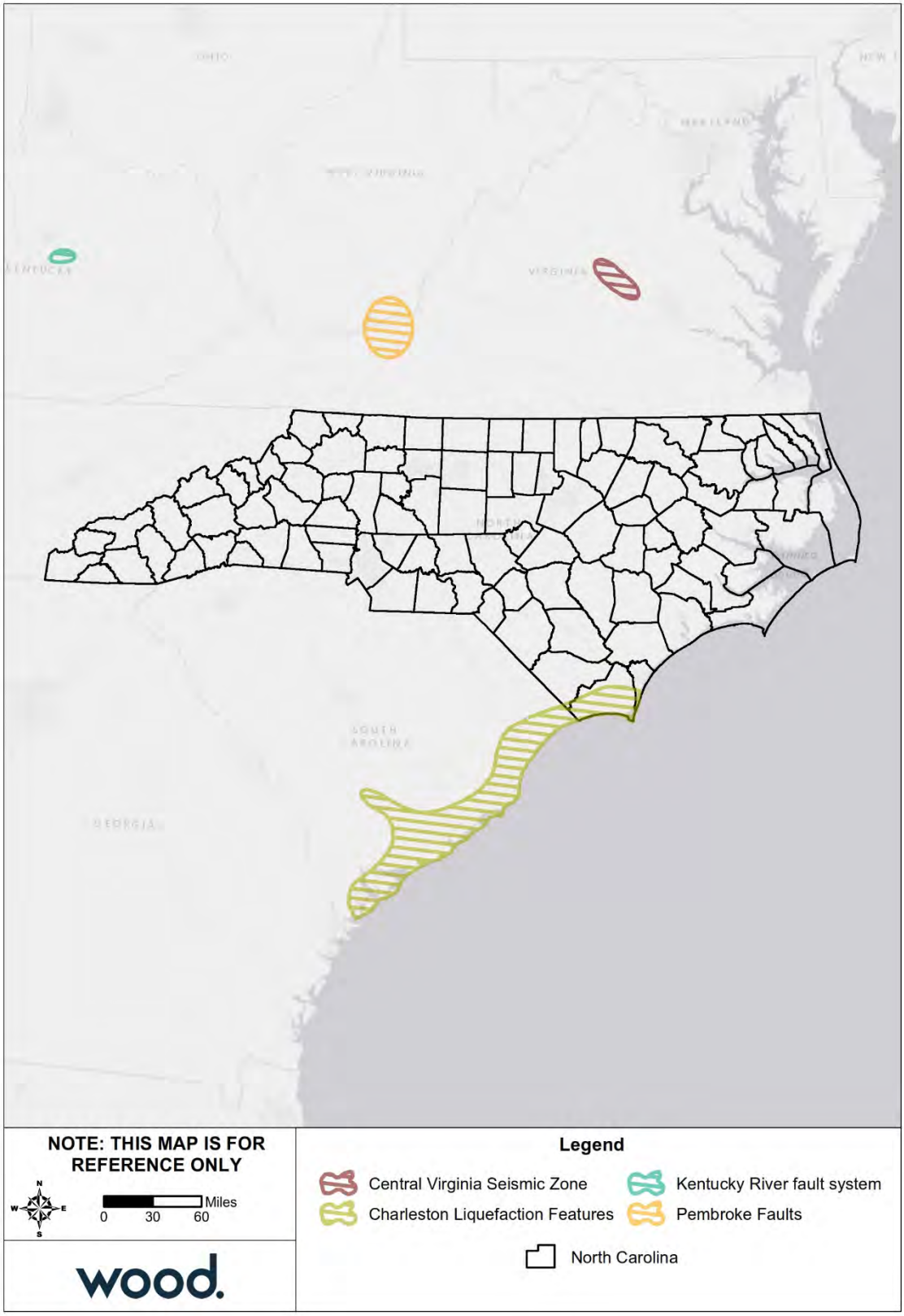
Warning Time: 4 – Less than 6 hours

Duration: 1 – Less than 6 hours

Location

Figure 4.5 reflects the Quaternary faults that present an earthquake hazard for the Wake County planning area based on data from the USGS Earthquake Hazards Program.

Figure 4.5 – US Quaternary Faults



Source: USGS Earthquake Hazards Program

All of North Carolina is subject to earthquakes, with the western and southern region most vulnerable to a damaging earthquake. The state is affected by both the Charleston Fault in South Carolina and New Madrid Fault in Tennessee. Both of these faults have generated earthquakes measuring greater than 8.0 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines in eastern Tennessee and throughout North Carolina that could produce less severe shaking.

Extent

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude. A detailed description of the Richter Scale is given in Table 4.21. Although the Richter scale is usually used by the news media when reporting the intensity of earthquakes and is the scale most familiar to the public, the scale currently used by the scientific community in the United States is called the Modified Mercalli Intensity (MMI) scale. The MMI scale is an arbitrary ranking based on observed effects. Table 4.22 shows descriptions for levels of earthquake intensity on the MMI scale compared to the Richter scale. Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Table 4.21 – Richter Scale

Magnitude	Effects
Less than 3.5	Generally not felt, but recorded.
3.5 – 5.4	Often felt, but rarely causes damage.
5.4 – 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 – 6.9	Can be destructive in areas up to 100 kilometers across where people live.
7.0 – 7.9	Major earthquake. Can cause serious damage over larger areas.
8.0 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: FEMA

Table 4.22 – Comparison of Richter Scale and Modified Mercalli Intensity (MMI) Scale

MMI	Richter Scale	Felt Intensity
I	0 – 1.9	Not felt. Marginal and long period effects of large earthquakes.
II	2.0 – 2.9	Felt by persons at rest, on upper floors, or favorably placed.
III	3.0 – 3.9	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV	4.0 – 4.3	Hanging objects swing. Vibration like passing of heavy trucks. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink the upper range of IV, wooden walls and frame creak.
V	4.4 – 4.8	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Pendulum clocks stop, start.
VI	4.9 – 5.4	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Books, etc., fall off shelves. Pictures fall off walls. Furniture moved. Weak plaster and masonry D cracked. Small bells ring. Trees, bushes shaken.
VII	5.5 – 6.1	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices. Some cracks in masonry C. Waves on ponds. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.
VII	6.2 – 6.5	Steering of motor cars is affected. Damage to masonry C; partial collapse. Some damage to masonry B. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory

MMI	Richter Scale	Felt Intensity
		stacks, monuments, towers, elevated tanks. Frame houses moved on foundations. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.
IX	6.6 – 6.9	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundations.) Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluvial areas sand and mud ejected, earthquake fountains, sand craters.
X	7.0 – 7.3	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
XI	7.4 – 8.1	Rails bent greatly. Underground pipelines completely out of service.
XII	> 8.1	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown in the air.

Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally, and bound together by using steel, concrete, etc.; designed to resist lateral forces. Masonry B: Good workmanship and mortar; reinforced, but not designed in detail to resist lateral forces. Masonry C: Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces. Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.
Source: Oklahoma State Hazard Mitigation Plan.

The most severe earthquake to impact the Wake County area was the Charleston earthquake of 1886. It is estimated to have been felt as a 7 or 8 on the MMI Scale. Since then, six earthquakes have been felt in Wake County, and all were at an MMI Scale of 4 or lower.

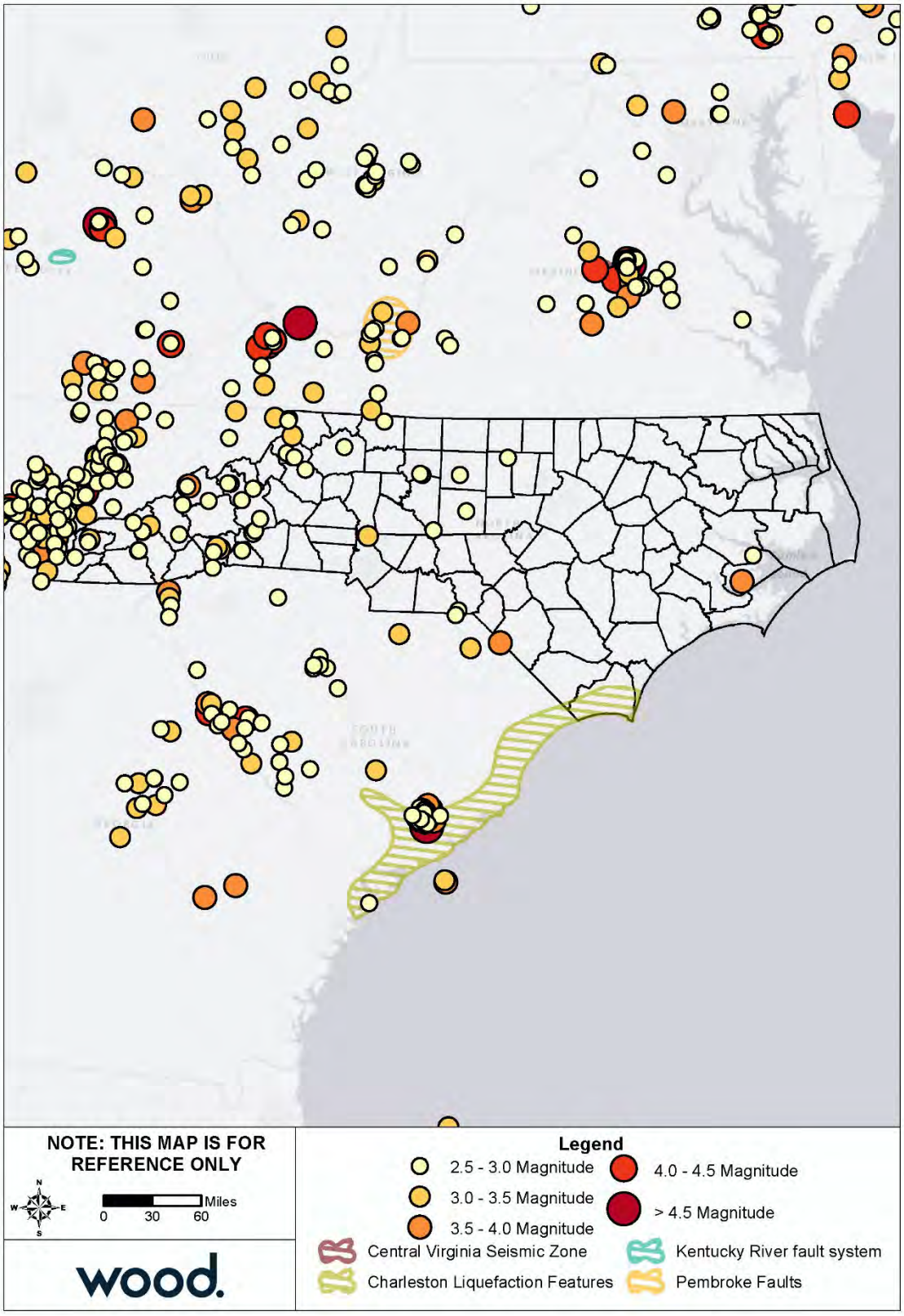
Impact: 1 – Minor

Spatial Extent: 4 – Large

Historical Occurrences

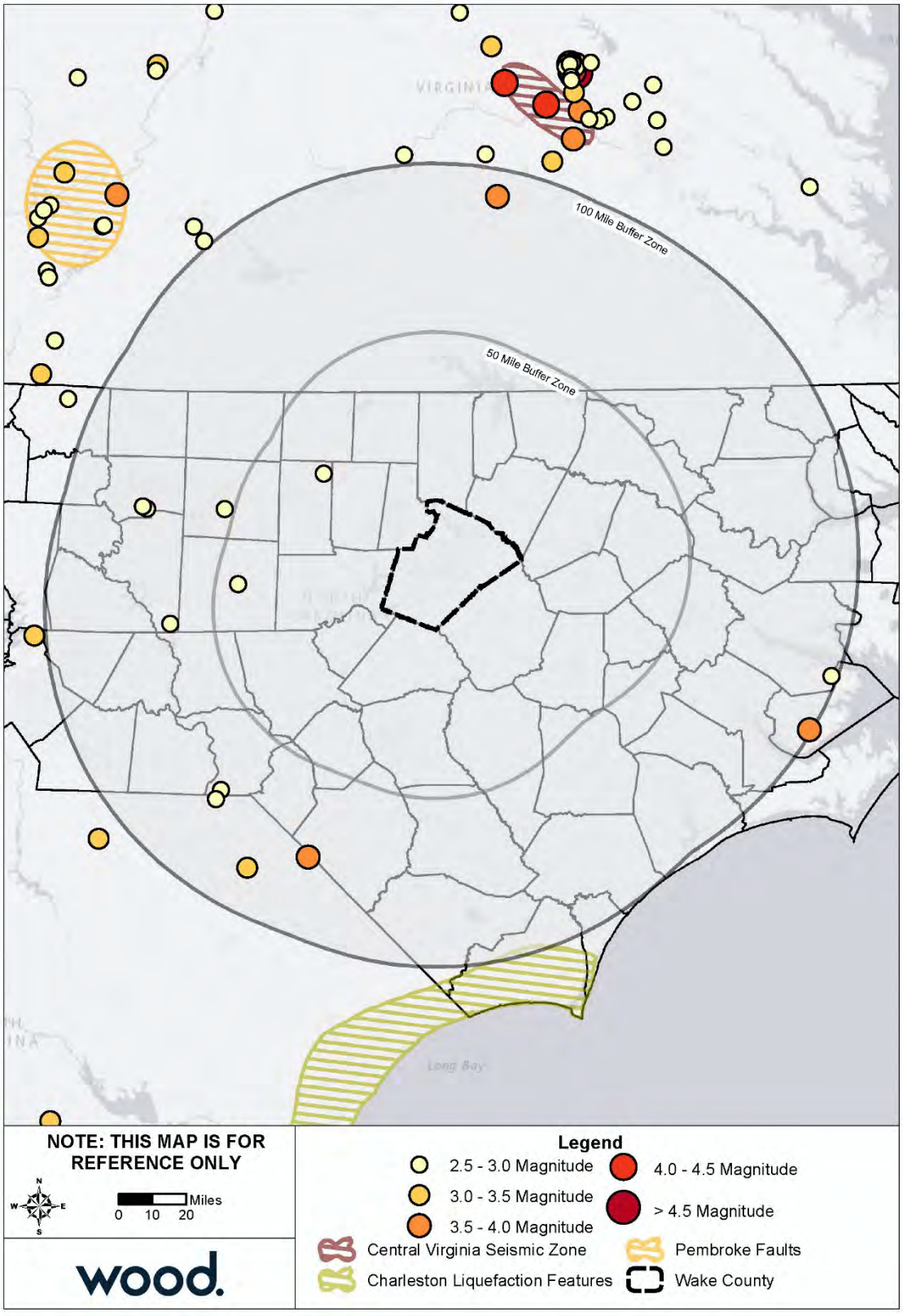
The USGS Earthquake Hazards Program maintains a database of all historical earthquakes of a magnitude 2.5 and greater. These events are illustrated in the following pages. Figure 4.6 shows historical earthquakes by magnitude in relation to North Carolina and the Quaternary Faults identified by USGS. This includes events from 1973 to 2019. Figure 4.7 provides a more detailed view of earthquakes that have occurred within 50 and 100 miles of Wake County.

Figure 4.6 – Historical Earthquakes by Magnitude, 1973-2019



Source: USGS Earthquakes Hazard Program

Figure 4.7 – Historical Earthquakes, Distance from Wake County, 1973-2019



Source: USGS Earthquakes Hazard Program

The above map documents all earthquakes that have occurred within North Carolina; however, given the long distances across which earthquake impacts can be felt, these events do not encompass all earthquakes that have affected North Carolina. The following data, detailed in Table 4.23, was compiled and presented in the 2015 Wake County Hazard Mitigation Plan and remains relevant to the planning area.

Table 4.23 – Historical Earthquakes Impacting North Carolina

Date	Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
12/16/1811 – 1	NE Arkansas	8.5	XI	VI
12/16/1811 – 2	NE Arkansas	8.0	X	VI
12/18/1811 – 3	NE Arkansas	8.0	X	VI
01/23/1812	New Madrid, MO	8.4	XI	VI
02/071812	New Madrid, MO	8.7	XII	VI
04/29/1852	Wytheville, VA	5.0	VI	VI
08/31/1861	Wilkesboro, NC	5.1	VII	VII
12/23/1875	Central Virginia	5.0	VII	VI
08/31/1886	Charleston, SC	7.3	X	VII
05/31/1897	Giles County, VA	5.8	VIII	VI
01/01/1913	Union County, SC	4.8	VII	VI
02/21/1916	Asheville, NC	5.5	VII	VII
07/08/1926	Mitchell County, NC	5.2	VII	VII
11/03/1928	Newport, TN	4.5	VI	VI
05/13/1957	McDowell County, NC	4.1	VI	VI
07/02/1957	Buncombe County, NC	3.7	VI	VI
11/24/1957	Jackson County, NC	4.0	VI	VI
10/27/1959 *	Chesterfield, SC	4.0	VI	VI
07/13/1971	Newry, SC	3.8	VI	VI
11/30/1973	Alcoa, TN	4.6	VI	VI
11/13/1976	Southwest Virginia	4.1	VI	VI
05/05/1981	Henderson County, NC	3.5	VI	VI

* Conflicting reports on this event, intensity in North Carolina could have been either V or VI

Source: 2015 Wake County Hazard Mitigation Plan (This information compiled by Dr. Kenneth B. Taylor and provided by Tiawana Ramsey of NCEM. Information was compiled from the National Earthquake Center, Earthquakes of the US by Carl von Hake (1983), and a compilation of newspaper reports in the Eastern Tennessee Seismic Zone compiled by Arch Johnston, CERI, Memphis State University (1983)).

Probability of Future Occurrence

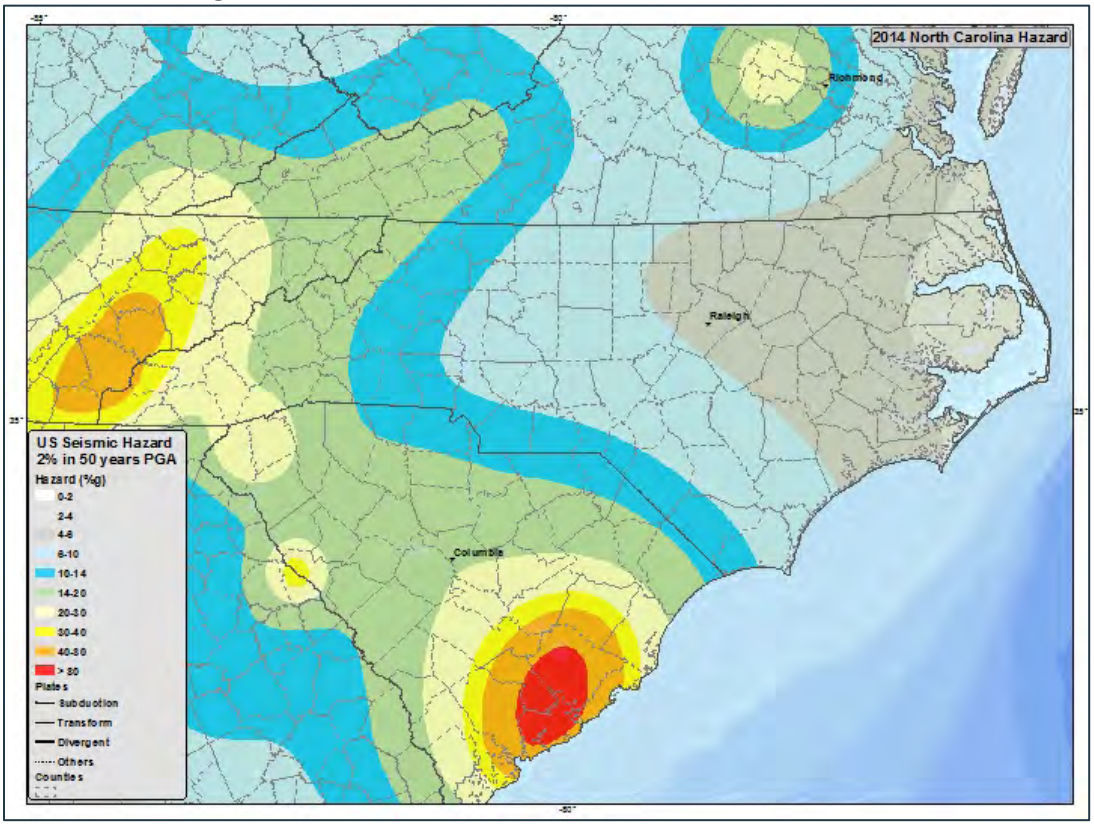
Ground motion is the movement of the earth's surface due to earthquakes or explosions. It is produced by waves generated by a sudden slip on a fault or sudden pressure at the explosive source and travels through the earth and along its surface. Ground motion is amplified when surface waves of unconsolidated materials bounce off of or are refracted by adjacent solid bedrock. The probability of ground motion is depicted in USGS earthquake hazard maps by showing, by contour values, the earthquake ground motions (of a particular frequency) that have a common given probability of being exceeded in 50 years.

Figure 4.8 reflects the seismic hazard for Wake County based on the national USGS map of peak acceleration with two percent probability of exceedance in 50 years. To produce these estimates, the ground motions being considered at a given location are those from all future possible earthquake magnitudes at all possible distances from that location. The ground motion coming from a particular magnitude and distance is assigned an annual probability equal to the annual probability of occurrence of the causative magnitude and distance. The method assumes a reasonable future catalog of earthquakes,

based upon historical earthquake locations and geological information on the recurrence rate of fault ruptures. When all the possible earthquakes and magnitudes have been considered, a ground motion value is determined such that the annual rate of its being exceeded has a certain value.

Therefore, for the given probability of exceedance, two percent, the locations shaken more frequently will have larger ground motions. Wake County is located within the light blue and dark gray zones representing a low peak acceleration of 0.04 to 0.1% g.

Figure 4.8 – Seismic Hazard Information for North Carolina



Source: USGS Earthquake Hazards Program

Based on this data, it can be reasonably assumed that an earthquake event affecting Wake County is unlikely.

Probability: 1 – Unlikely

Climate Change

Scientists are beginning to believe there may be a connection between climate change and earthquakes. Changing ice caps and sea-level redistribute weight over fault lines, which could potentially have an influence on earthquake occurrences. However, currently no studies quantify the relationship to a high level of detail, so recent earthquakes should not be linked with climate change. While not conclusive, early research suggest that more intense earthquakes and tsunamis may eventually be added to the adverse consequences that are caused by climate change.

Vulnerability Assessment

Methodologies and Assumptions

Population and property at risk to flooding was estimated using data from the North Carolina Emergency Management (NCEM) IRISK database, which was compiled in NCEM's Risk Management Tool.

People

Earthquake events in Wake County are unlikely to produce more than mild ground shaking; therefore, injury or death is unlikely. Objects falling from shelves generally pose the greatest threat to safety.

Table 4.24 and Table 4.25 detail the population estimated to be at risk from a 250-year earthquake and a 500-year earthquake, respectively, according to the NCEM IRISK database.

Table 4.24 – Estimated Population Impacted by 250-Year Earthquake

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Raleigh	419,053	48,654	11.60%	35,611	4,136	11.60%	30,469	3,538	11.60%
Apex	41,724	4,218	10.10%	3,546	358	10.10%	3,034	307	10.10%
Cary	136,260	12,025	8.80%	11,579	1,033	8.90%	9,907	873	8.80%
Fuquay-Varina	25,023	2,791	11.20%	2,126	237	11.10%	1,819	203	11.20%
Garner	30,981	4,534	14.60%	2,633	385	14.60%	2,253	330	14.60%
Holly Springs	25,790	2,211	8.60%	2,192	188	8.60%	1,875	161	8.60%
Knightdale	18,501	3,307	17.90%	1,572	281	17.90%	1,345	240	17.80%
Morrisville	18,655	4,676	25.10%	1,585	397	25%	1,356	340	25.10%
Rolesville	5,199	834	16%	442	71	16.10%	378	61	16.10%
Wake Forest	30,382	3,726	12.30%	2,582	321	12.40%	2,209	270	12.20%
Wendell	7,889	835	10.60%	670	71	10.60%	574	61	10.60%
Zebulon	6,102	781	12.80%	519	66	12.70%	444	57	12.80%
Unincorporated Wake County	135,124	22,391	16.60%	11,483	1,903	16.60%	9,825	1,628	16.60%
Total	**900,683**	**110,983**	**12.32%**	**76,540**	**9,447**	**12.34%**	**65,488**	**8,069**	**12.32%**

Source: NCEM Risk Management Tool

Table 4.25 – Estimated Population Impacted by 500-Year Earthquake

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Raleigh	419,053	420,104	100.30%	35,611	35,714	100.30%	30,469	30,547	100.30%
Apex	41,724	41,724	100%	3,546	3,546	100%	3,034	3,034	100%
Cary	136,260	137,544	100.90%	11,579	11,814	102%	9,907	9,986	100.80%
Fuquay-Varina	25,023	25,023	100%	2,126	2,126	100%	1,819	1,819	100%
Garner	30,981	30,981	100%	2,633	2,633	100%	2,253	2,253	100%

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Holly Springs	25,790	25,790	100%	2,192	2,192	100%	1,875	1,875	100%
Knightdale	18,501	18,501	100%	1,572	1,572	100%	1,345	1,345	100%
Morrisville	18,655	18,655	100%	1,585	1,585	100%	1,356	1,356	100%
Rolesville	5,199	5,199	100%	442	442	100%	378	378	100%
Wake Forest	30,382	31,175	102.60%	2,582	2,682	103.90%	2,209	2,261	102.40%
Wendell	7,889	7,889	100%	670	670	100%	574	574	100%
Zebulon	6,102	6,102	100%	519	519	100%	444	444	100%
Unincorporated Wake County	135,124	135,124	100%	11,483	11,483	100%	9,825	9,825	100%
Total	**900,683**	**903,811**	**100.35%**	**76,540**	**76,978**	**100.57%**	**65,488**	**65,697**	**100.32%**

Source: NCEM Risk Management Tool

Property

In a severe earthquake event, buildings can be damaged by the shaking itself or by the ground beneath them settling to a different level than it was before the earthquake (subsidence). Buildings can even sink into the ground if soil liquefaction occurs. If a structure (a building, road, etc.) is built across a fault, the ground displacement during an earthquake could seriously damage that structure.

Earthquakes can also cause damages to infrastructure, resulting in secondary hazards. Damages to dams or levees could cause failures and subsequent flooding. Fires can be started by broken gas lines and power lines. Fires can be a serious problem, especially if the water lines that feed the fire hydrants have been damaged as well.

Wake County has not been impacted by an earthquake with more than a moderate intensity, so damage to the built environment is unlikely.

Table 4.26 through Table 4.27 detail the estimated buildings impacted from varying magnitudes of earthquake events.

Table 4.26 – Estimated Buildings Impacted by 250-Year Earthquake Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	13,673	10.7%	$424,380	6,158	4.8%	$1,302,645	2,077	1.6%	$534,247	21,908	17.1%	$2,261,272
Apex	14,554	1,385	9.5%	$30,754	638	4.4%	$101,729	127	0.9%	$25,004	2,150	14.8%	$157,487
Cary	45,306	3,712	8.2%	$153,063	1,837	4.1%	$386,301	428	0.9%	$101,539	5,977	13.2%	$640,903
Fuquay-Varina	10,244	1,051	10.3%	$12,141	574	5.6%	$95,264	120	1.2%	$25,330	1,745	17%	$132,735
Garner	11,975	1,611	13.5%	$16,109	677	5.7%	$94,971	164	1.4%	$25,963	2,452	20.5%	$137,042
Holly Springs	9,178	762	8.3%	$8,411	222	2.4%	$47,943	53	0.6%	$20,173	1,037	11.3%	$76,527
Knightdale	7,144	1,217	17%	$12,152	255	3.6%	$26,315	59	0.8%	$13,951	1,531	21.4%	$52,417
Morrisville	5,181	1,198	23.1%	$32,527	334	6.4%	$106,722	42	0.8%	$7,218	1,574	30.4%	$146,467
Rolesville	2,103	318	15.1%	$751	88	4.2%	$5,204	29	1.4%	$2,999	435	20.7%	$8,954
Wake Forest	10,547	1,170	11.1%	$13,756	527	5%	$56,347	134	1.3%	$14,127	1,831	17.4%	$84,230
Wendell	3,728	356	9.5%	$1,344	263	7.1%	$17,247	58	1.6%	$6,949	677	18.2%	$25,540
Zebulon	3,074	339	11%	$2,146	296	9.6%	$41,797	65	2.1%	$5,605	700	22.8%	$49,548
Unincorporated Wake County	59,372	9,230	15.5%	$22,309	3,059	5.2%	$193,247	360	0.6%	$52,279	12,649	21.3%	$267,835
Total	**310,482**	**36,022**	**11.6%**	**$729,843**	**14,928**	**4.8%**	**$2,475,732**	**3,716**	**1.2%**	**$835,384**	**54,666**	**17.6%**	**$4,040,957**

Source: NCEM Risk Management Tool

Table 4.27 – Estimated Buildings Impacted by 500-Year Earthquake Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$9,406,402	6,345	5%	$12,656,615	2,272	1.8%	$5,415,760	128,056	100%	$27,478,777
Apex	14,554	13,758	94.5%	$1,006,370	648	4.5%	$942,887	148	1%	$286,564	14,554	100%	$2,235,820
Cary	45,306	42,944	94.8%	$3,946,800	1,872	4.1%	$4,179,591	462	1%	$1,027,396	45,278	99.9%	$9,153,787
Fuquay-Varina	10,244	9,524	93%	$548,907	585	5.7%	$874,308	130	1.3%	$258,931	10,239	100%	$1,682,145
Garner	11,975	11,103	92.7%	$563,146	687	5.7%	$910,771	181	1.5%	$257,289	11,971	100%	$1,731,206
Holly Springs	9,178	8,887	96.8%	$549,465	226	2.5%	$474,617	62	0.7%	$201,468	9,175	100%	$1,225,549
Knightdale	7,144	6,811	95.3%	$308,199	265	3.7%	$235,747	67	0.9%	$138,754	7,143	100%	$682,700
Morrisville	5,181	4,793	92.5%	$646,953	340	6.6%	$1,032,965	48	0.9%	$64,561	5,181	100%	$1,744,480
Rolesville	2,103	1,983	94.3%	$71,720	91	4.3%	$39,738	29	1.4%	$24,399	2,103	100%	$135,857
Wake Forest	10,547	9,852	93.4%	$542,005	541	5.1%	$495,629	151	1.4%	$169,170	10,544	100%	$1,206,803
Wendell	3,728	3,378	90.6%	$83,614	277	7.4%	$151,000	73	2%	$78,095	3,728	100%	$312,709
Zebulon	3,074	2,677	87.1%	$71,316	316	10.3%	$366,134	79	2.6%	$61,445	3,072	99.9%	$498,894
Unincorporated Wake County	59,372	55,779	93.9%	$2,448,636	3,122	5.3%	$1,980,577	402	0.7%	$533,421	59,303	99.9%	$4,962,634
Total	**310,482**	**290,928**	**93.7%**	**$20,193,533**	**15,315**	**4.9%**	**$24,340,579**	**4,104**	**1.3%**	**$8,517,253**	**310,347**	**100%**	**$53,051,361**

Source: NCEM Risk Management Tool

Environment

An earthquake is unlikely to cause substantial impacts to the natural environment in Wake County. Impacts to the built environment (e.g. ruptured gas line) could damage the surrounding environment. However, this type damage is unlikely based on historical occurrences.

Consequence Analysis

Table 4.28 summarizes the potential negative consequences of earthquake.

Table 4.28 – Consequence Analysis - Earthquake

Category	Consequences
Public	Impact expected to be severe for people who are unprotected or unable to take shelter; moderate to light impacts are expected for those who are protected.
Responders	Responders may be required to enter unstable structures or compromised infrastructure. Adverse impacts are expected to be severe for unprotected personnel and moderate to light for protected personnel.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel in the area of the incident may require relocation of operations and lines of succession execution. Disruption of lines of communication and destruction of facilities may extensively postpone delivery of services.
Property, Facilities and Infrastructure	Damage to facilities and infrastructure in the area of the incident may be extensive for facilities, people, infrastructure, and HazMat.
Environment	May cause extensive damage, creating denial or delays in the use of some areas. Remediation may be needed.
Economic Condition of the Jurisdiction	Local economy and finances expected to be adversely affected, possibly for an extended period of time.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery are not timely and effective.

Hazard Summary by Jurisdiction

The following table summarizes earthquake hazard risk by jurisdiction. Earthquake risk is uniform across the planning area.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	1	1	4	4	1	1.9	L
Apex	1	1	4	4	1	1.9	L
Cary	1	1	4	4	1	1.9	L
Fuquay-Varina	1	1	4	4	1	1.9	L
Garner	1	1	4	4	1	1.9	L
Holly Springs	1	1	4	4	1	1.9	L
Knightdale	1	1	4	4	1	1.9	L
Morrisville	1	1	4	4	1	1.9	L
Raleigh	1	1	4	4	1	1.9	L
Rolesville	1	1	4	4	1	1.9	L
Wake Forest	1	1	4	4	1	1.9	L
Wendell	1	1	4	4	1	1.9	L
Zebulon	1	1	4	4	1	1.9	L

4.5.4 Extreme Heat

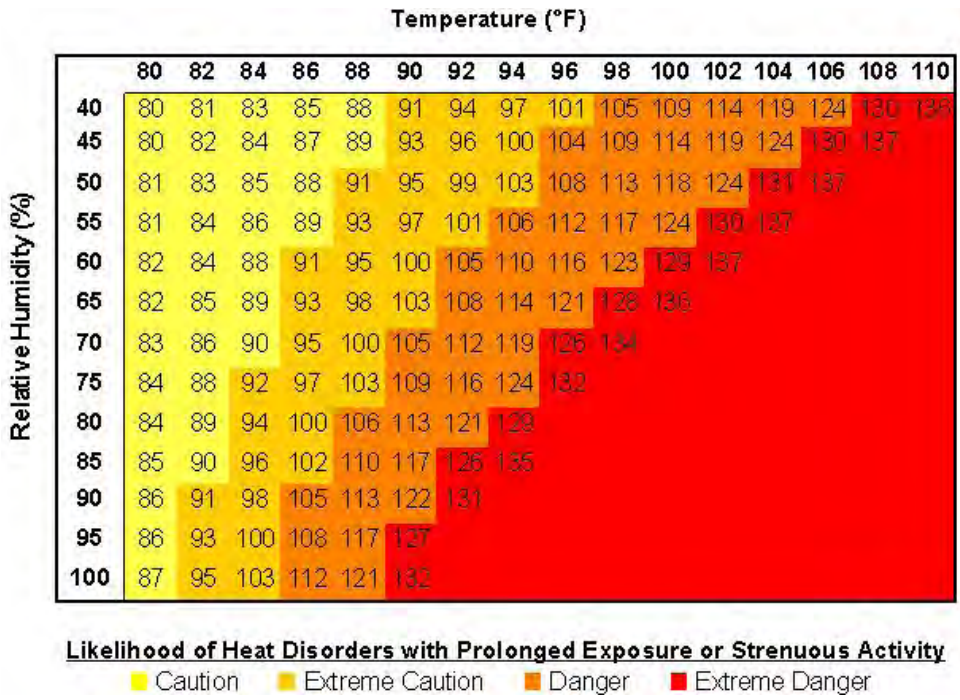
Hazard Background

Per information provided by FEMA, in most of the United States extreme heat is defined as a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees. In extreme heat, evaporation is slowed and the body must work extra hard to maintain a normal temperature, which can lead to death by overwork of the body. Extreme heat often results in the highest annual number of deaths among all weather-related disasters. Per Ready.gov:

- Extreme heat can occur quickly and without warning
- Older adults, children, and sick or overweight individuals are at greater risk from extreme heat
- Humidity increases the feeling of heat as measured by heat index

Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature. The Heat Index Chart in Figure 4.9 uses both of these factors to produce a guide for the apparent temperature or relative intensity of heat conditions.

Figure 4.9 – Heat Index Chart



Source: National Weather Service (NWS) http://www.nws.noaa.gov/os/heat/heat_index.shtml
Note: Exposure to direct sun can increase Heat Index values by as much as 15°F. The shaded zone above 105°F corresponds to a heat index that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

During these conditions, the human body has difficulties cooling through the normal method of the evaporation of perspiration. Health risks rise when a person is over exposed to heat.

The most dangerous place to be during an extreme heat incident is in a permanent home, with little or no air conditioning. Those at greatest risk for heat-related illness include people 65 years of age and older, young children, people with chronic health problems such as heart disease, people who are obese, people who are socially isolated, and people who are on certain medications, such as tranquilizers, antidepressants, sleeping pills, or drugs for Parkinson's disease. However, even young and healthy

individuals are susceptible if they participate in strenuous physical activities during hot weather or are not acclimated to hot weather. Table 4.29 lists typical symptoms and health impacts of exposure to extreme heat.

Table 4.29 – Typical Health Impacts of Extreme Heat

Heat Index (HI)	Disorder
80-90° F (HI)	Fatigue possible with prolonged exposure and/or physical activity
90-105° F (HI)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105-130° F (HI)	Heatstroke/sunstroke highly likely with continued exposure

Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

The National Weather Service has a system in place to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F) and the night time minimum Heat Index is 80°F or above for two or more consecutive days. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees.

Impacts of extreme heat are not only focused on human health, as prolonged heat exposure can have devastating impacts on infrastructure as well. Prolonged high heat exposure increases the risk of pavement deterioration, as well as railroad warping or buckling. High heat also puts a strain on energy systems and consumption, as air conditioners are run at a higher rate and for longer; extreme heat can also reduce transmission capacity over electric systems.

Warning Time: 1 – More than 24 hours warning time

Duration: 4 – More than one week

Location

The entire planning area is susceptible to high temperatures and incidents of extreme heat.

Extent

The extent of extreme heat can be defined by the maximum apparent temperature reached. Apparent temperature is a function of ambient air temperature and relative humidity and is reported as the heat index. The National Weather Service Forecast Office in Raleigh sets the following criteria for heat advisory and excessive heat warning:

- **Heat Advisory** – Heat Index of 105°F to 109°F for 3 hours or more. Can also be issued for lower values 100ºF to 104ºF for heat lasting several consecutive days
- **Excessive Heat Watch** – Potential for heat index values of 110°F or hotter within 24 to 48 hours. Also issued during prolonged heat waves when the heat index is near 110°F
- **Excessive Heat Warning** – Heat Index of 110°F or greater for any duration

Based on data from the "Raleigh State Univ" weather station from January 1892 through January 2019, the highest temperature recorded in Wake County was 107°F and occurred in July 2011.

Impact: 3 – Critical

Spatial Extent: 4 – Large

Historical Occurrences

According to the National Oceanic and Atmospheric Administration (NOAA), 2017 was North Carolina's hottest year on record; that record stretches back 123 years to 1895.

The following two heat-related incidents were reported by NCEI for Wake County; these incidents caused one injury and no fatalities, property damage, or crop damage:

July 22, 1998 – Excessive heat plagued central North Carolina during July 22 through July 23. Maximum temperatures reached the 98 to 103 degree range combined with dew points in the 78 to 80 degree range with little wind to give heat index values of around 110 degrees for several hours each afternoon. To make matters worse, the minimum temperatures did not fall below 80 at several locations and those that did achieved that feat for only an hour or two. Strong thunderstorms ended the 2 day excessive heat ordeal on the evening of the 23 when rain cooled the environment enough to send temperatures into the lower 70s at most locations.

August 22, 2007 – An athlete from Enloe High School running track collapsed from heat exhaustion and was sent to the hospital in critical condition. The student remained in the hospital in critical condition for several days.

Probability of Future Occurrence

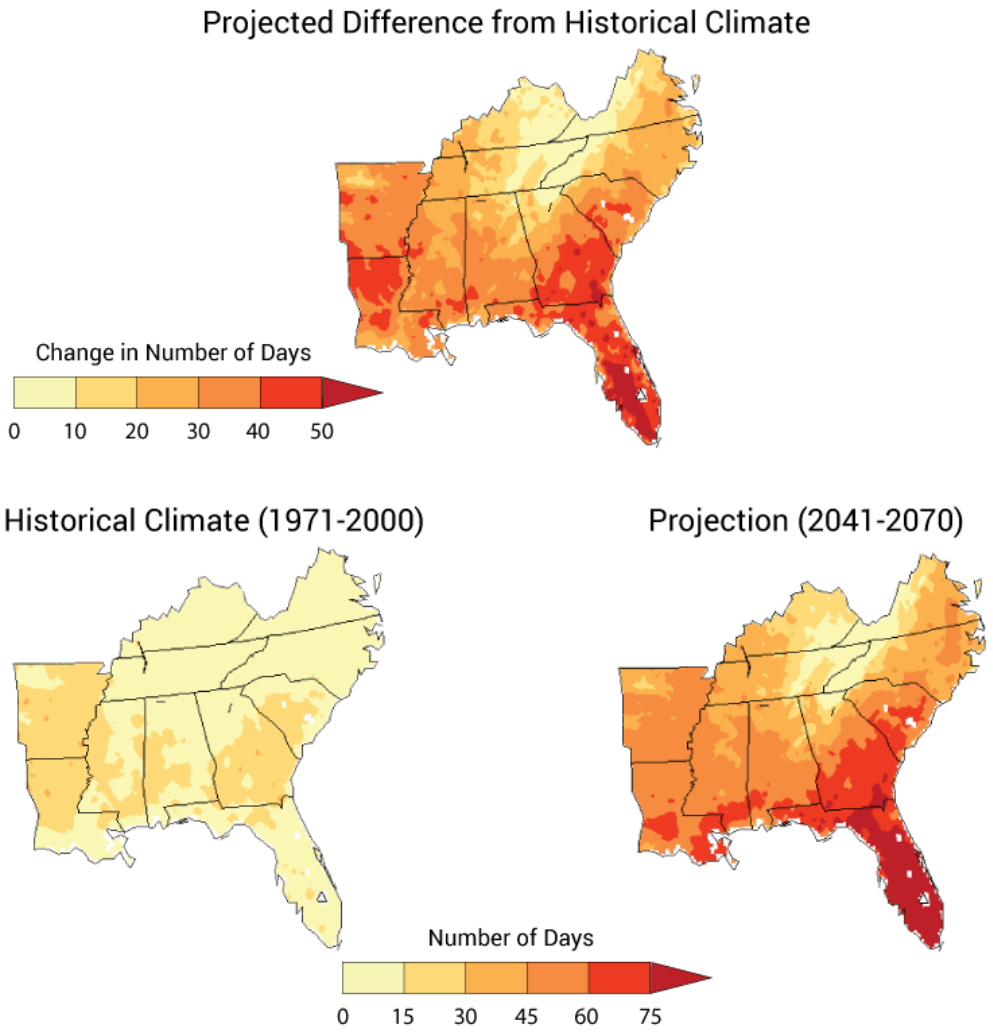
Data was gathered from the North Carolina State Climate Office's Climate Thresholds Tool using the Raleigh State University weather station as an approximation for Wake County. During the 20-year period from 1999 through 2018, Wake County experienced 33 days with a high temperature above 100°F, or an average of 1.65 days per year. In 2012, there were 10 days with recorded temperatures above this threshold.

Probability: 4 – Highly Likely

Climate Change

Research shows that average temperatures will continue to rise in the Southeast United States and globally, directly affecting the Wake County region in North Carolina. Per the Fourth National Climate Assessment, "extreme temperatures are projected to increase even more than average temperatures. Cold waves are projected to become less intense and heat waves more intense." The number of days over 95°F is expected to increase by between 20 and 30 days annually, as shown in Figure 4.10. The Triangle Regional Resilience Partnership Resilience Assessment notes that the number of days with extreme temperatures has been increasing in the Triangle; climbing from an average of 18 days over 92°F per year from 1948 to 2012 to a peak of 48 days over 92°F in 2010.

Figure 4.10 – Projected Change in Number of Days Over 95°F



Source: NOAA NCDC from 2014 National Climate Assessment

Vulnerability Assessment

Methodologies and Assumptions

No data is available to assess the vulnerability of people or property in the planning area to extreme heat.

People

Extreme heat can cause heat stroke and even loss of human life. The elderly and the very young are most at risk to the effects of heat. People who are isolated are also more vulnerable to extreme heat.

Property

Extreme heat is unlikely to cause significant damages to the built environment. However, road surfaces can be damaged as asphalt softens, and concrete sections may buckle under expansion caused by heat. Train rails may also distort or buckle under the stress of head induced expansion. Power transmission lines may sag from expansion and if contact is made with vegetation the line may short out causing power

outages. Additional power demand for cooling also increases power line temperature adding to heat impacts.

Extreme heat can also cause significant agricultural losses. Between 2007-2017, the sum of claims paid for crop damage due to heat in Wake County was $2,844,454, or an average of $258,587 in losses every year. Losses were greatest in 2016 when 512 acres of flue cured tobacco, soybeans, and corn were affected, resulting in $1,684,909 in crop losses. Table 4.19 summarizes the crop losses due to drought in reported in the RMA system.

Table 4.30 – Crop Losses Resulting from Heat, 2007-2017

Year	Determined Acres	Indemnity Amount
2008	16.40	$380.00
2010	1480.92	$338,250.00
2011	296.21	$104,999.00
2012	456.98	$114,504.00
2015	239.62	$280,358.30
2016	512.32	$494,026.75
2017	386.77	$179,418.00
Total	**6,391.67**	**$2,844,454.10**

Source: USDA Risk Management Agency

Environment

Wild animals are vulnerable to heat disorders similar to humans, including mortality. Vegetation growth will be stunted or plants may be killed if temperatures rise above their tolerance extremes.

Consequence Analysis

Table 4.31 summarizes the potential negative consequences of extreme heat.

Table 4.31 – Consequence Analysis – Extreme Heat

Category	Consequences
Public	Extreme heat may cause illness and/or death.
Responders	Consequences may be greater for responders if their work requires exertion and/or wearing heavy protective gear.
Continuity of Operations (including Continued Delivery of Services)	Continuity of operations is not expected to be impacted by extreme heat because warning time for these events is long.
Property, Facilities and Infrastructure	Minor impacts may occur, including possible damages to road surfaces and power lines.
Environment	Environmental impacts include strain on local plant and wildlife, including potential for illness or death.
Economic Condition of the Jurisdiction	Farmers may face crop losses or increased livestock costs.
Public Confidence in the Jurisdiction's Governance	Extreme heat is unlikely to impact public confidence.

Hazard Summary by Jurisdiction

The following table summarizes extreme heat hazard risk by jurisdiction. Extreme heat risk does not vary significantly by jurisdiction.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	4	3	4	1	3	3.3	H
Apex	4	3	4	1	3	3.3	H
Cary	4	3	4	1	3	3.3	H
Fuquay-Varina	4	3	4	1	3	3.3	H
Garner	4	3	4	1	3	3.3	H
Holly Springs	4	3	4	1	3	3.3	H
Knightdale	4	3	4	1	3	3.3	H
Morrisville	4	3	4	1	3	3.3	H
Raleigh	4	3	4	1	3	3.3	H
Rolesville	4	3	4	1	3	3.3	H
Wake Forest	4	3	4	1	3	3.3	H
Wendell	4	3	4	1	3	3.3	H
Zebulon	4	3	4	1	3	3.3	H

4.5.5 Flood

Hazard Background

Flooding is defined by the rising and overflowing of water onto normally dry land. As defined by FEMA, a flood is a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties. Flooding can result from an overflow of inland waters or an unusual accumulation or runoff of surface waters from any source.

Flooding is the most frequent and costly of all natural hazards in the United States, and has caused more than 10,000 death(s) since 1900. Approximately 90 percent of presidentially declared disasters result from flood-related natural hazard events. Taken as a whole, more frequent, localized flooding problems that do not meet federal disaster declaration thresholds ultimately cause the majority of damages across the United States.

Sources and Types of Flooding

Flooding within Wake County can be attributed to two main sources as noted below.

Riverine Flooding: The primary riverine flooding sources in Wake County are the Black River, Contentnea River, Haw River, Cape Fear River, and Neuse River, according to the 2015 Preliminary Flood Insurance Study for Wake County. These rivers and their tributaries are susceptible to overflowing their banks during and following excessive precipitation events. Though less common, riverine flood events (such as the "100-year flood") will cause significantly more damage and economic disruption for the area than incidences of localized stormwater flooding.

Wake County has an Effective FIRM is dated May 2, 2006 and a Revised Flood Insurance Study (FIS) dated November 17, 2017. The FIS summarizes the principal flood problems in the county as follows:

> "Flooding problems in the unincorporated areas of Wake County have been mostly attributed to the inefficient removal of runoff from highly developed areas. The extent to which development in this area has affected flooding problems can be seen by comparing a flood in May 1957 with one in February 1973. The 1957 flood resulted from approximately 5.7 inches of rain and was considered to have an average frequency of once in 7 years. The 1973 flood reached higher levels in the floodplain but resulted from only 3.5 inches of rain, or a storm predicted to occur once in every 2 to 5 years. This increase in flood potential, caused partially by the intense development which has taken place in the area, has resulted in reduced crop yields and lowered land values and caused more frequent property damage."

Flash Flooding: A flash flood occurs when water levels rise at an extremely fast rate as a result of intense rainfall over a brief period, possibly from slow-moving intense thunderstorms and sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Ice jam flooding is a form of flash flooding that occurs when ice breaks up in moving waterways, and then stacks on itself where channels narrow. This creates a natural dam, often causing flooding within minutes of the dam formation. Flash flooding can happen in Special Flood Hazard Areas (SFHAs) as delineated by the National Flood Insurance Program (NFIP) and can also happen in areas not associated with floodplains. Flash flood hazards caused by surface water runoff are most common in urbanized areas, where greater population density generally equates to more impervious surface (e.g., pavement and buildings) which increases the amount of surface water generated.

Flash flooding is a dangerous form of flooding which can reach full peak in only a few minutes. Rapid onset allows little or no time for protective measures. Flash flood waters move at very fast speeds and

can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding can result in higher loss of life, both human and animal, than slower developing river and stream flooding.

In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle the increased storm runoff. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns.

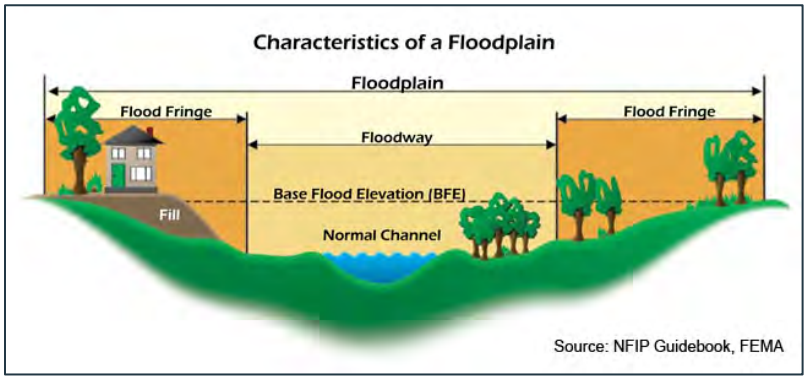
Localized flooding may be caused by the following issues:

- **Inadequate Capacity –** An undersized/under capacity pipe system can cause water to back-up behind a structure which can lead to areas of ponded water and/or overtopping of banks.
- **Clogged Inlets** – Debris covering the asphalt apron and the top of grate at catch basin inlets may contribute to an inadequate flow of stormwater into the system. Debris within the basin itself may also reduce the efficiency of the system by reducing the carrying capacity.
- **Blocked Drainage Outfalls** – Debris blockage or structural damage at drainage outfalls may prevent the system from discharging runoff, which may lead to a back-up of stormwater within the system.
- **Improper Grade** – Poorly graded asphalt around catch basin inlets may prevent stormwater from entering the catch basin as designed. Areas of settled asphalt may create low spots within the roadway that allow for areas of ponded water.

Flooding and Floodplains

In the case of riverine flooding, the area adjacent to a channel is the floodplain, as shown in Figure 4.11. A floodplain is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream.

Figure 4.11 – Characteristics of a Floodplain



In its common usage, the floodplain most often refers to that area that is inundated by the "100-year flood," which is the flood that has a 1% chance in any given year of being equaled or exceeded. The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. The potential for flooding can change and increase through various land use changes and changes to land

surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

The 100-year flood, which is the minimum standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. Participation in the NFIP requires adoption and enforcement of a local floodplain management ordinance which is intended to prevent unsafe development in the floodplain, thereby reducing future flood damages. Participation in the NFIP allows for the federal government to make flood insurance available within the community as a financial protection against flood losses. Since floods have an annual probability of occurrence, have a known magnitude, depth and velocity for each event, and in most cases, have a map indicating where they will likely occur, they are in many ways often the most predictable and manageable hazard.

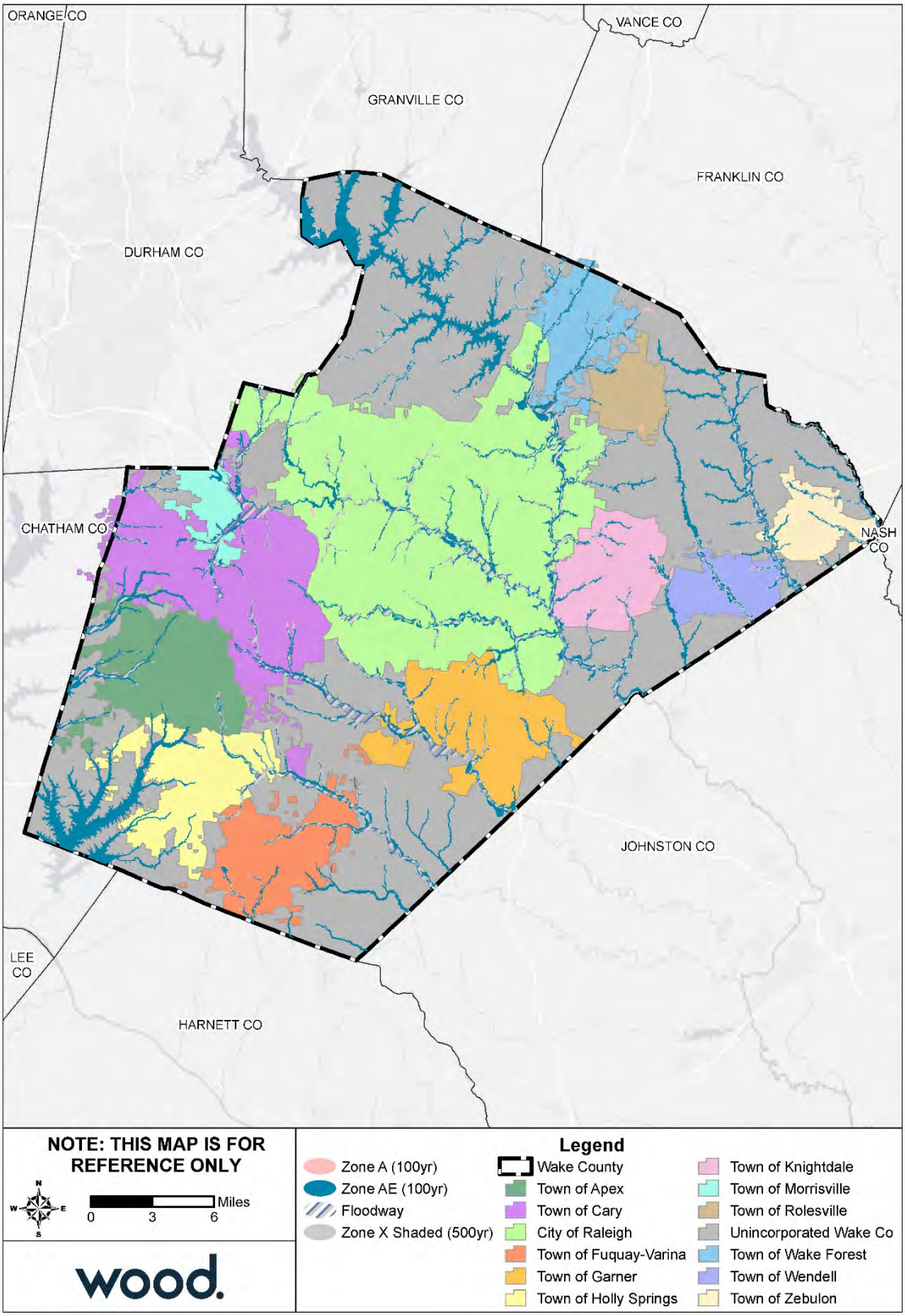
Warning Time: 3 – 6 to 12 hours

Duration: 3 – Less than 1 week

Location

Figure 4.12 reflects the effective mapped flood insurance zones for Wake County.

Figure 4.12 – FEMA Flood Hazard Areas in Wake County



Source: FEMA 2009 Effective DFIRM

Extent

Flood extent can be defined by the amount of land in the floodplain and the potential magnitude of flooding as measured by flood height and velocity.

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRMs). It is the official map for a community on which FEMA has delineated both the Special Flood Hazard Areas (SFHAs) and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 100-year flood event. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. Flood prone areas were identified within Wake County using the Effective FIRMs, dated May 2, 2006. Table 4.32 summarizes the flood insurance zones identified by the Digital FIRM (DFIRM).

Table 4.32 – Mapped Flood Insurance Zones within Wake County

Zone	Description
AE	AE Zones, also within the 100-year flood limits, are defined with BFEs that reflect the combined influence of stillwater flood elevations and wave effects less than 3 feet. The AE Zone generally extends from the landward VE zone limit to the limits of the 100-year flood from coastal sources, or until it reaches the confluence with riverine flood sources. The AE Zones also depict the SFHA due to riverine flood sources, but instead of being subdivided into separate zones of differing BFEs with possible wave effects added, they represent the flood profile determined by hydrologic and hydraulic investigations and have no wave effects. The Coastal AE Zone is differentiated from the AE Zone by the Limit of Moderate Wave Action (LiMWA) and includes areas susceptible to wave action between 1.5 to 3 feet.
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
0.2% Annual Chance (shaded Zone X)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
Zone X (unshaded)	Minimal risk areas outside the 1-percent and .2-percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. Zone X (unshaded) is used on new and revised maps in place of Zone C.

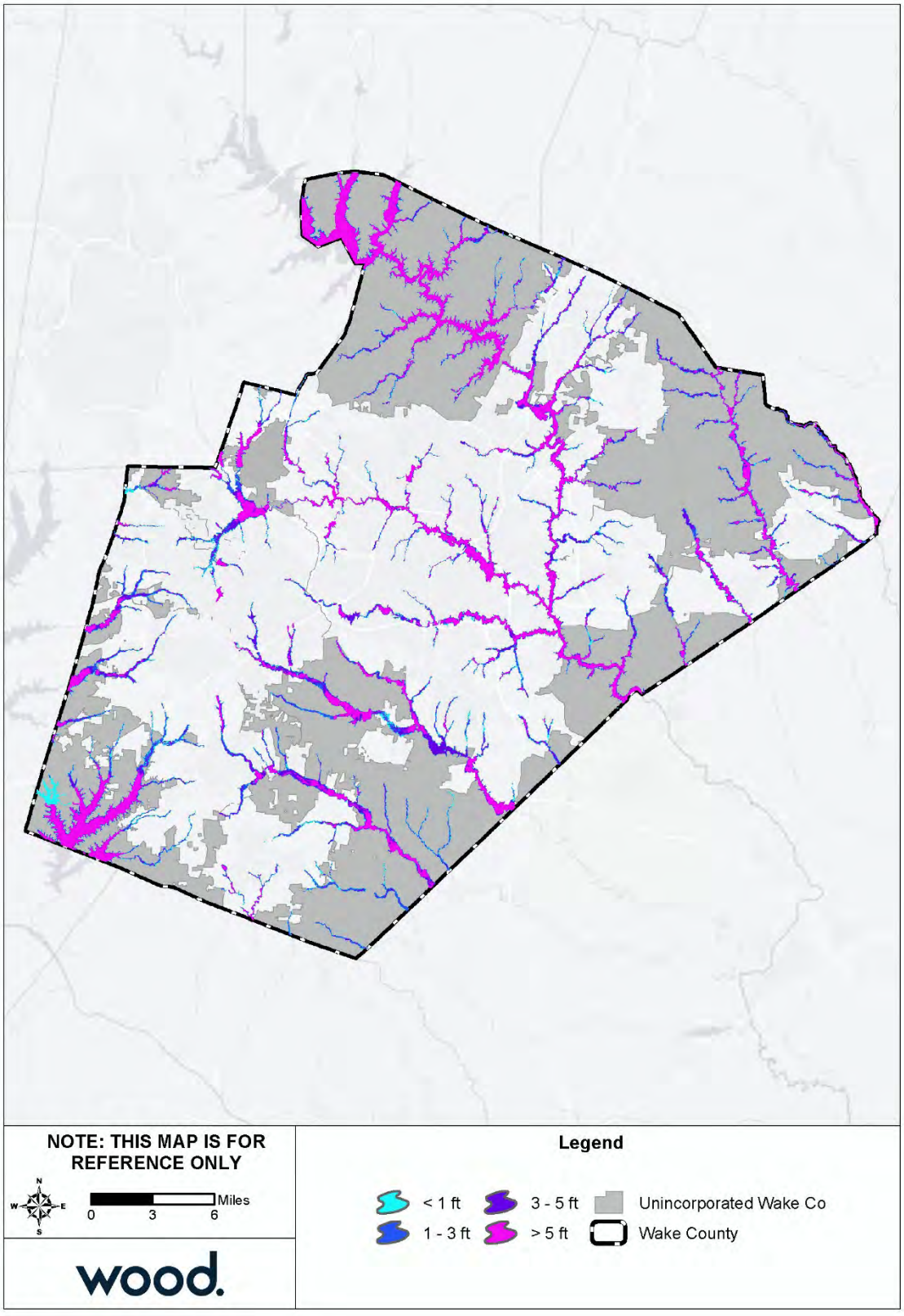
Approximately 9% of the County falls within the SFHA. Table 4.33 below summarizes acreage of the County's total area by flood zone on the effective DFIRM. Figure 4.13 shows the depth of flooding predicted from a 1% annual chance flood.

Table 4.33 – Flood Zone Acreage in Wake County

Flood Zone	Acreage	Percent of Total (%)
Zone A	415.97	0.08
Zone AE	49,341.95	9.00
Zone X (500-year)	3,548.68	0.65
Zone X Unshaded	495,237.24	90.28
Total	**548,543.84**	--

Source: FEMA Effective DFIRM; Wake County GIS

Figure 4.13 – Flood Depth, 100-Year Floodplain



Source: FEMA Effective DFIRM

The NFIP utilizes the 100-year flood as a basis for floodplain management. The Flood Insurance Study (FIS) defines the probability of flooding as flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 100-year period (recurrence intervals). Or considered another way, properties within a 100-year flood zone have a one percent probability of being equaled or exceeded during any given year. Mortgage lenders require that owners of properties with federally-backed mortgages located within SFHAs purchase and maintain flood insurance policies on their properties. Consequently, newer and recently purchased properties in the community are typically insured against flooding.

Impact: 3 – Critical

Spatial Extent: 2 – Small

Historical Occurrences

Table 4.34 details the historical occurrences of flooding identified from 2007 through 2018 by NCEI Storm Events database. It should be noted that only those historical occurrences listed in the NCEI database are shown here and that other, unrecorded or unreported events may have occurred within the planning area during this timeframe.

Table 4.34 – NCEI Records of Flooding, 2007-2018

Location	Date	Type	Deaths/ Injuries	Reported Property Damage	Reported Property Damage (PV)	Reported Crop Damage	Reported Crop Damage (PV)
Raleigh	04/27/08	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	04/27/08	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/30/08	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	09/06/08	Flash Flood	0/0	$100,000	$69,731	$0	$0
Raleigh	05/05/09	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	05/05/09	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	06/16/09	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	06/16/09	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	12/02/09	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	12/02/09	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	12/02/09	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	01/25/10	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	01/25/10	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/05/10	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/24/10	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	09/30/10	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	09/30/10	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/06/11	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/06/11	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	09/21/11	Flash Flood	0/0	$5,000	$3,871	$0	$0
Raleigh	07/30/12	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	09/06/12	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	09/08/12	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	09/08/12	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	09/18/12	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	06/07/13	Flash Flood	0/0	$0	$0	$0	$0

Location	Date	Type	Deaths/ Injuries	Reported Property Damage	Reported Property Damage (PV)	Reported Crop Damage	Reported Crop Damage (PV)
Raleigh	06/07/13	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	06/07/13	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	07/08/13	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	09/01/13	Flash Flood	0/0	$10,000	$8,279	$0	$0
Raleigh	05/15/14	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	05/15/14	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	05/15/14	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	07/10/14	Flash Flood	0/0	$10,000	$8,528	$0	$0
Raleigh	08/12/14	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/12/14	Flash Flood	0/0	$2,500,000	$2,138,508	$0	$0
Raleigh	06/18/15	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	06/18/15	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	12/30/15	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	07/17/16	Flood	0/0	$0	$0	$0	$0
Raleigh	04/25/17	Flash Flood	0/0	$150,000	$140,799	$0	$0
Raleigh	04/25/17	Flash Flood	0/0	$10,000	$9,387	$0	$0
Raleigh	05/21/18	Flash Flood	0/0	$600,000	$584,315	$0	$0
Raleigh	07/06/18	Flash Flood	0/0	$10,000	$9,782	$0	$0
Raleigh	07/06/18	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	07/06/18	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	07/07/18	Flash Flood	0/0	$10,000	$9,782	$0	$0
Raleigh	08/19/18	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/19/18	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/19/18	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/20/18	Flash Flood	0/0	$80,000	$78,582	$0	$0
Raleigh	08/20/18	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/20/18	Flash Flood	0/0	$0	$0	$0	$0
Raleigh	08/20/18	Flash Flood	0/0	$0	$0	$0	$0
Apex	07/27/10	Flash Flood	0/0	$0	$0	$0	$0
Apex	07/27/10	Flash Flood	0/0	$0	$0	$0	$0
Apex	05/15/14	Flash Flood	0/0	$0	$0	$0	$0
Apex	04/25/17	Flash Flood	0/0	$2,000	$1,877	$0	$0
Cary	07/17/07	Flash Flood	0/0	$0	$0	$0	$0
Cary	05/05/09	Flash Flood	0/0	$0	$0	$0	$0
Cary	05/05/09	Flood	0/0	$0	$0	$0	$0
Cary	06/01/10	Flash Flood	0/0	$0	$0	$0	$0
Cary	07/24/11	Flash Flood	0/0	$0	$0	$0	$0
Cary	08/06/11	Flash Flood	0/0	$0	$0	$0	$0
Cary	07/15/14	Flash Flood	0/0	$2,500	$2,133	$0	$0
Cary	08/12/14	Flash Flood	0/0	$10,000	$8,554	$0	$0
Cary	06/18/15	Flash Flood	0/0	$5,000	$4,404	$0	$0
Cary	07/16/16	Flash Flood	0/0	$250,000	$228,531	$0	$0
Cary	06/16/17	Flash Flood	0/0	$0	$0	$0	$0
Fuquay-Varina	08/28/08	Flash Flood	0/0	$0	$0	$0	$0
Fuquay-Varina	07/07/18	Flash Flood	0/0	$0	$0	$0	$0

Location	Date	Type	Deaths/ Injuries	Reported Property Damage	Reported Property Damage (PV)	Reported Crop Damage	Reported Crop Damage (PV)
Fuquay-Varina	09/14/18	Flash Flood	0/0	$0	$0	$0	$0
Holly Springs	09/22/09	Flash Flood	0/0	$0	$0	$0	$0
Holly Springs	05/27/11	Flash Flood	0/0	$0	$0	$0	$0
Holly Springs	06/07/13	Flash Flood	0/0	$0	$0	$0	$0
Holly Springs	04/09/15	Flash Flood	0/0	$20,000	$17,501	$0	$0
Morrisville	08/30/08	Flash Flood	0/0	$0	$0	$0	$0
Morrisville	07/21/14	Flash Flood	0/0	$0	$0	$0	$0
Morrisville	07/21/14	Flash Flood	0/0	$0	$0	$0	$0
Morrisville	07/05/18	Flash Flood	0/0	$0	$0	$0	$0
Wake Forest	12/02/09	Flash Flood	0/0	$0	$0	$0	$0
Wake Forest	06/07/13	Flash Flood	0/0	$0	$0	$0	$0
Wake Forest	09/01/17	Flash Flood	0/0	$0	$0	$0	$0
Zebulon	06/18/15	Flash Flood	0/0	$20,000	$17,616	$0	$0
Zebulon	10/11/18	Flash Flood	0/0	$50,000	$49,351	$0	$0
Unincorporated Wake County	09/30/10	Flash Flood	0/0	$0	$0	$0	$0
Unincorporated Wake County	08/12/14	Flash Flood	0/0	$0	$0	$0	$0
Unincorporated Wake County	04/09/15	Flash Flood	0/0	$5,000	$4,375	$0	$0
Unincorporated Wake County	10/08/16	Flash Flood	0/0	$65,500,000	$60,350,833	$0	$0
Unincorporated Wake County	10/09/16	Flood	4/0	$24,700,000	$22,758,253	$20,000,000	$18,427,735
Unincorporated Wake County	04/25/17	Flash Flood	0/0	$2,000	$1,877	$0	$0
Unincorporated Wake County	09/17/18	Flood	0/0	$1,310	$1,290	$30,000	$29,549
Unincorporated Wake County	09/17/18	Flood	0/0	$5,000,000	$4,924,887	$20,000,000	$19,699,547
Total		**93 Events**	**4/0**	**$99,052,810**	**$91,433,045**	**$40,030,000**	**$38,156,832**

Source: NCEI

According to NCEI, 93 recorded flood events affected the planning area from 2007 to 2018 causing an estimated $99,052,810 in property damage, $40,030,000 in crop damage, and 4 deaths.

Table 4.35 provides a summary of this historical information by participating jurisdiction. It is important to note that many of the events attributed to the county are countywide or cover large portions of the county. The individual counts by jurisdiction are for those events that are only attributed to that one jurisdiction.

Table 4.35 – Summary of Historical Flood Occurrences by Participating Jurisdiction, 2007-2018

Jurisdiction	Event Count	Deaths	Injuries	Property Damage	Property Damage (PV)	Crop Damage	Crop Damage (PV)
Raleigh	54	0	0	$3,485,000	$2,400,211	$0	$0
Apex	4	0	0	$2,000	$1,488	$0	$0

Jurisdiction	Event Count	Deaths	Injuries	Property Damage	Property Damage (PV)	Crop Damage	Crop Damage (PV)
Cary	11	0	0	$267,500	$179,356	$0	$0
Fuquay-Varina	3	0	0	$0	$0	$0	$0
Holly Springs	4	0	0	$20,000	$14,459	$0	$0
Morrisville	4	0	0	$0	$0	$0	$0
Wake Forest	3	0	0	$0	$0	$0	$0
Zebulon	2	0	0	$70,000	$61,655	$0	$0
Unincorporated Wake County	8	4	0	$95,208,310	$71,289,655	$40,030,000	$29,973,486
Total	**93**	**4**	**0**	**$99,052,810**	**$73,946,825**	**$40,030,000**	**$29,973,486**

Source: NCEI

The following historical flood elevations are reported in the 2017 Revised FIS for Wake County and illustrate the potential for flooding throughout the county:

July 4, 2001 – Middle Creek and Swift Creek overflowed their banks, causing extensive flooding in Holly Springs, Fuquay-Varina, and Garner. A mobile home park near Ten-Ten Road and Highway 401 was evacuated. Many roads and a few bridges were washed out, causing some people to abandon their cars.

April 27, 2008 – Over three inches of rain fell between 6:45 p.m. and 11:00 p.m. with nearly 2.5 inches falling in the first hour alone. The heavy rainfall caused Marsh Creek to overflow, flooding south bound lanes of Capital Boulevard near the intersection of Brentwood Road. The softball field and walking trail in Brentwood Park also experienced flooding, with 4 to 5 feet of flowing water through the park.

September 6, 2008 – During the early morning house Tropical Storm Hanna made landfall near Myrtle beach, SC and tracked north into central North Carolina along Interstate 95. Four to seven inches of rain which fell over the eastern piedmont resulted in flash flooding over large areas including the Triangle. Up to seven inches of rain caused flash flooding in many locations across Raleigh particularly along Crabtree Creek and other flood prone areas. A motorist was rescued from a vehicle after driving into a flooded underpass at Hillsborough Drive and Chapel Hill Drive in west Raleigh. Sullivan Drive between Dan Allen and Varsity Drive was closed due to flooding along with Avent Ferry Road at Trailwood Drive. Number creeks across the region flooded low lying areas as well as some vehicles.

Probability of Future Occurrence

By definition of the 100-year flood event, SFHAs are defined as those areas that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. Properties located in these areas have a 26 percent chance of flooding over the life of a 30-year mortgage.

The 500-year flood area is defined as those areas that will be inundated by the flood event having a 0.2-percent chance of being equaled or exceeded in any given year; it is not the flood that will occur once every 500 years.

While exposure to flood hazards vary across jurisdictions, all jurisdictions have at least some area of land in FEMA flood hazard areas, therefore the likelihood of flooding is considered possible (between 10% and 50% annual probability) for all jurisdictions.

Additional flood risk comes from localized stormwater flooding and flash floods. Historical records indicate that an average of 7.75 flood or flash flood events occur each year in the planning area.

Probability: 3 – Likely

Climate Change

Per the Fourth National Climate Assessment, frequency and intensity of heavy precipitation events is expected to increase across the country. Additionally, increases in precipitation totals are expected in the Southeast. Therefore, with more rainfall falling in more intense incidents, the region may experience more frequent flash flooding. Increased flooding may also result from more intense tropical cyclone; researchers have noted the occurrence of more intense storms bringing greater rainfall totals, a trend that is expected to continue as ocean and air temperatures rise.

Vulnerability Assessment

The following section provides an assessment of vulnerability to flooding by jurisdiction and flood return period.

Methodologies and Assumptions

Population and property at risk to flooding was estimated using data from the North Carolina Emergency Management (NCEM) IRISK database, which was compiled in NCEM's Risk Management Tool.

As a subset of the building vulnerability analysis, exposure of pre-FIRM structures was also estimated. Table 4.36 below provides the NFIP entry date for each participating jurisdiction, which was used to determine which buildings were constructed pre-FIRM. Pre-FIRM structures were built prior to the adoption of flood protection building standards and are therefore assumed to be at greater risk to the flood hazard.

Table 4.36 – NFIP Entry Dates

Jurisdiction	NFIP Entry Date
City of Raleigh	08/15/78
Town of Apex	03/03/92
Town of Cary	07/17/78
Town of Fuquay-Varina	11/01/78
Town of Garner	07/03/78
Town of Holly Springs	03/03/92
Town of Knightdale	08/01/78
Town of Morrisville	11/01/78
Town of Rolesville	03/03/92
Town of Wake Forest	07/03/78
Town of Wendell	06/01/78
Town of Zebulon	07/03/78
Unincorporated Wake County	11/15/78

Source: Federal Emergency Management Agency Community Status Book Report: Communities Participating in the National Flood Program, August 2013

If the NFIP entry date for a given community is between January and June, buildings constructed the same year as the entry date are considered to be post-FIRM (e.g., if the NFIP entry date is 02/01/1991, buildings constructed in 1990 and before are pre-FIRM. Buildings constructed from 1991 to the present are post-FIRM.). If the NFIP entry date is between July and December, then the following year applies for the year built cut-off (e.g., if the NFIP entry date is 12/18/2007, buildings constructed in the year 2007 and before are pre-FIRM, 2008 and newer are post-FIRM).

Effective FEMA DFIRM data was used for the flood hazard areas. Flood zones used in the analysis consist of Zone AE (1-percent-annual-chance flood), Zone AE Floodway, and the 0.2-percent-annual-chance flood hazard area.

People

Certain health hazards are common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept or where their wastes are stored can contribute polluted waters to the receiving streams.

Debris also poses a risk both during and after a flood. During a flood, debris carried by floodwaters can cause physical injury from impact. During the recovery process, people may often need to clear debris out of their properties but may encounter dangers such as sharp materials or rusty nails that pose a risk of tetanus. People must be aware of these dangers prior to a flood so that they understand the risks and take necessary precautions before, during, and after a flood.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as e.coli and other disease causing agents.

The second type of health problem arises after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If the City water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

Floods can also result in fatalities. Individuals face particularly high risk when driving through flooded streets. According to NCEI records, there have been 4 deaths in Wake County caused by flood events.

Table 4.37 details the population at risk from the 1% annual chance flood event, according to data from the NCEM IRISK database. Note that development and population growth have occurred since the original analysis for the IRISK dataset was performed, therefore actual population at risk is likely higher.

Table 4.37 – Population Impacted by the 100 Year Flood Event

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Raleigh	419,053	1,624	0.4%	35,611	138	0.4%	30,469	118	0.4%
Apex	41,724	33	0.1%	3,546	3	0.1%	3,034	2	0.1%
Cary	136,260	624	0.5%	11,579	54	0.5%	9,907	45	0.5%
Fuquay-Varina	25,023	37	0.1%	2,126	3	0.1%	1,819	3	0.2%
Garner	30,981	148	0.5%	2,633	13	0.5%	2,253	11	0.5%
Holly Springs	25,790	9	0%	2,192	1	0%	1,875	1	0.1%
Knightdale	18,501	14	0.1%	1,572	1	0.1%	1,345	1	0.1%
Morrisville	18,655	23	0.1%	1,585	2	0.1%	1,356	2	0.1%
Rolesville	5,199	0	0%	442	0	0%	378	0	0%
Wake Forest	30,382	19	0.1%	2,582	2	0.1%	2,209	1	0%
Wendell	7,889	26	0.3%	670	2	0.3%	574	2	0.3%
Zebulon	6,102	30	0.5%	519	3	0.6%	444	2	0.5%
Unincorporated Wake County	135,124	140	0.1%	11,483	12	0.1%	9,825	10	0.1%
Total	**900,683**	**2,727**	**0.30%**	**76,540**	**234**	**0.31%**	**65,488**	**198**	**0.30%**

Source: NCEM Risk Management Tool

Property

Residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication systems may be damaged or destroyed by flood waters.

Table 4.38 details the property at risk from the 1% annual chance flood event, according to data from the NCEM IRISK database. As with population vulnerability data, actual property at risk is likely higher due to the amount of development that has occurred since the original analysis for the IRISK dataset was performed.

The damage estimates for the 1% annual chance flood event total $186,783,632, which equates to a loss ratio of less than 1 percent. The loss ratio is the damage estimate divided by the total potential exposure (i.e., total value of all buildings in the planning area), displayed as a percentage of value at risk. FEMA considers loss ratios greater than 10% to be significant and an indicator a community may have more difficulties recovering from an event.

Table 4.39 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings across all jurisdictions, by sector and flood event. Vulnerability of CIKR as well as High Potential Loss Properties, where applicable, can be found by jurisdiction in each community's annex to this plan.

Table 4.38 – Buildings Impacted by the 100-Year Flood Event

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	424	0.3%	458	0.4%	$21,967,204	169	0.1%	$160,840,826	7	0%	$356,363	634	0.5%	$183,164,393
Apex	14,554	3	0%	11	0.1%	$71,079	0	0%	$0	0	0%	$0	11	0.1%	$71,079
Cary	45,306	65	0.1%	195	0.4%	$927,583	10	0%	$1,064,743	0	0%	$0	205	0.5%	$1,992,327
Fuquay-Varina	10,244	8	0.1%	14	0.1%	$142,468	0	0%	$0	0	0%	$0	14	0.1%	$142,468
Garner	11,975	43	0.4%	53	0.4%	$258,970	1	0%	$1,279	0	0%	$0	54	0.5%	$260,249
Holly Springs	9,178	1	0%	3	0%	$9,209	0	0%	$0	0	0%	$0	3	0%	$9,209
Knightdale	7,144	0	0%	5	0.1%	$5,075	0	0%	$0	0	0%	$0	5	0.1%	$5,075
Morrisville	5,181	3	0.1%	6	0.1%	$223,964	1	0%	$199	0	0%	$0	7	0.1%	$224,162
Rolesville	2,103	0	0%	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Wake Forest	10,547	1	0%	6	0.1%	$10,184	1	0%	$25,973	0	0%	$0	7	0.1%	$36,158
Wendell	3,728	7	0.2%	11	0.3%	$34,384	0	0%	$0	0	0%	$0	11	0.3%	$34,384
Zebulon	3,074	4	0.1%	13	0.4%	$65,703	0	0%	$0	0	0%	$0	13	0.4%	$65,703
Unincorporated Wake County	59,372	32	0.1%	58	0.1%	$192,357	21	0%	$500,068	2	0%	$86,000	81	0.1%	$778,425
Total	**310,482**	**591**	**0.2%**	**833**	**0.3%**	**$23,908,180**	**203**	**0.1%**	**$162,433,088**	**9**	**0%**	**$442,363**	**1,045**	**0.3%**	**$186,783,632**

Source: NCEM Risk Management Tool

Table 4.39 – Critical Infrastructure and Key Resources Buildings at Risk to Flood Events by Sector

Sector	Event	Number of Buildings at Risk	Estimated Damages
Banking and Finance	100 Year	4	$1,433,067
	Floodway	1	$48,447
Commercial Facilities	100 Year	184	$157,262,261
	Floodway	46	$7,942,338
Critical Manufacturing	100 Year	10	$1,514,411
	Floodway	4	$255,532
Government Facilities	100 Year	7	$345,852
	Floodway	1	$64,062
Healthcare and Public Health	100 Year	1	$74,308
Transportation Systems	100 Year	6	$2,245,553
	Floodway	1	$60,845
All Categories	**100 Year**	**212**	**$162,875,452**
	Floodway	**53**	**$8,371,224**

Source: NCEM Risk Management Tool

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event and provide a clearer picture of the current property at risk in Wake County, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain. However, for parcels where updated building footprints were available, the parcel was considered exposed only if the building intersected the floodplain boundary.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions. This information is presented by individual jurisdiction in each jurisdiction's respective annex of this plan.

Table 4.40 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table 4.40 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	21	$9,443,180
Apartment	14	$309,325,723
Commercial	30	$437,590,714
EXEMPT	20	$192,726,683
Forestry	1	$777,207
Golf Course	1	$76,222
Industrial	13	$63,502,639
Part Exempt	1	$541,282
Residential Less Than 10 Acres	434	$145,027,953
Retirement Home	2	$16,116,150
Grand Total	**537**	**$1,175,128,053**

Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Repetitive Loss Analysis

A repetitive loss property is a property for which two or more flood insurance claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978. An analysis of repetitive loss was completed to examine repetitive losses within the region.

According to August 2018 NFIP records, there are a total of 118 repetitive loss properties within Wake County, of which 49 are insured and 69 are uninsured. At the time of their first claim, 35 of these properties were non-residential and 83 were residential. There are 27 properties on the list classified as severe repetitive loss properties. A severe repetitive loss property is classified as such if it has four or more separate claim payments of more than $5,000 each (including building and contents payments) or two or more separate claim payments (building only) where the total of the payments exceeds the current value of the property.

Table 4.41 summarizes repetitive loss properties by jurisdiction as identified by FEMA through the NFIP.

Table 4.41 – Repetitive Loss Properties by Jurisdiction

Jurisdiction	Total Number of Properties	Total Number of Losses	Total Amount of Claims Payments
Raleigh	109	352	$14,342,725
Apex	0	0	$0
Cary	0	0	$0
Fuquay-Varina	0	0	$0
Garner	4	9	$82,019
Holly Springs	0	0	$0
Knightdale	0	0	$0
Morrisville	0	0	$0
Rolesville	0	0	$0
Wake Forest	0	0	$0
Wendell	0	0	$0
Zebulon	0	0	$0
Unincorporated Wake County	5	17	$283,104
Total	**118**	**378**	**$14,707,848**

Source: FEMA/ISO

Environment

During a flood event, chemicals and other hazardous substances may end up contaminating local water bodies. Flooding kills animals and in general disrupts the ecosystem. Snakes and insects may also make their way to the flooded areas.

Floods can also cause significant erosion, which can alter streambanks and deposit sediment, changing the flow of streams and rivers and potentially reducing the drainage capacity of those waterbodies.

Consequence Analysis

Table 4.42 summarizes the potential detrimental consequences of flood.

Table 4.42 – Consequence Analysis - Flood

Category	Consequences
Public	Localized impact expected to be severe for incident areas and moderate to light for other adversely affected areas.
Responders	First responders are at risk when attempting to rescue people from their homes. They are subject to the same health hazards as the public. Flood waters may prevent access to areas in need of response or the flood may prevent access to the critical facilities themselves which may prolong response time. Damage to personnel will generally be localized to those in the flood areas at the time of the incident and is expected to be limited.
Continuity of Operations (including Continued Delivery of Services)	Floods can severely disrupt normal operations, especially when there is a loss of power. Damage to facilities in the affected area may require temporary relocation of some operations. Localized disruption of roads, facilities, and/or utilities caused by incident may postpone delivery of some services.
Property, Facilities and Infrastructure	Buildings and infrastructure, including transportation and utility infrastructure, may be damaged or destroyed. Impacts are expected to be localized to the area of the incident. Severe damage is possible.
Environment	Chemicals and other hazardous substances may contaminate local water bodies. Wildlife and livestock deaths possible. The localized impact is expected to be severe for incident areas and moderate to light for other areas affected by the flood or HazMat spills.
Economic Condition of the Jurisdiction	Local economy and finances will be adversely affected, possibly for an extended period of time. During floods (especially flash floods), roads, bridges, farms, houses and automobiles are destroyed. Additionally, the local government must deploy firemen, police and other emergency response personnel and equipment to help the affected area. It may take years for the affected communities to be re-built and business to return to normal.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery are not timely and effective.

Hazard Summary by Jurisdiction

The following table summarizes flood hazard risk by jurisdiction. To account for increased risk of flood due to stormwater and flash flooding, communities with between 2 and 12 flash flood events in the period from 2007-2018 were assigned a probability rating of 3, and communities with over 12 flash flood events during this period were assigned a probability rating of 4. Communities with 10% or more of their land area in the SFHA were assigned a spatial extent of 3. All other factors do not vary by jurisdiction.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	3	3	3	3	3	3.0	H
Apex	3	3	2	3	3	2.8	H
Cary	3	3	2	3	3	2.8	H
Fuquay-Varina	3	3	2	3	3	2.8	H
Garner	2	3	2	3	3	2.5	H
Holly Springs	3	3	2	3	3	2.8	H
Knightdale	2	3	2	3	3	2.5	H
Morrisville	3	3	2	3	3	2.8	H
Raleigh	4	3	2	3	3	3.1	H
Rolesville	2	3	2	3	3	2.5	H
Wake Forest	3	3	2	3	3	2.8	H
Wendell	2	3	2	3	3	2.5	H
Zebulon	3	3	2	3	3	2.8	H

4.5.6 Landslide

Hazard Background

A landslide is the downhill movement of masses of soil and rock, driven by gravity. Landslides occur when susceptible rock, earth, or debris moves down a slope under the force of gravity and water. They can be triggered by natural changes, such as heavy rains, snow melt, fires, and earthquakes; and human-caused changes, such as slope or drainage modifications. Landslides may be very small or very large and can move at slow to very high speeds.

There are several types of landslides: rock falls, rock topple, slides, and flows. Rock falls are rapid movements of bedrock, which result in bouncing or rolling. A topple is a section or block of rock that rotates or tilts before falling to the slope below. Slides are movements of soil or rock along a distinct surface of rupture, which separates the slide material from the more stable underlying material. Mudflows, sometimes referred to as mudslides, mudflows, lahars or debris avalanches, are fast-moving rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as heavy rainfall or rapid snowmelt, changing the soil into a flowing river of mud or "slurry." Slurry can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way. As the flows reach flatter ground, the mudflow spreads over a broad area where it can accumulate in thick deposits.

Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly.

Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved in the past, relatively flat-lying areas away from sudden changes in slope, and areas at the top or along ridges set back from the tops of slopes.

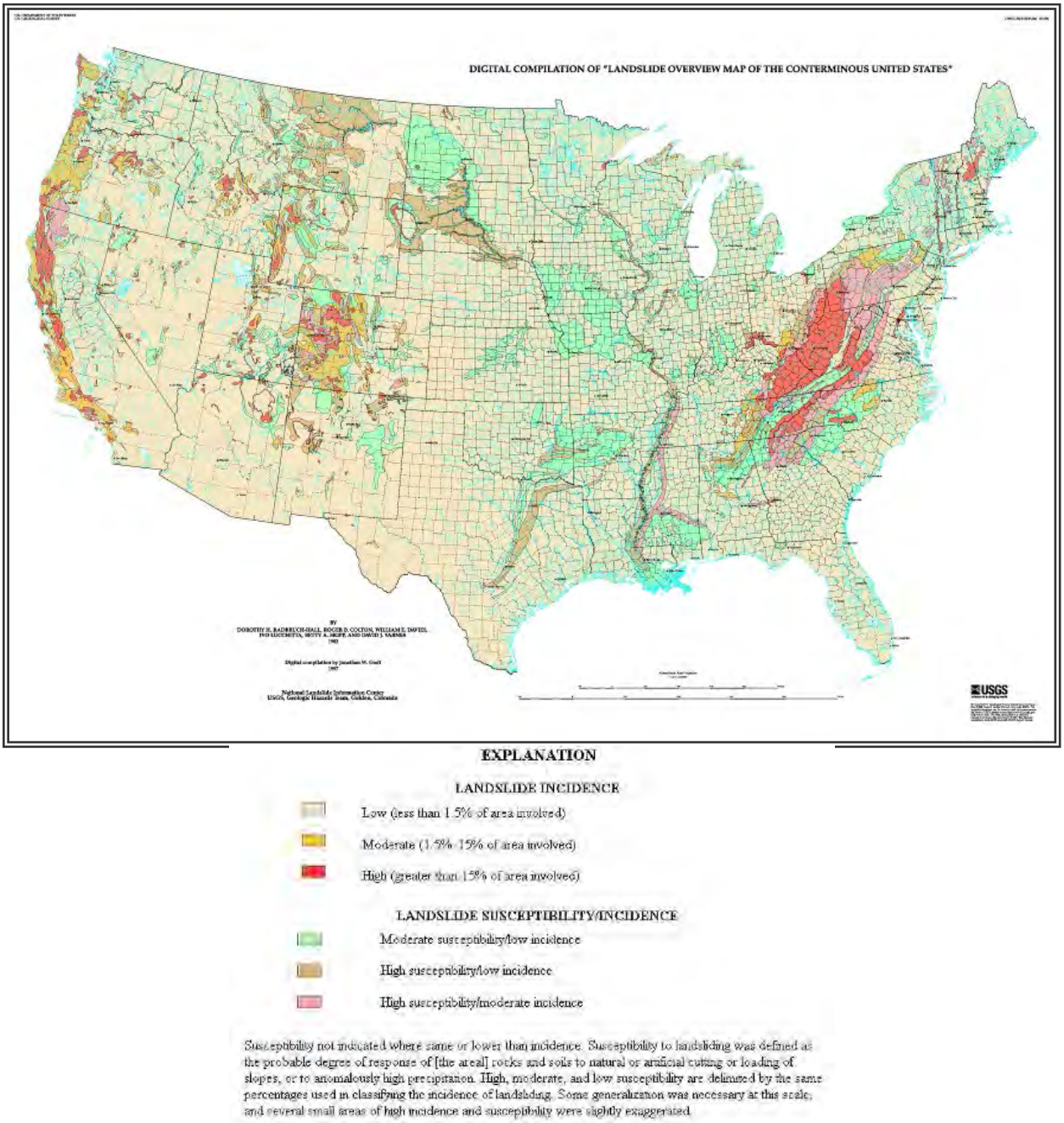
Warning Time: 3 – 6 to 12 hours

Duration: 1 – Less than 6 hours

Location

The U.S. Geological Survey (USGS) has produced landslide susceptibility and incidence mapping of the U.S., as shown in Figure 4.14. The USGS determines susceptibility based on the probable degree of response to cutting or loading of slopes or to anomalously high precipitation. Incidence is measured by the rate of past occurrences. According to the USGS definition and mapping, most of Wake County faces low susceptibility and incidence of landslide. However, areas along the western border of county, including portions of Apex, Cary, and Morrisville, face moderate susceptibility to and incidence of landslide.

Figure 4.14 – Landslide Incidence and Susceptibility



Source: USGS

Extent

Landslide extent can be defined by susceptibility and incidence, which are defined and depicted in Figure 4.14. Event magnitude is also dependent on topography; landslide risk is higher in areas with steeper slopes. Given the gentle topography of most of the county, the magnitude of any landslides in the planning area would be minor.

The event that occurred in Holly Springs in 2003 defines the potential extent of damages that may occur because of landslide in Wake County. This event caused damages to multiple nearby homes but did not result in any deaths or injuries.

Impact: 1 – Minor

Spatial Extent: 1 – Negligible

Historical Occurrences

According to the North Carolina Department of Environmental Quality (NC DEQ), two recent landslides have occurred in Wake County and caused significant property damage. These event narratives from NC DEQ are reported below:

- *Interstate I-540, Wake County (summer 2000)* — While landslides are more frequent in the mountainous part of North Carolina, landslides also occur in other parts of the state. One landslide example occurred in the summer of 2000 along Interstate I-540 in Raleigh in Wake County.
- *Holly Springs, Wake County (summer 2003)* — Piedmont earth movements have affected homes as well. In May 2003 a soil embankment failure in Holly Springs, Wake County, North Carolina, affected a number of homes.

Figure 4.15 shows the location of all past landslide occurrences recorded by NC DEQ since 1995. Past landslide events have all occurred on the western side of the county, which is consistence with the susceptibility and incidence mapping produced by USGS. There have been two events in Raleigh, one in Cary, five in Apex, one in Holly Springs, and two in the unincorporated county.

The following event details were recorded in the NC Geological Survey's movement history records:

Cary, 1995 – Movement occurred in winter and spring of 1995 in Cary that appears to be threatening an apartment complex.

Southeast Durham, 1996 – A slide caused road damage, blocked a drainage ditch, and damaged a cut slope. I-540 and US-70 were affected.

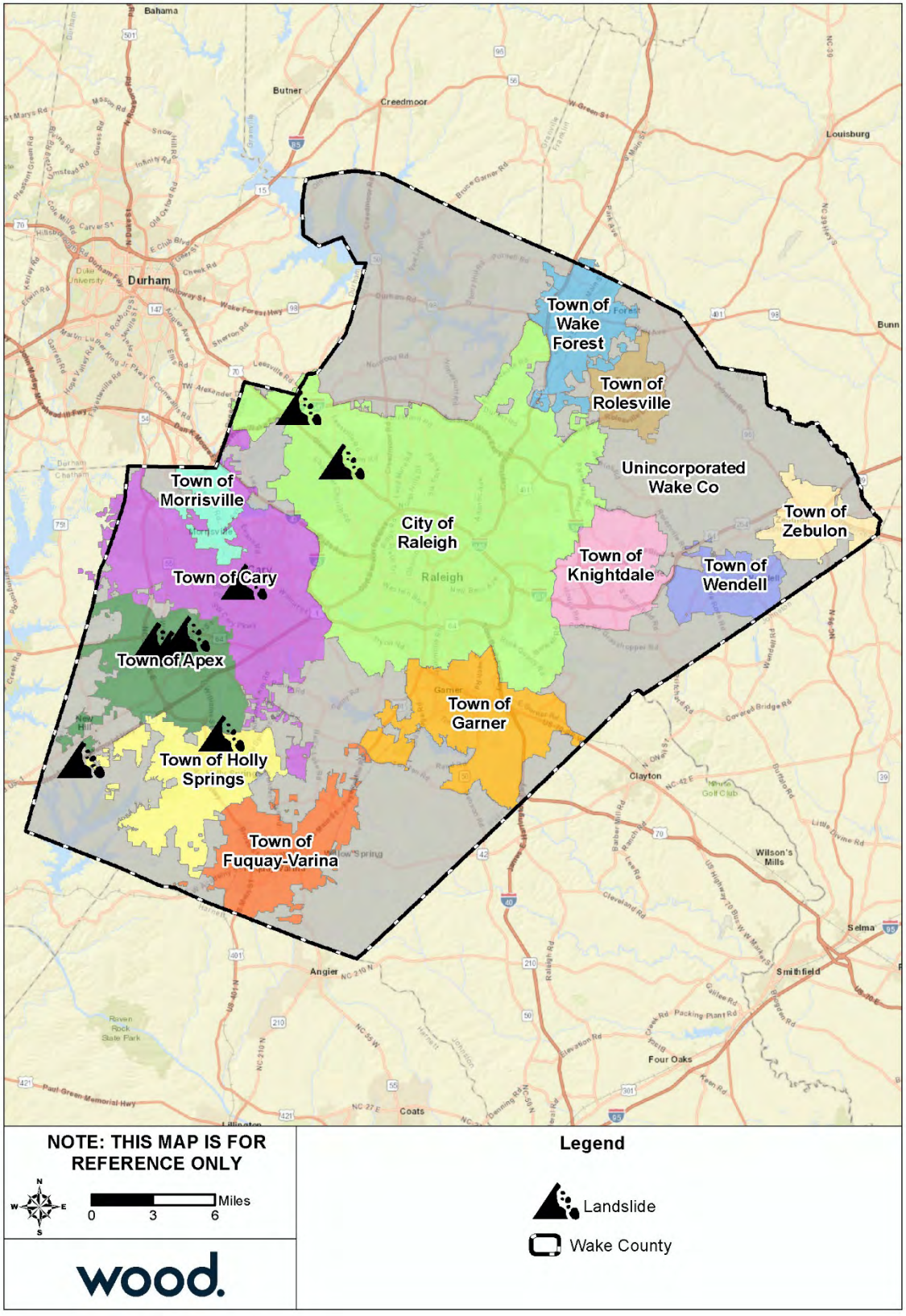
Apex, April 1998 – Evidence of failure seen on September 30, 1999. Failure was possibly associated with Hurricane Floyd.

West Raleigh, 1999 – Movement began in the winter of 1999 and caused road damage. Sediment covered Lynn Road. The slope was since stabilized with a gabion wall.

Holly Springs, 2003 – Damage caused to three homes in a subdivision. Scarp noted at the homes foundation.

Apex, 2006 – Movement occurred during Tropical Storm Alberto, however slow movement was noted by a neighbor approximately 4-6 weeks prior to failure. The damage threatened a retaining wall and a sewer line.

Figure 4.15 – Landslide Locations



Source: NC Geological Survey

Probability of Future Occurrence

From 1995 through 2018 there have been 11 landslide events in the planning area, which equates to an annual probability of 45.8 percent. This probability applies to Wake County and jurisdictions in western Wake County, but reflects only the probability of a minor event. Jurisdictions in eastern Wake County that do not have any historical occurrences or susceptibility are unlikely to experience any landslide events in the future. Across all areas of the county, the probability of a severe landslide event is unlikely.

Probability: 1 – Unlikely

Climate Change

Per the Fourth National Climate Assessment, frequency and intensity of heavy precipitation events is expected to increase across the country. Additionally, increases in precipitation totals are expected in the Southeast. Increased flooding may also result from more intense tropical cyclone; researchers have noted the occurrence of more intense storms bringing greater rainfall totals, a trend that is expected to continue as ocean and air temperatures rise. More rainfall falling in more intense incidents could contribute to an increase in landslide events.

Vulnerability Assessment

Methodologies and Assumptions

This assessment of vulnerability to landslide in Wake County was based solely on records of past events. Data on susceptibility is limited for the planning area and only available in an area-wide aggregate.

People

People are unlikely to sustain serious physical harm as a result of landslides in Wake County. Impacts would be relatively minor and highly localized. An individual using an impacted structure or infrastructure at the time of a landslide event may sustain minor injuries.

Property

Landslides are infrequent in Wake County and occur in small, highly localized instances relative to the general area of risk. Additionally, these events are generally small scale in terms of the magnitude of impacts. As a result, it is difficult to estimate the property at risk to landslide. On average, a landslide event in the planning area may cause minor to moderate property damage to one or more buildings or cause localized damage to infrastructure. A landslide event may also result in the need for debris removal.

Environment

Because landslides are essentially a mass movement of sediment, they may result in changes to terrain, damage to trees in the slide area, changes to drainage patterns, and increases in sediment loads in nearby waterways. Landslides in Wake County are unlikely to cause any more severe impacts.

Consequence Analysis

Table 4.43 summarizes the potential negative consequences of landslide.

Table 4.43 – Consequence Analysis - Landslide

Category	Consequences
Public	Any impacts to the public are expected to be minor. Individuals may sustain injuries if they are in an affected structure or using affected infrastructure when the event occurs.
Responders	Impacts to responders are unlikely. Personnel responsible for debris cleanup or roadway closures may face increased risk.

Category	Consequences
Continuity of Operations (including Continued Delivery of Services)	Landslide is unlikely to affect continuity of operations in Wake County.
Property, Facilities and Infrastructure	Buildings and infrastructure may incur minor damages as a result of landslide; however, vulnerability in Wake County is low.
Environment	Environmental impacts are expected to be minimal. Landslide may cause terrain and drainage changes and may temporarily increase sediment loads in nearby waterways.
Economic Condition of the Jurisdiction	Economic impacts are not expected.
Public Confidence in the Jurisdiction's Governance	Any landslide occurring in Wake County is unlikely to be severe and would not be expected to affect public confidence.

Hazard Summary by Jurisdiction

The following table summarizes landslide hazard risk by jurisdiction. Probability was determined to be slightly higher for jurisdictions in western Wake County where USGS mapping indicates there is moderate susceptibility and incidence. It should be noted that this probability rating reflects a low-consequence event and that the probability of a significant landslide is unlikely across the entire county. All other factors do not vary across jurisdictions.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	2	1	1	3	1	1.5	L
Apex	2	1	1	3	1	1.5	L
Cary	2	1	1	3	1	1.5	L
Fuquay-Varina	1	1	1	3	1	1.2	L
Garner	1	1	1	3	1	1.2	L
Holly Springs	2	1	1	3	1	1.5	L
Knightdale	1	1	1	3	1	1.2	L
Morrisville	2	1	1	3	1	1.5	L
Raleigh	2	1	1	3	1	1.5	L
Rolesville	1	1	1	3	1	1.2	L
Wake Forest	1	1	1	3	1	1.2	L
Wendell	1	1	1	3	1	1.2	L
Zebulon	1	1	1	3	1	1.2	L

4.5.7 Hurricane and Tropical Storm

Hazard Background

Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. A tropical cyclone refers to any such circulation that develops over tropical waters. Tropical cyclones act as a "safety-valve," limiting the continued build-up of heat and energy in tropical regions by maintaining the atmospheric heat and moisture balance between the tropics and the pole-ward latitudes. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes.

The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, warm sea surface temperature, rotational force from the spinning of the earth, and the absence of wind shear in the lowest 50,000 feet of the atmosphere. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is in early to mid-September and the average number of storms that reach hurricane intensity per year in the Atlantic basin is about six.

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane.

Warning Time: 1 – More than 24 hours

Duration: 2 – Less than 24 hours

Location

Hurricanes and tropical storms can occur anywhere within the Wake County planning area. While coastal areas are most vulnerable to hurricanes, their wind and rain impacts can be felt hundreds of miles inland.

Extent

Hurricane intensity is classified by the Saffir-Simpson Scale (Table 4.44), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

Table 4.44 – Saffir-Simpson Scale

Category	Maximum Sustained Wind Speed (MPH)	Types of Damage
1	74–95	Very dangerous winds will produce some damage; Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96–110	Extremely dangerous winds will cause extensive damage; Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111–129	Devastating damage will occur; Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130–156	Catastrophic damage will occur; Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	157 +	Catastrophic damage will occur; A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds and barometric pressure, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified as "major" hurricanes and, while hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, they account for over 70 percent of the damage in the United States. Table 4.45 describes the damage that could be expected for each category of hurricane. Damage during hurricanes may also result from spawned tornadoes, storm surge, and inland flooding associated with heavy rainfall that usually accompanies these storms.

Table 4.45 – Hurricane Damage Classifications

Storm Category	Damage Level	Description of Damages	Photo Example
1	MINIMAL	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.	
2	MODERATE	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings.	
3	EXTENSIVE	Some structural damage to small residences and utility buildings, with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland.	
4	EXTREME	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.	
5	CATASTROPHIC	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.	

Source: National Hurricane Center; Federal Emergency Management Agency

Hurricane Fran is illustrative of the potential impact of hurricanes on the Wake County planning area. In Wake County alone, Fran caused oved $900 million in residential and commercial property damage and at least one death. Additional losses included infrastructure damages and power outages.

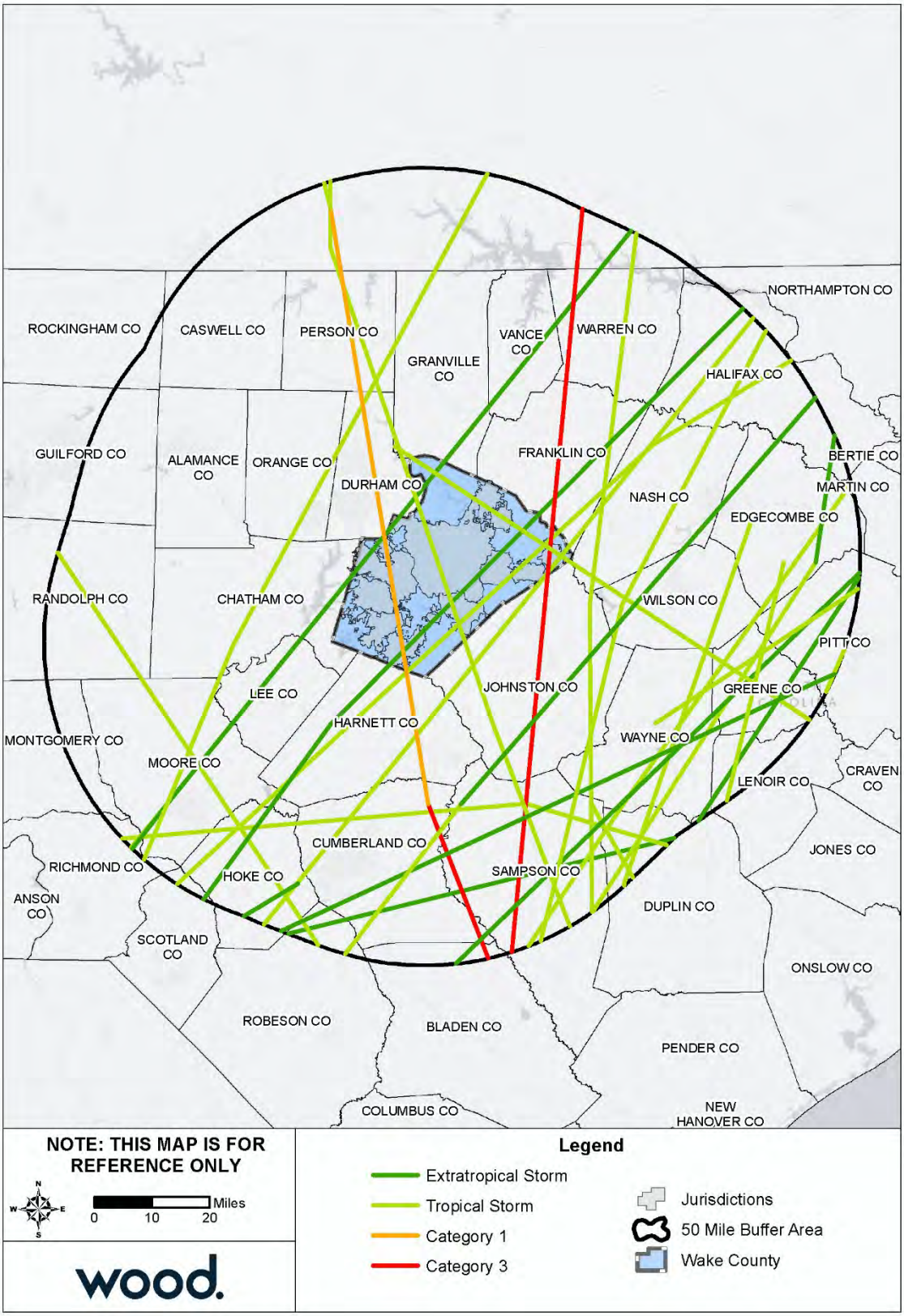
Impact: 3 – Critical

Spatial Extent: 4 – Large

Historical Occurrences

According to the Office of Coastal Management's Tropical Cyclone Storm Segments data, which is a subset of the International Best Track Archive for Climate Stewardship (IBTrACS) dataset, 28 hurricanes and tropical storms have passed within 50 miles of Wake County since 1900. These storms tracks are shown in Figure 4.16. The date, storm name, storm category, and maximum wind speed of each event are detailed in Table 4.46.

Figure 4.16 – Hurricane Tracks within 50 miles of Wake County since 1900



Source: NOAA Office of Coastal Management

Table 4.46 – Hurricane and Tropical Storm Tracks Passing within 50 Miles of Wake County, 1900-2016

Date	Storm Name	Max Storm Category*	Max Wind Speed (mph)
9/6/1916	Unnamed	Tropical Storm	52
9/23/1920	Unnamed	Tropical Storm	40
9/30/1924	Unnamed	Extratropical Storm	69
9/19/1928	Unnamed	Tropical Storm	81
10/2/1929	Unnamed	Extratropical Storm	58
9/6/1935	Unnamed	Tropical Storm	58
8/2/1944	Unnamed	Tropical Storm	69
10/20/1944	Unnamed	Extratropical Storm	58
9/18/1945	Unnamed	Tropical Storm	58
10/15/1954	Hazel	Category 4	132
8/17/1955	Diane	Tropical Storm	69
7/10/1959	Cindy	Tropical Storm	40
9/14/1961	Unnamed	Tropical Storm	40
6/16/1965	Unnamed	Extratropical Storm	40
10/1/1971	Ginger	Tropical Storm	52
9/6/1996	Fran	Category 3	115
9/4/1998	Earl	Extratropical Storm	58
9/5/1999	Dennis	Tropical Storm	58
9/23/2000	Helene	Tropical Storm	40
6/14/2006	Alberto	Extratropical Storm	40
9/1/2006	Ernesto	Tropical Storm	58
9/6/2008	Hanna	Tropical Storm	69
6/7/2013	Andrea	Tropical Storm	46

*Reports the most intense category that occurred within 50 miles of Wake County, not for the storm event overall.
Source: Office of Coastal Management, 2019. https://marinecadastre.gov/data/

The above list of storms is not an exhaustive list of hurricanes that have affected Wake County. Several storms, including Hurricane Floyd and Tropical Storm Hermine passed further than 50 miles away from Wake County yet had strong enough wind or rain impacts to affect the county. Storms with hurricane and tropical storm force winds that impacted Wake County from 1996 through 2017 are noted in Table 4.47, as identified by NCEI.

Table 4.47 – Recorded Winds in Wake County, 1996-2017

Date	Type	Storm	Fatalities	Injuries	Property Damage	Crop Damage
7/12/1996	Hurricane (Typhoon)	Hurricane Bertha	0	0	$0	$0
9/5/1996	Hurricane (Typhoon)	Hurricane Fran	3	0	$0	$0
8/27/1998	Hurricane (Typhoon)	Hurricane Bonnie	0	0	$0	$0
9/4/1999	Hurricane (Typhoon)	Hurricane Dennis	0	0	$0	$0
9/15/1999	Hurricane (Typhoon)	Hurricane Floyd	0	0	$0	$0
9/18/2003	Hurricane (Typhoon)	Hurricane Isabel	0	0	$890,000	$0
9/1/2006	Tropical Storm	Tropical Storm Ernesto	0	0	$0	$0
9/2/2016	Tropical Storm	Tropical Storm Hermine	0	0	$20,000	$0
		Total	**3**	**0**	**$910,000**	**$0**

Source: NCEI

Hurricane Fran (1996) – In the RAH county warning area along, the damage exceeded 2 billion dollars. Damage to crops, livestock, farm equipment/buildings was over 400 million. The agricultural damage was the greatest in Sampson, Johnston, and Wayne counties. Several hundred thousand trees were uprooted or broken. Tens of thousands of homes were damaged by falling trees. In the path of the storm's center, almost every neighborhood was affected. The copious rainfall produced many severe flash and river floods. Along the Crabtree Creek in Raleigh, which crested at its highest since 1973, hundreds of new cars from local dealerships floated in 6 feet of water. Scores of businesses reported heavy damage at the area's largest shopping center.

Hurricane Dennis (1999) – The remnants of Dennis finally moved inland across the central portion of the state. Its main impact was to end the drought in the eastern half of the state. The Triangle received from 6 to 8 inches of rain with Chapel Hill peaking out at 12 inches. The I-40 corridor of counties also got dumped on with totals in the 6- to 10-inch range. This water caused considerable urban and lowland flooding. Several main stem rivers also went into flood. The winds with the remnants of Dennis were generally not a significant problem. There were many old, larger trees uprooted and widespread limb damage was reported. However, the wind and rain combination caused considerable crop damage.

Hurricane Floyd (1999) – Hurricane Floyd produced more human misery and environmental impact in North Carolina than any disaster in memory. The 15-20 inches of rain that fell across the eastern half of the state caused every river and stream to flood. Many rivers set new flood records. Whole communities were underwater for days, even weeks in some areas. Thousands of homes were lost. Crop damage was extensive. The infrastructure of the eastern counties, mainly roads, bridges, water plants, etc., was heavily damaged. By the end of 1999, $1.5 billion had already been spent, with estimates that the cost would reach $3-4 billion. The counties within the Raleigh county warning area probably sustained more than half of the state total. Even worse, was the loss of life, mainly due to flooding. Many Carolinians did not heed the call to evacuate and many more drove into flooded streams and rivers. In the central part of the state, 21 people lost their lives. Also, the loss of livestock was significant, mainly swine and poultry.

Tropical Storm Ernesto (2006) – Tropical Storm Ernesto produced high winds county wide. There were numerous reports form emergency officials of downed trees and large tree limbs.

Tropical Storm Hermine (2016) – Tropical Storm Hermine produced heavy rain across portions of central North Carolina. However, due to dry antecedent conditions, no flooding occurred despite rainfall amounts of up to 3 to 5 inches across southeastern portions of central North Carolina. Given the rain and gusty winds associated with Hermine there were numerous reports of trees down and wind damage and resultant power outages. A large tree fell through the roof of a house near New Hill.

Probability of Future Occurrence

Probability: 3 – Likely

In the 22-year period from 1996 through 2017, 8 hurricanes and tropical storms have impacted the Wake County area, which equates to a 36 percent annual probability of hurricane winds impacting the county. This probability does not account for impacts from hurricane rains, which may also be severe. An additional 5 storms passed within 50 miles of Wake County during this period; these storms did not have significant wind impacts but may have brought heavy rains. Overall, the probability of a hurricane or tropical storm impacting Wake County is likely.

Climate Change

One of the primary factors contributing to the origin and growth of tropical storm and hurricanes systems is water temperature. Per the Fourth National Climate Assessment, “There is growing evidence that the tropics have expanded poleward by about 70 to 200 miles in each hemisphere since satellite

measurements began in 1979, with an accompanying shift of the subtropical dry zones, midlatitude jets, and both midlatitude and tropical cyclone tracks." It is unclear as of yet whether these changes can be attributed to climate change, but current climate science suggests cyclones would become more frequent and intense as water temperatures warm. In addition to occurring with greater frequency, intense hurricanes are also expected to produce greater amounts of rainfall. The 2017 hurricane season is considered an indicator of these potential changes.

Vulnerability Assessment

Methodologies and Assumptions

Property at risk to hurricanes was estimated using data from the North Carolina Emergency Management (NCEM) IRISK database, which was compiled in NCEM's Risk Management Tool. The vulnerability data displayed below is for wind-related damages. Hurricanes may also cause substantial damages from heavy rains and subsequent flooding, which is addressed in Section 4.5.5 Flood.

People

The very young, the elderly and the handicapped are especially vulnerable to harm from hurricanes. For those who are unable to evacuate for medical reasons, there should be provision to take care of special-needs patients and those in hospitals and nursing homes. Many of these patients are either oxygen-dependent, insulin-dependent, or in need of intensive medical care. There is a need to provide ongoing treatment for these vulnerable citizens, either on the coast or by air evacuation to upland hospitals. The stress from disasters such as a hurricane can result in immediate and long-term physical and emotional health problems among victims.

Property

Hurricanes can cause catastrophic damage to coastlines and several hundred miles inland. Hurricanes can produce winds exceeding 157 mph as well as tornadoes and microbursts. Additionally, hurricanes often bring intense rainfall that can result in flash flooding. Floods and flying debris from the excessive winds are often the deadly and most destructive results of hurricanes.

Hurricanes and tropical storms can also cause agricultural damages. For Wake County, USDA RMA reports losses of $736,364 from 2007-2017 due to cyclones, which equates to an average annual loss of $66,942. Table 4.48 summarizes the crop losses due to drought in reported in the RMA system.

Table 4.48 – Crop Losses Resulting from Severe Weather, 2007-2017

Year	Determined Acres	Indemnity Amount
2010	55.11	$42,928.00
2011	419.90	$262,951.00
2016	398.59	$430,484.80
Total	**873.60**	**$736,363.80**

Source: USDA Risk Management Agency

The damage estimates for the 100-year hurricane wind event total $398,511,328, which equates to a loss ratio of less than 1 percent. These damage estimates account for only wind impacts and actual damages would likely be higher due to flooding. Therefore, the Region would likely experience a higher overall loss ratio from the 100-year hurricane event and face difficulty recovering from such an event.

Table 4.49 through Table 4.53 detail the estimated building damages from varying magnitudes of hurricane events.

Table 4.49 – Estimated Buildings Impacted by 25-Year Hurricane Wind Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,050	93%	$13,488,953	6,345	5%	$2,566,523	2,272	1.8%	$1,960,364	127,667	99.7%	$18,015,840
Apex	14,554	13,717	94.2%	$1,370,251	648	4.5%	$96,898	148	1%	$30,743	14,513	99.7%	$1,497,891
Cary	45,306	42,705	94.3%	$5,413,382	1,872	4.1%	$843,439	462	1%	$185,816	45,039	99.4%	$6,442,637
Fuquay-Varina	10,244	9,363	91.4%	$759,309	585	5.7%	$95,115	130	1.3%	$34,730	10,078	98.4%	$889,153
Garner	11,975	11,012	92%	$679,897	687	5.7%	$105,640	181	1.5%	$30,352	11,880	99.2%	$815,890
Holly Springs	9,178	8,683	94.6%	$585,883	226	2.5%	$62,277	62	0.7%	$23,514	8,971	97.7%	$671,674
Knightdale	7,144	6,674	93.4%	$463,148	265	3.7%	$37,022	67	0.9%	$30,882	7,006	98.1%	$531,052
Morrisville	5,181	4,779	92.2%	$514,220	340	6.6%	$307,695	48	0.9%	$15,502	5,167	99.7%	$837,417
Rolesville	2,103	1,968	93.6%	$230,741	91	4.3%	$8,544	29	1.4%	$5,028	2,088	99.3%	$244,312
Wake Forest	10,547	9,772	92.7%	$911,444	541	5.1%	$133,986	151	1.4%	$44,521	10,464	99.2%	$1,089,951
Wendell	3,728	3,270	87.7%	$183,760	277	7.4%	$24,193	73	2%	$12,908	3,620	97.1%	$220,861
Zebulon	3,074	2,675	87%	$162,367	316	10.3%	$55,095	79	2.6%	$13,139	3,070	99.9%	$230,601
Unincorporated Wake County	59,372	55,162	92.9%	$5,066,679	3,122	5.3%	$536,300	402	0.7%	$98,562	58,686	98.8%	$5,701,541
Total	**310,482**	**288,830**	**93%**	**$29,830,034**	**15,315**	**4.9%**	**$4,872,727**	**4,104**	**1.3%**	**$2,486,061**	**308,249**	**99.3%**	**$37,188,820**

Source: NCEM Risk Management Tool

Table 4.50 – Estimated Buildings Impacted by 50-Year Hurricane Wind Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$49,910,371	6,345	5%	$9,753,440	2,272	1.8%	$8,826,046	128,056	100%	$68,489,856
Apex	14,554	13,758	94.5%	$5,146,914	648	4.5%	$344,580	148	1%	$123,314	14,554	100%	$5,614,808
Cary	45,306	42,944	94.8%	$20,437,014	1,872	4.1%	$3,555,396	462	1%	$751,377	45,278	99.9%	$24,743,787
Fuquay-Varina	10,244	9,524	93%	$3,022,976	585	5.7%	$386,422	130	1.3%	$135,271	10,239	100%	$3,544,669
Garner	11,975	11,103	92.7%	$2,916,521	687	5.7%	$388,516	181	1.5%	$110,169	11,971	100%	$3,415,206
Holly Springs	9,178	8,887	96.8%	$2,685,332	226	2.5%	$252,814	62	0.7%	$66,210	9,175	100%	$3,004,356
Knightdale	7,144	6,811	95.3%	$1,751,201	265	3.7%	$140,602	67	0.9%	$117,162	7,143	100%	$2,008,965
Morrisville	5,181	4,793	92.5%	$2,103,855	340	6.6%	$1,022,575	48	0.9%	$61,450	5,181	100%	$3,187,880
Rolesville	2,103	1,983	94.3%	$813,404	91	4.3%	$31,923	29	1.4%	$12,881	2,103	100%	$858,207
Wake Forest	10,547	9,852	93.4%	$3,977,196	541	5.1%	$549,214	151	1.4%	$160,595	10,544	100%	$4,687,005
Wendell	3,728	3,378	90.6%	$756,442	277	7.4%	$76,005	73	2%	$47,616	3,728	100%	$880,063
Zebulon	3,074	2,677	87.1%	$635,555	316	10.3%	$212,876	79	2.6%	$46,950	3,072	99.9%	$895,382
Unincorporated Wake County	59,372	55,779	93.9%	$20,496,296	3,122	5.3%	$2,522,217	402	0.7%	$360,569	59,303	99.9%	$23,379,082
Total	**310,482**	**290,928**	**93.7%**	**$114,653,077**	**15,315**	**4.9%**	**$19,236,580**	**4,104**	**1.3%**	**$10,819,610**	**310,347**	**100%**	**$144,709,266**

Source: NCEM Risk Management Tool

Table 4.51 – Estimated Buildings Impacted by 100-Year Hurricane Wind Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$128,715,805	6,345	5%	$33,214,120	2,272	1.8%	$30,447,640	128,056	100%	$192,377,565
Apex	14,554	13,758	94.5%	$13,173,617	648	4.5%	$1,193,921	148	1%	$480,982	14,554	100%	$14,848,520
Cary	45,306	42,944	94.8%	$51,345,150	1,872	4.1%	$12,594,032	462	1%	$2,727,029	45,278	99.9%	$66,666,211
Fuquay-Varina	10,244	9,524	93%	$7,596,640	585	5.7%	$1,479,181	130	1.3%	$499,228	10,239	100%	$9,575,049
Garner	11,975	11,103	92.7%	$7,781,221	687	5.7%	$1,425,997	181	1.5%	$412,885	11,971	100%	$9,620,103
Holly Springs	9,178	8,887	96.8%	$7,024,984	226	2.5%	$957,182	62	0.7%	$216,917	9,175	100%	$8,199,083
Knightdale	7,144	6,811	95.3%	$4,524,674	265	3.7%	$516,869	67	0.9%	$417,503	7,143	100%	$5,459,045
Morrisville	5,181	4,793	92.5%	$5,766,554	340	6.6%	$2,981,303	48	0.9%	$228,286	5,181	100%	$8,976,143
Rolesville	2,103	1,983	94.3%	$1,980,105	91	4.3%	$102,001	29	1.4%	$35,562	2,103	100%	$2,117,667
Wake Forest	10,547	9,852	93.4%	$10,566,637	541	5.1%	$1,802,458	151	1.4%	$530,608	10,544	100%	$12,899,702
Wendell	3,728	3,378	90.6%	$2,000,680	277	7.4%	$257,441	73	2%	$175,742	3,728	100%	$2,433,862
Zebulon	3,074	2,677	87.1%	$1,603,959	316	10.3%	$836,776	79	2.6%	$195,890	3,072	99.9%	$2,636,625
Unincorporated Wake County	59,372	55,779	93.9%	$52,237,409	3,122	5.3%	$9,197,403	402	0.7%	$1,266,942	59,303	99.9%	$62,701,753
Total	**310,482**	**290,928**	**93.7%**	**$294,317,435**	**15,315**	**4.9%**	**$66,558,684**	**4,104**	**1.3%**	**$37,635,214**	**310,347**	**100%**	**$398,511,328**

Source: NCEM Risk Management Tool

Table 4.52 – Estimated Buildings Impacted by 300-Year Hurricane Wind Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$525,488,756	6,345	5%	$151,196,161	2,272	1.8%	$136,567,702	128,056	100%	$813,252,620
Apex	14,554	13,758	94.5%	$40,034,120	648	4.5%	$4,033,293	148	1%	$1,621,622	14,554	100%	$45,689,036
Cary	45,306	42,944	94.8%	$196,048,226	1,872	4.1%	$36,098,632	462	1%	$10,263,618	45,278	99.9%	$242,410,477
Fuquay-Varina	10,244	9,524	93%	$60,085,421	585	5.7%	$15,693,569	130	1.3%	$5,402,472	10,239	100%	$81,181,462
Garner	11,975	11,103	92.7%	$53,264,329	687	5.7%	$12,113,648	181	1.5%	$4,034,805	11,971	100%	$69,412,782
Holly Springs	9,178	8,887	96.8%	$63,367,358	226	2.5%	$7,258,465	62	0.7%	$2,270,227	9,175	100%	$72,896,050
Knightdale	7,144	6,811	95.3%	$33,099,261	265	3.7%	$4,220,584	67	0.9%	$3,013,398	7,143	100%	$40,333,242
Morrisville	5,181	4,793	92.5%	$15,973,924	340	6.6%	$8,206,253	48	0.9%	$694,380	5,181	100%	$24,874,557
Rolesville	2,103	1,983	94.3%	$4,909,682	91	4.3%	$263,350	29	1.4%	$96,399	2,103	100%	$5,269,432
Wake Forest	10,547	9,852	93.4%	$25,792,988	541	5.1%	$4,674,382	151	1.4%	$1,555,115	10,544	100%	$32,022,485
Wendell	3,728	3,378	90.6%	$12,979,785	277	7.4%	$2,415,799	73	2%	$1,545,144	3,728	100%	$16,940,728
Zebulon	3,074	2,677	87.1%	$10,285,587	316	10.3%	$9,266,489	79	2.6%	$3,452,372	3,072	99.9%	$23,004,448
Unincorporated Wake County	59,372	55,779	93.9%	$259,574,432	3,122	5.3%	$28,290,555	402	0.7%	$10,439,543	59,303	99.9%	$298,304,530
Total	**310,482**	**290,928**	**93.7%**	**$1,300,903,869**	**15,315**	**4.9%**	**$283,731,180**	**4,104**	**1.3%**	**$180,956,797**	**310,347**	**100%**	**$1,765,591,849**

Source: NCEM Risk Management Tool

Table 4.53 – Estimated Buildings Impacted by 700-Year Hurricane Wind Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$1,263,887,853	6,345	5%	$302,507,103	2,272	1.8%	$184,538,126	128,056	100%	$1,750,933,082
Apex	14,554	13,758	94.5%	$131,328,593	648	4.5%	$9,412,786	148	1%	$4,606,351	14,554	100%	$145,347,729
Cary	45,306	42,944	94.8%	$529,858,025	1,872	4.1%	$81,374,716	462	1%	$24,422,300	45,278	99.9%	$635,655,041
Fuquay-Varina	10,244	9,524	93%	$169,833,216	585	5.7%	$43,225,463	130	1.3%	$15,085,781	10,239	100%	$228,144,460
Garner	11,975	11,103	92.7%	$152,591,639	687	5.7%	$30,688,285	181	1.5%	$11,073,419	11,971	100%	$194,353,344
Holly Springs	9,178	8,887	96.8%	$193,255,397	226	2.5%	$16,949,835	62	0.7%	$6,633,352	9,175	100%	$216,838,584
Knightdale	7,144	6,811	95.3%	$91,684,078	265	3.7%	$10,852,401	67	0.9%	$7,084,666	7,143	100%	$109,621,144
Morrisville	5,181	4,793	92.5%	$51,258,144	340	6.6%	$24,297,787	48	0.9%	$1,996,181	5,181	100%	$77,552,112
Rolesville	2,103	1,983	94.3%	$14,021,628	91	4.3%	$659,838	29	1.4%	$267,483	2,103	100%	$14,948,949
Wake Forest	10,547	9,852	93.4%	$76,829,477	541	5.1%	$12,352,008	151	1.4%	$4,748,661	10,544	100%	$93,930,146
Wendell	3,728	3,378	90.6%	$35,555,601	277	7.4%	$6,593,918	73	2%	$3,964,687	3,728	100%	$46,114,207
Zebulon	3,074	2,677	87.1%	$27,885,173	316	10.3%	$25,517,971	79	2.6%	$10,420,744	3,072	99.9%	$63,823,888
Unincorporated Wake County	59,372	55,779	93.9%	$704,602,902	3,122	5.3%	$64,696,088	402	0.7%	$26,367,559	59,303	99.9%	$795,666,549
Total	**310,482**	**290,928**	**93.7%**	**$3,442,591,726**	**15,315**	**4.9%**	**$629,128,199**	**4,104**	**1.3%**	**$301,209,310**	**310,347**	**100%**	**$4,372,929,235**

Source: NCEM Risk Management Tool

Environment

Aquatic species within the lake will either be displaced or destroyed. The velocity of the flood wave will likely destroy riparian and instream vegetation and destroy wetland function. The flood wave will like cause erosion within and adjacent to the stream. Deposition of eroded deposits may choke instream habitat or disrupt riparian areas. Sediments within the lake bottom and any low oxygen water from within the lake will be dispersed, potentially causing fish kills or releasing heavy metals found in the lake sediment layers.

Consequence Analysis

Table 4.54 summarizes the potential negative consequences of hurricanes and tropical storms.

Table 4.54 – Consequence Analysis – Hurricane and Tropical Storm

Category	Consequences
Public	Impacts include injury or death, loss of property, outbreak of diseases, mental trauma and loss of livelihoods. Power outages and flooding are likely to displace people from their homes. Water can become polluted such that if consumed, diseases and infection can be easily spread. Residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication systems may be damaged or destroyed, resulting in cascading impacts on the public.
Responders	Localized impact expected to limit damage to personnel in the inundation area at the time of the incident.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel from flooding or wind may require temporary relocation of some operations. Operations may be interrupted by power outages. Disruption of roads and/or utilities may postpone delivery of some services. Regulatory waivers may be needed locally. Fulfillment of some contracts may be difficult. Impact may reduce deliveries.
Property, Facilities and Infrastructure	Structural damage to buildings may occur; loss of glass windows and doors by high winds and debris; loss of roof coverings, partial wall collapses, and other damages requiring significant repairs are possible in a major (category 3 to 5) hurricane.
Environment	Hurricanes can devastate wooded ecosystems and remove all the foliation from forest canopies, and they can change habitats so drastically that the indigenous animal populations suffer as a result. Specific foods can be taken away as high winds will often strip fruits, seeds and berries from bushes and trees. Secondary impacts may occur; for example, high winds and debris may result in damage to an above-ground fuel tank, resulting in a significant chemical spill.
Economic Condition of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damages. Intangible impacts also likely, including business interruption and additional living expenses.
Public Confidence in the Jurisdiction's Governance	Likely to impact public confidence due to possibility of major event requiring substantial response and long-term recovery effort.

Hazard Summary by Jurisdiction

The following table summarizes hurricane and tropical storm hazard risk by jurisdiction. Most aspects of hurricane risk do not vary substantially by jurisdiction; however, impacts may be greater in more highly developed areas with greater amounts of impervious surface and higher exposure in terms of both property and population density. Additionally, mobile home units are more vulnerable to wind damage. While mobile home units do not comprise a significant proportion of any jurisdictions housing mix, Wake

County, Apex, Cary, and Raleigh each have over 250 mobile home units in their jurisdiction and therefore may face more severe impacts from wind.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	3	4	4	1	2	3.2	H
Apex	3	4	4	1	2	3.2	H
Cary	3	4	4	1	2	3.2	H
Fuquay-Varina	3	3	4	1	2	2.9	H
Garner	3	3	4	1	2	2.9	H
Holly Springs	3	3	4	1	2	2.9	H
Knightdale	3	3	4	1	2	2.9	H
Morrisville	3	4	4	1	2	3.2	H
Raleigh	3	4	4	1	2	3.2	H
Rolesville	3	3	4	1	2	2.9	H
Wake Forest	3	3	4	1	2	2.9	H
Wendell	3	3	4	1	2	2.9	H
Zebulon	3	3	4	1	2	2.9	H

4.5.8 Severe Weather (Thunderstorm Winds, Lightning & Hail)

Hazard Background

Thunderstorm Winds

Thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of greater than 35,000 ft. As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at earth's surface and causes strong winds associated with thunderstorms.

There are four ways in which thunderstorms can organize: single cell, multi-cell cluster, multi-cell lines (squall lines), and supercells. Even though supercell thunderstorms are most frequently associated with severe weather phenomena, thunderstorms most frequently organize into clusters or lines. Warm, humid conditions are favorable for the development of thunderstorms. The average single cell thunderstorm is approximately 15 miles in diameter and lasts less than 30 minutes at a single location. However, thunderstorms, especially when organized into clusters or lines, can travel intact for distances exceeding 600 miles.

Thunderstorms are responsible for the development and formation of many severe weather phenomena, posing great hazards to the population and landscape. Damage that results from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy precipitation. Stronger thunderstorms are capable of producing tornadoes and waterspouts. While conditions for thunderstorm conditions may be anticipated within a few hours, severe conditions are difficult to predict. Regardless of severity, storms generally pass within a few hours.

Warning Time: 4 – Less than six hours

Duration: 1 – Less than six hours

Lightning

Lightning is a sudden electrical discharge released from the atmosphere that follows a course from cloud to ground, cloud to cloud, or cloud to surrounding air, with light illuminating its path. Lightning's unpredictable nature causes it to be one of the most feared weather elements.

All thunderstorms produce lightning, which often strikes outside of the area where it is raining and is known to fall more than 10 miles away from the rainfall area. When lightning strikes, electricity shoots through the air and causes vibrations creating the sound of thunder. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Nationwide, lightning kills 75 to 100 people each year. Lightning strikes can also start building fires and wildland fires, and damage electrical systems and equipment.

The watch/warning time for a given storm is usually a few hours. There is no warning time for any given lightning strike. Lightning strikes are instantaneous. Storms that cause lightning usually pass within a few hours.

Warning Time: 4 – minimal or no warning time (less than 6 hours warning)

Duration: 1 – less than six hours

Hail

According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere causing them to freeze. The raindrops form into small frozen droplets and then continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain droplet. This frozen rain droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow.

At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 mph, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 mph. The largest hailstone recorded in the United States was found in Vivian, South Dakota on July 23, 2010; it measured eight inches in diameter, almost the size of a soccer ball. While soccer-ball-sized hail is the exception, but even small pea sized hail can do damage.

Hailstorms in North Carolina cause damage to property, crops, and the environment, and kill and injure livestock. In the United States, hail causes more than $1 billion in damage to property and crops each year. Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail. Hail has been known to cause injury to humans; occasionally, these injuries can be fatal.

The onset of thunderstorms with hail is generally rapid. However, advancements in meteorological forecasting allow for some warning. Storms usually pass in a few hours.

Warning Time: 4 – Less than 6 hours

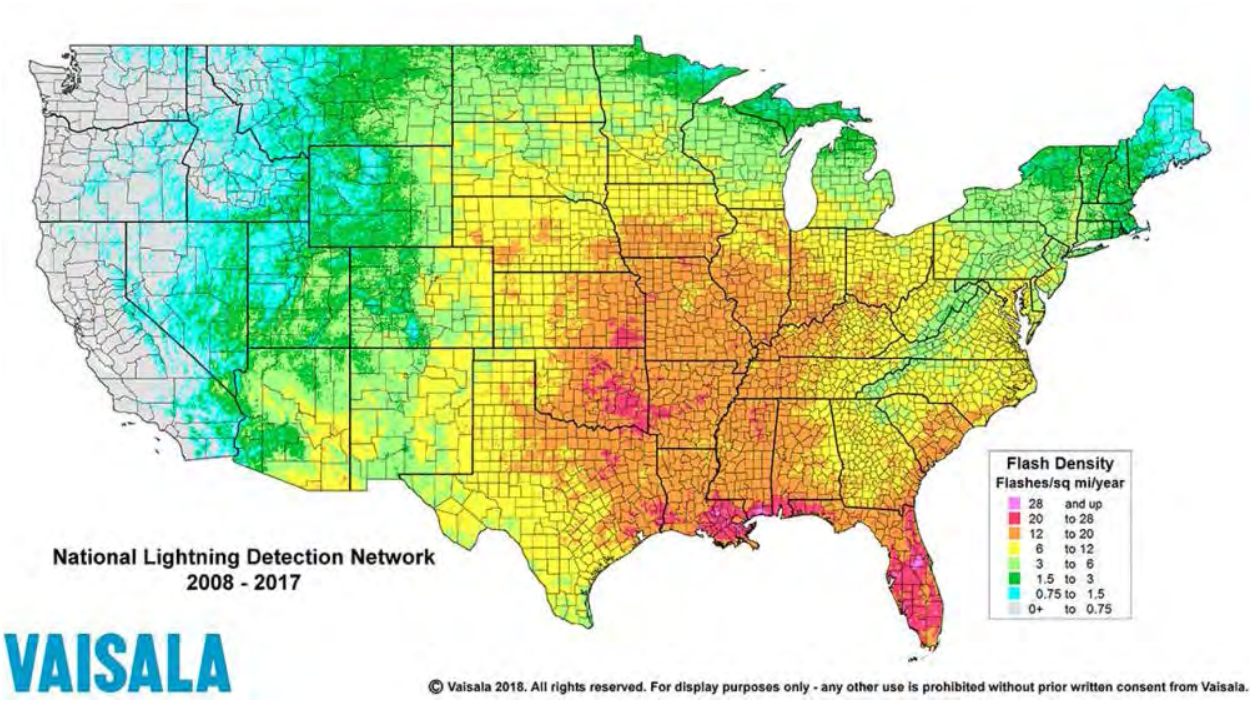
Duration: 1 – Less than 6 hours

Location

Thunderstorm wind, lightning, and hail events do not have a defined vulnerability zone. The scope of lightning and hail is generally defined to the footprint of its associated thunderstorm. The entirety of Wake County shares equal risk to the threat of severe weather.

According to the Vaisala flash density map, shown in Figure 4.17, the majority of Wake County is located in an area that experiences 6 to 12 lightning flashes per square mile per year. It should be noted that future lightning occurrences may exceed these figures.

Figure 4.17 – Lightning Flash Density (2008-2017)



Source: Vaisala

Extent

Thunderstorm Winds

The magnitude of a thunderstorm event can be defined by the storm's maximum wind speed and its impacts. NCEI divides wind events into several types including High Wind, Strong Wind, Thunderstorm Wind, Tornado and Hurricane. For this severe weather risk assessment, High Wind, Strong Wind and Thunderstorm Wind data was collected. Hurricane Wind and Tornadoes are addressed as individual hazards. The following definitions come from the NCEI Storm Data Preparation document.

- **High Wind** – Sustained non-convective winds of 40mph or greater lasting for one hour or longer or winds (sustained or gusts) of 58 mph for any duration on a widespread or localized basis.
- **Strong Wind** – Non-convective winds gusting less than 58 mph, or sustained winds less than 40 mph, resulting in a fatality, injury, or damage.
- **Thunderstorm Wind** – Winds, arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 58 mph, or winds of any speed (non-severe thunderstorm winds below 58 mph) producing a fatality, injury or damage.

The strongest recorded thunderstorm wind event in the county occurred on January 11, 2014 with a measured gust of 86 mph at Raleigh-Durham International Airport and estimated gusts of 75 mph elsewhere across the county. The event caused one fatality, four injuries, and an estimated $1.35 million in property damage.

Impact: 2 – Limited

Spatial Extent: 4 – Large

Lightning

Lightning is measured by the Lightning Activity Level (LAL) scale, created by the National Weather Service to define lightning activity into a specific categorical scale. The LAL is a common parameter that is part of fire weather forecasts nationwide.

Table 4.55 – Lightning Activity Level Scale

Lightning Activity Level Scale	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground lightning strikes in a five minute period
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five minute period
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a five minute period
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five minute period
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag warning

Source: National Weather Service

With the right conditions in place, the entire county is susceptible to each lightning activity level as defined by the LAL. Most lightning strikes cause limited damage to specific structures in a limited area, and cause very few injuries or fatalities, and minimal disruption on quality of life.

Impact: 1 – Minor

While the total area vulnerable to a lightning strike corresponds to the footprint of a given thunderstorm, a specific lightning strike is usually a localized event and occurs randomly. It should be noted that while lightning is most often affiliated with severe thunderstorms, it may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall. All of Wake County is uniformly exposed to the threat of lightning.

Spatial Extent: 1 – Negligible

Hail

The National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4.56 indicates the hailstone measurements utilized by the National Weather Service.

Table 4.56 – Hailstone Measurement Comparison Chart

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf ball
2.0 inch	Hen egg
2.5 inch	Tennis ball
2.75 inch	Baseball

Average Diameter	Corresponding Household Object
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

The Tornado and Storm Research Organization (TORRO) has further described hail sizes by their typical damage impacts. Table 4.57 describes typical intensity and damage impacts of the various sizes of hail.

Table 4.57 – Tornado and Storm Research Organization Hailstorm Intensity Scale

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5-9	0.2-0.4	Pea	No damage
Potentially Damaging	10-15	0.4-0.6	Mothball	Slight general damage to plants, crops
Significant	16-20	0.6-0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	21-30	0.8-1.2	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
Severe	31-40	1.2-1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	41-50	1.6-2.0	Golf ball > Pullet's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
Destructive	51-60	2.0-2.4	Hen's egg	Bodywork of grounded aircraft dented, brick walls pitted
Destructive	61-75	2.4-3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	76-90	3.0-3.5	Large orange > softball	Severe damage to aircraft bodywork
Super Hailstorms	91-100	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University
Notes: In addition to hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity.

The average hailstone size recorded between 1998 and 2017 in Wake County was a little over 1" in diameter; the largest hailstone recorded was 2.75", recorded on September 1, 2017. This storm resulted in a recorded $10 million in property damage per NCEI. The largest hailstone ever recorded in the U.S. fell in Vivian, SD on June 23, 2010, with a diameter of 8 inches and a circumference of 18.62 inches.

Impact: 1 – Minor

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. Wake County is uniformly exposed to severe thunderstorms; therefore, the entire planning area is equally exposed to hail which may be produced by such storms. However, large-scale hail tends to occur in a more localized area within the storm.

Spatial Extent: 2 – Small

Historical Occurrences

Thunderstorm Winds

Between January 1, 1998 and December 31, 2017, the NCEI recorded 324 separate incidents of thunderstorm winds, occurring on 172 separate days. These events caused $2,956,000 in recorded

property damage, 12 injuries and 1 fatality. The recorded gusts averaged 58.7 mph, with the highest gusts recorded at 86 mph. Gusts of 86 mph were recorded six times in the county, all during a storm on January 11, 2014. Of these events, 73 caused property damage. Wind gusts with property damage recorded averaged $40,500 in damage, with two gusts causing a reported $1,000,000 in damage each (in Wilbon on January 11, 2014 and in Morrisville on June 13, 2013). These incidents are recorded below:

Table 4.58 – Recorded Thunderstorm Winds with Property Damages in Wake County, 1998-2017

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Fuquay Spgs	4/19/1998	1835	58	0	0	$25,000
Bayleaf	8/15/2008	1512	58	0	0	$15,000
Wilders Grove	7/1/2009	2246	58	0	0	$2,000
Raleigh	7/1/2009	2246	58	0	0	$1,000
Holly Spgs	7/31/2009	1250	58	0	0	$100,000
Knightdale	6/13/2010	1640	58	0	0	$1,000
Millbrook	7/29/2010	2135	58	0	0	$1,000
Zebulon	11/17/2010	35	58	0	0	$7,000
Royal Mills	3/23/2011	1907	58	0	0	$20,000
Apex	4/5/2011	300	58	0	0	$30,000
Asbury	5/9/2012	1523	58	0	0	$2,000
Purnell	6/29/2012	2208	58	0	0	$5,000
Barham	7/1/2012	1410	58	0	0	$1,000
Millbrook	7/3/2012	1915	58	0	0	$2,000
Banks	7/3/2012	2007	58	0	0	$2,000
Raleigh	7/4/2012	1530	58	0	0	$1,000
College View	7/4/2012	1612	58	0	0	$5,000
Wilders Grove	7/5/2012	1440	58	0	0	$3,000
Macedonia	7/5/2012	1454	58	0	0	$2,000
Eagle Rock	7/5/2012	1506	58	0	0	$3,000
Apex	7/6/2012	1635	58	0	0	$2,000
Varina	7/9/2012	1351	58	0	0	$500
Holly Spgs	7/9/2012	1435	58	0	0	$3,000
Apex	7/24/2012	1433	58	0	0	$7,000
Raleigh	7/24/2012	1449	58	0	0	$10,000
Echo Hgts	7/24/2012	1449	58	0	0	$2,000
Auburn	7/24/2012	1451	58	0	0	$2,000
Method	7/24/2012	1455	58	0	0	$5,000
Bayleaf	8/8/2012	1759	58	0	0	$750
Green Level	4/19/2013	1735	58	0	0	$7,000
Morrisville	6/13/2013	1630	70	0	0	$1,000,000
Brentwood	7/24/2013	1640	58	0	0	$2,000
Macedonia	8/10/2013	1615	58	0	0	$5,000
Wilbon	1/11/2014	1352	86	0	0	$1,000,000
(Rdu)Raleigh-Durham	1/11/2014	1403	86	0	0	$350,000

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
(Rdu)Raleigh-Durham	6/11/2014	1615	58	0	0	$5,000
Purnell	6/19/2014	1645	58	0	0	$500
Apex	7/15/2014	1610	58	0	0	$1,000
Apex	7/15/2014	1618	58	0	0	$500
Leesville	8/12/2014	1816	58	0	0	$2,000
Macedonia	8/18/2014	1850	58	0	0	$1,000
(Rdu)Raleigh-Durham	8/20/2014	1655	58	0	0	$25,000
Garner	8/20/2014	1757	58	0	0	$2,000
Garner	8/20/2014	1800	58	0	0	$10,000
Cary	6/17/2015	2123	58	0	0	$15,000
Pet Xrds	6/20/2015	1950	58	0	0	$20,000
Pet Xrds	6/20/2015	1950	58	0	0	$20,000
Williams Xrds	6/26/2015	1500	58	0	0	$1,000
Auburn	7/13/2015	629	58	0	0	$5,000
Mc Cullers	7/13/2015	630	58	0	0	$2,000
Morrisville	7/21/2015	1815	58	0	0	$1,000
College View	2/16/2016	604	58	0	0	$15,000
Starmount	2/24/2016	1746	58	0	0	$50,000
Fuquay Spgs	3/14/2016	1358	58	0	0	$5,000
Macedonia	4/28/2016	1638	58	0	0	$10,000
Lassiter	4/28/2016	1730	58	0	0	$1,000
Lassiter	5/2/2016	1605	58	0	0	$2,500
Caraleigh	6/4/2016	1840	58	0	0	$1,500
(Rdu)Raleigh-Durham	6/5/2016	1815	59	0	0	$2,500
Rockton	6/23/2016	0	58	0	0	$2,500
Bonsal	6/29/2016	1815	58	0	0	$2,000
Raleigh	6/29/2016	1909	58	0	0	$1,500
Knightdale	7/19/2016	2140	58	0	0	$2,500
Wilders Grove	9/30/2016	911	58	0	0	$5,000
Brookhaven	5/11/2017	2039	58	0	0	$75,000
Varina	6/16/2017	1820	58	0	0	$500
Raleigh	6/16/2017	1857	58	0	0	$10,000
Wendell Arpt	7/8/2017	1812	58	0	0	$2,000
Millbrook	7/13/2017	1830	58	0	0	$10,000
Fuquay Spgs	7/16/2017	1628	58	0	0	$500
Leesville	7/23/2017	1720	58	0	0	$8,000
Lassiter	8/23/2017	1453	58	0	0	$10,000
Brookhaven	9/1/2017	1721	58	0	0	$4,000
Total				**0**	**0**	**$2,956,250**

Source: NCEI

In addition to recorded thunderstorm wind events, NCEI reports 17 high wind and strong wind events during this same period that caused $1,093,000 in property damage. Of all 341 wind events during this period, there were 5 incidents that directly caused deaths or injuries. These incidents are recorded below:

Table 4.59 – Recorded Wind Events with Injuries and/or Fatalities, 1998-2017

Location	Event Type	Date	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Raleigh	Thunderstorm Wind	8/21/2007	50	0	8	$0
Neuse	Thunderstorm Wind	1/11/2014	86	1	2	$0
Forestville	Thunderstorm Wind	1/11/2014	86	0	1	$0
Brookhaven	Thunderstorm Wind	1/11/2014	86	0	1	$0
Wake (Zone)	Strong Wind	10/8/2016	39	1	0	$500,000
			Total	**2**	**12**	**$500,000**

Source: NCEI

Lightning

According to NCEI data, there were 33 lightning strikes reported between 1998 and 2017. Of these, 26 recorded property damage totaling over $2.4 million and three directly caused fatalities. Event narratives indicate in some cases that property damage occurred but was not estimated; therefore, actual property damage amounts are higher. No injuries or crop damage was recorded by these strikes. It should be noted that lightning events recorded by the NCEI are only those that are reported; it is certain that additional lightning incidents have occurred in Wake County. Table 4.60 details NCEI-recorded lightning strikes from 1998 through 2017.

Table 4.60 – Recorded Lightning Strikes in Wake County, 1998-2017

Location	Date	Time	Fatalities	Injuries	Property Damage
Wake Forest	1/16/1998	1900	0	0	$35,000
Cary	5/3/1998	1650	0	0	$50,000
Falls	7/24/1999	1515	1	0	$0
Cary	9/3/2000	1820	0	0	$0
Fuquay Springs	6/22/2001	1614	0	0	$0
Wendell	8/22/2003	1405	0	0	$450,000
Cary	3/7/2005	1240	0	0	$20,000
Knightdale	7/13/2005	2342	1	0	$0
Raleigh	4/3/2006	900	0	0	$0
Raleigh	4/22/2006	1200	0	0	$0
Raleigh	8/15/2008	1500	0	0	$200,000
Forestville	7/1/2009	2215	0	0	$5,000
Holly Springs	6/2/2010	1420	0	0	$1,000,000
Willow	6/2/2010	1440	0	0	$25,000
Upchurch	6/15/2010	1810	0	0	$50,000
Upchurch	6/22/2010	1815	0	0	$125,000
Macedonia	7/16/2010	1944	0	0	$10,000
Knightdale	7/17/2010	1200	0	0	$10,000
Wilders Grove	7/17/2010	1308	0	0	$10,000

Location	Date	Time	Fatalities	Injuries	Property Damage
Leesville	7/20/2010	1757	0	0	$15,000
Falls	7/20/2010	1830	0	0	$10,000
Apex	7/27/2010	1146	0	0	$5,000
Six Forks	7/29/2010	2120	0	0	$2,000
Holly Springs	7/29/2010	2245	0	0	$300,000
Cary	2/28/2011	1910	0	0	$5,000
Cary	2/28/2011	1910	0	0	$5,000
Cary	7/24/2011	1425	0	0	$15,000
Wyatt	5/9/2012	1545	0	0	$5,000
Morrisville	7/6/2012	1600	0	0	$5,000
Upchurch	7/6/2012	1625	0	0	$5,000
Varina	2/19/2014	500	0	0	$30,000
Macedonia	4/9/2015	1915	1	0	$0
Auburn	7/13/2015	640	0	0	$25,000
		Total	**3**	**0**	**$2,417,000**

Source: NCEI

The following are a selection of narrative descriptions recorded in NCEI for lightning events that occurred in Wake County:

July 24, 1999 – A 24-year-old male was stepping from a boat to a dock when he was struck by lightning; he never regained consciousness and died the next day.

July 13, 2005 – A smoldering tree which had been struck by lightning a few hours earlier fell, killing a firefighter.

April 9, 2015 – A 28-year-old male was struck and killed by lightning in the parking lot of a shopping center.

Twenty of the 27 incidents recorded by the NCEI included property damage, which was mostly recorded as fire damage ignited by lightning. The highest rate of property damage recorded for a single incident was $1,000,000.

Hail

NCEI records 270 separate hail incidents across 140 days between January 1, 1998 and December 31, 2017 in Wake County. Of these, two events were reported to have caused property damage and none caused death, injury or crop damage. The largest diameter hail recorded in the County was in Raleigh on March 28, 2005; the average hail size in all storms was a little over one inch in diameter.

Table 4.61 – Summary of Hail Occurrences by Jurisdiction

Location	Number of Occurrences	Average Hail Diameter
Apex	10	1.038”
Cary	15	.92”
Fuquay-Varina	13	1.13”
Garner	13	1.14”
Holly Springs	8	.92”
Knightdale	7	.96”

Morrisville	6	.92”
Raleigh	42	1.1”
Rolesville	5	1.076”
Wake Forest	6	1.21”
Wendell	4	.75”
Zebulon	4	1.03”
Unincorporated Wake County	76	1.04”

The following narratives provide detail on select hailstorms from the above list of NCEI recorded events:

June 15, 1998 – Dime size hail fell in north Raleigh. This storm also produced very heavy rain and frequent lightning across much of northern Wake county from near the RDU Airport to Falls Lake and north Raleigh.

July 10, 2003 – Tobacco fields were damaged by large hail.

March 28, 2005 – 3.5 to 4 inch elongated hail reported at I-540 and Falls of Neuse Road. 3 inch hail reported at Strickland and Falls of Neuse Roads. 2 inch hail reported in Five Points. Golf ball sized hail reported at Cameron Village, Atlantic and New Hope Church Roads, North Raleigh Community Hospital, Green and Lee Spring Roads, and Durant and Falls of Neuse Roads. Ping pong ball sized hail reported on Wake Forest Road. Quarter to half dollar sized hail reported on Highwoods Road.

April 15, 2007 – Quarter size hail reported between Angier and Fuquay-Varina.

July 1, 2012 – A lee side surface trough interacted with a very unstable atmosphere and produced clusters of showers and thunderstorms. Some of these storms became severe and produce large hail and damaging winds across all of central North Carolina.

September 1, 2017 – The remnants of Harvey increased the southwesterly flow over Central North Carolina as it moved northeastward through Tennessee and Kentucky. In the wake of the northward moving warm front, a cold front moved into and stalled over Central North Carolina providing lift in the strongly sheared, moist environment. The resulting thunderstorms became severe, producing damaging wind gusts, large hail and flash flooding.

Probability of Future Occurrence

Based on historical occurrences recorded by NCEI for the 20-year period from 1998 through 2017, Wake County averages 16.2 thunderstorm wind events per year. Over this same period, 33 lightning events were reported as having caused death, injury, or property damage, which equates to an average of 1.65 damaging lightning strikes per year.

The average hail storm in Wake County occurs in late afternoon and has a hail stone with a diameter of an inch. Over the 20-year period from 1998 through 2017, Wake County experienced 207 reported hail incidents; this averages over ten reported incidents per year somewhere in the planning area, or a 100% chance that the County will experience a hail incident each year.

Based on these historical occurrences, there is a 100% chance that the County will experience severe weather each year. The probability of a damaging impacts is highly likely.

Probability: 4 – Highly Likely

Climate Change

According to the National Aeronautics and Space Administration (NASA), thunderstorm events in the future are likely to become more frequent in the southeast as a result of weather extremes. Thunderstorm

potential is measured by an index that NASA created called the Convective Available Potential Energy (CAPE) index. This measures how warm and moist the air is, which is a major contributing factor in thunderstorm/tornado formation. NASA projects that by the period of 2072-2099, the CAPE in the southeastern United States will increase dramatically. Parts of North Carolina are in an area that will likely experience the greatest increase in CAPE in the United States and all of the state is likely to experience at least some increase. This indicates that there will potentially be even more frequent thunderstorms in the state going forward.

Vulnerability Assessment

Methodologies and Assumptions

Population and property at risk to wind events was estimated using data from the North Carolina Emergency Management (NCEM) IRISK database, which was compiled in NCEM's Risk Management Tool.

People

People and populations exposed to the elements are most vulnerable to severe weather. A common hazard associated with wind events is falling trees and branches. Risk of being struck by lightning is greater in open areas, at higher elevations, and on the water.

Lightning can also cause cascading hazards, including power loss. Loss of power could critically impact those relying on energy to service, including those that need powered medical devices. Additionally, the ignition of fires is always a concern with lightning strikes.

The availability of sheltered locations such as basements, buildings constructed using hail-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. Residents living in mobile homes are more vulnerable to hail events due to the lack of shelter locations and the vulnerability of the housing unit to damages. According to the 2017 American Community Survey (ACS) 5-Year Estimates, 12,321 occupied housing units (3.2 percent) in Wake County are classified as "mobile homes or other types of housing." Using the 2017 ACS persons per household estimate of 2.62, the population at risk due to their housing type was estimated at 32,281 residents. Individual who work outdoors may also face increased risk.

Since 1998, the NCEI records three fatalities and no injuries attributed to lightning in Wake County. NCEI records 2 fatalities and 12 injuries attributed to wind events in Wake County. There are no injuries or fatalities attributed to hail.

Property

Property damage caused by lightning usually occurs in one of two ways – either by direct damages through fires ignited by lightning, or by secondary impacts due to power loss. According to data collected on lightning strikes in Wake County, the vast majority of recorded property damage was due to structure fires.

NCEI records lightning impacts over 17 years (1998-2015), with $2,417,000 in property damage recorded (no incidents were recorded in 2016, 2017, or 2018). Historically, this has resulted in $142,176 in property impacts annually in Wake County. The average impact from lightning per incident in Wake County is $73,242.

General damages to property from hail are direct, including destroyed windows, dented cars, and building, roof and siding damage in areas exposed to hail. Hail can also cause enough damage to cars to cause them to be totaled. The level of damage is commensurate with both a material's ability to withstand hail impacts, and the size of the hailstones that are falling. Construction practices and building codes can help

maximize the resistance of the structures to damage. Large amounts of hail may need to be physically cleared from roadways and sidewalks, depending on accumulation. Hail can cause other cascading impacts, including power loss.

During a 20-year span between January 1, 1998 and December 31, 2017 in Wake County, NCEI reported $10 million in property damage as a direct result of hail. This averages to $50,000 per year in reported damages due to hail, though it should be noted that the $10 million in recorded damage was all due to one storm.

According to a National Insurance Crime Bureau (NICB) study of insurance claims from the Insurance Services Office (ISO) ClaimSearch database, between 2014 and 2016, North Carolina saw 45,274 separate hail damage claims.

It should be noted that property damage due to hail is usually insured loss, with damages covered under most major comprehensive insurance plans. Because of this, hail losses are notoriously underreported by the NCEI. It is difficult to find an accurate repository of hail damages in Wake County, thus the NCEI is still used to form a baseline.

When strong enough, wind events can cause significant direct damage to buildings and infrastructure. NCEM's IRISK database estimates damages from increasing magnitudes of wind events, detailed in Table 4.62 through Table 4.65.

Table 4.62 – Estimated Buildings Impacted by 50-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$81,662,620	6,345	5%	$18,471,232	2,272	1.8%	$17,102,582	128,056	100%	$117,236,435
Apex	14,554	13,758	94.5%	$8,397,881	648	4.5%	$654,750	148	1%	$248,731	14,554	100%	$9,301,362
Cary	45,306	42,944	94.8%	$33,033,201	1,872	4.1%	$6,952,793	462	1%	$1,479,415	45,278	99.9%	$41,465,409
Fuquay-Varina	10,244	9,524	93%	$4,933,125	585	5.7%	$773,772	130	1.3%	$266,664	10,239	100%	$5,973,561
Garner	11,975	11,103	92.7%	$4,947,010	687	5.7%	$761,435	181	1.5%	$215,958	11,971	100%	$5,924,403
Holly Springs	9,178	8,887	96.8%	$4,510,097	226	2.5%	$507,636	62	0.7%	$116,899	9,175	100%	$5,134,633
Knightdale	7,144	6,811	95.3%	$2,898,039	265	3.7%	$275,811	67	0.9%	$228,035	7,143	100%	$3,401,885
Morrisville	5,181	4,793	92.5%	$3,567,760	340	6.6%	$1,774,735	48	0.9%	$122,300	5,181	100%	$5,464,795
Rolesville	2,103	1,983	94.3%	$1,299,072	91	4.3%	$58,848	29	1.4%	$21,500	2,103	100%	$1,379,420
Wake Forest	10,547	9,852	93.4%	$6,734,588	541	5.1%	$1,033,008	151	1.4%	$297,223	10,544	100%	$8,064,819
Wendell	3,728	3,378	90.6%	$1,276,274	277	7.4%	$140,810	73	2%	$93,416	3,728	100%	$1,510,499
Zebulon	3,074	2,677	87.1%	$1,044,247	316	10.3%	$431,206	79	2.6%	$95,549	3,072	99.9%	$1,571,002
Unincorporated Wake County	59,372	55,779	93.9%	$33,897,736	3,122	5.3%	$5,082,607	402	0.7%	$691,995	59,303	99.9%	$39,672,338
Total	**310,482**	**290,928**	**93.7%**	**$188,201,650**	**15,315**	**4.9%**	**$36,918,643**	**4,104**	**1.3%**	**$20,980,267**	**310,347**	**100%**	**$246,100,561**

Source: NCEM Risk Management Tool

Table 4.63 – Estimated Buildings Impacted by 100-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$128,715,805	6,345	5%	$33,214,120	2,272	1.8%	$30,447,640	128,056	100%	$192,377,565
Apex	14,554	13,758	94.5%	$13,173,617	648	4.5%	$1,193,921	148	1%	$480,982	14,554	100%	$14,848,520
Cary	45,306	42,944	94.8%	$51,345,150	1,872	4.1%	$12,594,032	462	1%	$2,727,029	45,278	99.9%	$66,666,211
Fuquay-Varina	10,244	9,524	93%	$7,596,640	585	5.7%	$1,479,181	130	1.3%	$499,228	10,239	100%	$9,575,049
Garner	11,975	11,103	92.7%	$7,781,221	687	5.7%	$1,425,997	181	1.5%	$412,885	11,971	100%	$9,620,103
Holly Springs	9,178	8,887	96.8%	$7,024,984	226	2.5%	$957,182	62	0.7%	$216,917	9,175	100%	$8,199,083
Knightdale	7,144	6,811	95.3%	$4,524,674	265	3.7%	$516,869	67	0.9%	$417,503	7,143	100%	$5,459,045
Morrisville	5,181	4,793	92.5%	$5,766,554	340	6.6%	$2,981,303	48	0.9%	$228,286	5,181	100%	$8,976,143
Rolesville	2,103	1,983	94.3%	$1,980,105	91	4.3%	$102,001	29	1.4%	$35,562	2,103	100%	$2,117,667
Wake Forest	10,547	9,852	93.4%	$10,566,637	541	5.1%	$1,802,458	151	1.4%	$530,608	10,544	100%	$12,899,702
Wendell	3,728	3,378	90.6%	$2,000,680	277	7.4%	$257,441	73	2%	$175,742	3,728	100%	$2,433,862
Zebulon	3,074	2,677	87.1%	$1,603,959	316	10.3%	$836,776	79	2.6%	$195,890	3,072	99.9%	$2,636,625
Unincorporated Wake County	59,372	55,779	93.9%	$52,237,409	3,122	5.3%	$9,197,403	402	0.7%	$1,266,942	59,303	99.9%	$62,701,753
Total	**310,482**	**290,928**	**93.7%**	**$294,317,435**	**15,315**	**4.9%**	**$66,558,684**	**4,104**	**1.3%**	**$37,635,214**	**310,347**	**100%**	**$398,511,328**

Source: NCEM Risk Management Tool

Table 4.64 – Estimated Buildings Impacted by 300-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$346,924,189	6,345	5%	$94,447,260	2,272	1.8%	$75,592,846	128,056	100%	$516,964,295
Apex	14,554	13,758	94.5%	$36,282,343	648	4.5%	$3,450,031	148	1%	$1,557,827	14,554	100%	$41,290,201
Cary	45,306	42,944	94.8%	$142,533,175	1,872	4.1%	$33,341,124	462	1%	$7,796,364	45,278	99.9%	$183,670,662
Fuquay-Varina	10,244	9,524	93%	$19,284,407	585	5.7%	$4,869,455	130	1.3%	$1,634,768	10,239	100%	$25,788,631
Garner	11,975	11,103	92.7%	$18,621,802	687	5.7%	$4,345,869	181	1.5%	$1,339,071	11,971	100%	$24,306,742
Holly Springs	9,178	8,887	96.8%	$18,467,636	226	2.5%	$2,819,105	62	0.7%	$708,325	9,175	100%	$21,995,066
Knightdale	7,144	6,811	95.3%	$11,151,915	265	3.7%	$1,533,206	67	0.9%	$1,160,829	7,143	100%	$13,845,949
Morrisville	5,181	4,793	92.5%	$15,973,924	340	6.6%	$8,206,253	48	0.9%	$694,380	5,181	100%	$24,874,557
Rolesville	2,103	1,983	94.3%	$4,809,445	91	4.3%	$263,350	29	1.4%	$96,399	2,103	100%	$5,169,195
Wake Forest	10,547	9,852	93.4%	$25,792,988	541	5.1%	$4,674,382	151	1.4%	$1,555,115	10,544	100%	$32,022,485
Wendell	3,728	3,378	90.6%	$4,722,639	277	7.4%	$797,232	73	2%	$545,523	3,728	100%	$6,065,394
Zebulon	3,074	2,677	87.1%	$3,720,938	316	10.3%	$2,848,522	79	2.6%	$846,926	3,072	99.9%	$7,416,386
Unincorporated Wake County	59,372	55,779	93.9%	$124,251,902	3,122	5.3%	$23,876,333	402	0.7%	$3,957,886	59,303	99.9%	$152,086,121
Total	**310,482**	**290,928**	**93.7%**	**$772,537,303**	**15,315**	**4.9%**	**$185,472,122**	**4,104**	**1.3%**	**$97,486,259**	**310,347**	**100%**	**$1,055,495,684**

Source: NCEM Risk Management Tool

Table 4.65 – Estimated Buildings Impacted by 700-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$628,593,150	6,345	5%	$162,518,703	2,272	1.8%	$115,848,893	128,056	100%	$906,960,746
Apex	14,554	13,758	94.5%	$67,919,681	648	4.5%	$5,845,456	148	1%	$2,724,688	14,554	100%	$76,489,825
Cary	45,306	42,944	94.8%	$269,656,415	1,872	4.1%	$53,121,526	462	1%	$13,082,531	45,278	99.9%	$335,860,473
Fuquay-Varina	10,244	9,524	93%	$34,498,819	585	5.7%	$9,119,164	130	1.3%	$3,109,866	10,239	100%	$46,727,849
Garner	11,975	11,103	92.7%	$31,569,913	687	5.7%	$7,498,064	181	1.5%	$2,414,103	11,971	100%	$41,482,080
Holly Springs	9,178	8,887	96.8%	$34,668,791	226	2.5%	$4,684,483	62	0.7%	$1,326,494	9,175	100%	$40,679,769
Knightdale	7,144	6,811	95.3%	$19,359,471	265	3.7%	$2,615,372	67	0.9%	$1,921,880	7,143	100%	$23,896,724
Morrisville	5,181	4,793	92.5%	$29,152,922	340	6.6%	$14,472,769	48	0.9%	$1,217,612	5,181	100%	$44,843,303
Rolesville	2,103	1,983	94.3%	$8,295,647	91	4.3%	$423,875	29	1.4%	$165,725	2,103	100%	$8,885,247
Wake Forest	10,547	9,852	93.4%	$44,789,310	541	5.1%	$7,746,348	151	1.4%	$2,790,105	10,544	100%	$55,325,762
Wendell	3,728	3,378	90.6%	$7,860,005	277	7.4%	$1,444,310	73	2%	$953,122	3,728	100%	$10,257,437
Zebulon	3,074	2,677	87.1%	$6,204,673	316	10.3%	$5,372,684	79	2.6%	$1,833,694	3,072	99.9%	$13,411,050
Unincorporated Wake County	59,372	55,779	93.9%	$213,585,085	3,122	5.3%	$37,431,787	402	0.7%	$7,200,950	59,303	99.9%	$258,217,822
Total	**310,482**	**290,928**	**93.7%**	**$1,396,153,882**	**15,315**	**4.9%**	**$312,294,541**	**4,104**	**1.3%**	**$154,589,663**	**310,347**	**100%**	**$1,863,038,087**

Source: NCEM Risk Management Tool

Severe weather can also cause significant agricultural losses. Between 2007-2017, the sum of claims paid for crop damage due to hail and wind damages in Wake County was $1,285,682, or an average of $116,880 in losses every year. Table 4.68 summarizes the crop losses due to drought in reported in the RMA system.

Table 4.66 – Crop Losses Resulting from Severe Weather, 2007-2017

Year	Cause Description	Determined Acres	Indemnity Amount
2007	Hail	137.10	$263,755.00
2008	Hail	25.80	$61,333.00
2009	Hail	91.78	$133,582.00
2012	Hail	16.56	$11,728.00
2015	Hail	33.10	$34,456.00
2016	Hail	382.98	$132,304.30
2017	Hail	202.71	$198,752.00
Hail Subtotal		**890.03**	**$835,910.30**
2012	Wind/Excess Wind	16.50	$13,756.00
2014	Wind/Excess Wind	7.92	$12,110.40
2015	Wind/Excess Wind	9.62	$21,951.00
2016	Wind/Excess Wind	174.55	$401,954.45
Wind Subtotal		**208.59**	**$449,771.85**
TOTAL		**1,098.62**	**$1,285,682.15**

Source: USDA Risk Management Agency

Environment

The main environmental impact from wind is damage to trees or crops. Wind events can also bring down power lines, which could cause a fire and result in even greater environmental impacts. Lightning may also result in the ignition of wildfires. This is part of a natural process, however, and the environment will return to its original state in time.

Hail can cause extensive damage to the natural environment, pelting animals, trees and vegetation with hailstones. Melting hail can also increase both river and flash flood risk.

Consequence Analysis

Table 4.67 summarizes the potential negative consequences of severe weather.

Table 4.67 – Consequence Analysis – Severe Weather (Thunderstorm Winds, Lightning, and Hail)

Category	Consequences
Public	Injuries; fatalities
Responders	Injuries; fatalities; potential impacts to response capabilities due to storm impacts
Continuity of Operations (including Continued Delivery of Services)	Potential impacts to continuity of operations due to storm impacts; delays in providing services
Property, Facilities and Infrastructure	Possibility of structure fire ignition; potential for disruptions in power and communications infrastructure; destruction and/or damage to any exposed property, especially windows, cars and siding; mobile homes see increased risk
Environment	Potential fire ignition from lightning; hail damage to wildlife and foliage
Economic Condition of the Jurisdiction	Lightning damage contingent on target; can severely impact/destroy critical infrastructure and other economic drivers

Category	Consequences
Public Confidence in the Jurisdiction's Governance	Public confidence is not generally affected by severe weather events.

Hazard Summary by Jurisdiction

The following table summarizes severe weather hazard risk by jurisdiction. Most aspects of severe weather risk do not vary substantially by jurisdiction; however, wind and hail impacts may be greater in more highly developed areas with higher exposure in terms of both property and population density. Additionally, mobile home units are more vulnerable to wind damage. While mobile home units do not comprise a significant proportion of any jurisdictions housing mix, Wake County, Apex, Cary, and Raleigh each have over 250 mobile home units in their jurisdiction and therefore may face more severe impacts from wind. Where priority ratings vary between thunderstorm wind, lightning, and hail for impact and spatial extent, these scores represent an average rating with greater weight given to thunderstorm wind because it occurs much more frequently.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	4	2	3	4	1	2.9	H
Apex	4	1	3	4	1	2.6	H
Cary	4	2	3	4	1	2.9	H
Fuquay-Varina	4	1	3	4	1	2.6	H
Garner	4	1	3	4	1	2.6	H
Holly Springs	4	1	3	4	1	2.6	H
Knightdale	4	1	3	4	1	2.6	H
Morrisville	4	2	3	4	1	2.9	H
Raleigh	4	2	3	4	1	2.9	H
Rolesville	4	1	3	4	1	2.6	H
Wake Forest	4	1	3	4	1	2.6	H
Wendell	4	1	3	4	1	2.6	H
Zebulon	4	1	3	4	1	2.6	H

4.5.9 Severe Winter Storm

Hazard Background

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Events may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Some winter storms might be large enough to affect several states, while others might affect only localized areas. Occasionally, heavy snow might also cause significant property damages, such as roof collapses on older buildings.

All winter storm events have the potential to present dangerous conditions to the affected area. Larger snowfalls pose a greater risk, reducing visibility due to blowing snow and making driving conditions treacherous. A heavy snow event is defined by the National Weather Service as an accumulation of 4 of more inches in 12 hours or less. A blizzard is the most severe form of winter storm. It combines low temperatures, heavy snow, and winds of 35 miles per hour or more, which reduces visibility to a quarter mile or less for at least 3 hours. Winter storms are often accompanied by sleet, freezing rain, or an ice storm. Such freeze events are particularly hazardous as they create treacherous surfaces.

Ice storms are defined as storms with significant amounts of freezing rain and are a result of cold air damming (CAD). CAD is a shallow, surface-based layer of relatively cold, stably-stratified air entrenched against the eastern slopes of the Appalachian Mountains. With warmer air above, falling precipitation in the form of snow melts, then becomes either super-cooled (liquid below the melting point of water) or re-freezes. In the former case, super-cooled droplets can freeze on impact (freezing rain), while in the latter case, the re-frozen water particles are ice pellets (or sleet). Sleet is defined as partially frozen raindrops or refrozen snowflakes that form into small ice pellets before reaching the ground. They typically bounce when they hit the ground and do not stick to the surface. However, it does accumulate like snow, posing similar problems and has the potential to accumulate into a layer of ice on surfaces. Freezing rain, conversely, usually sticks to the ground, creating a sheet of ice on the roadways and other surfaces. All of the winter storm elements – snow, low temperatures, sleet, ice, etcetera – have the potential to cause significant hazard to a community. Even small accumulations can down power lines and trees limbs and create hazardous driving conditions and disrupt communication and power for days.

Advancements in meteorology and forecasting usually allow for mostly accurate forecasting a few days in advance of an impending storm. Most storms have a duration of a few hours; however, impacts can last a few days after the initial incident until cleanup is completed.

Warning Time: 1 – More than 24 hours

Duration: 3 – Less than 1 week

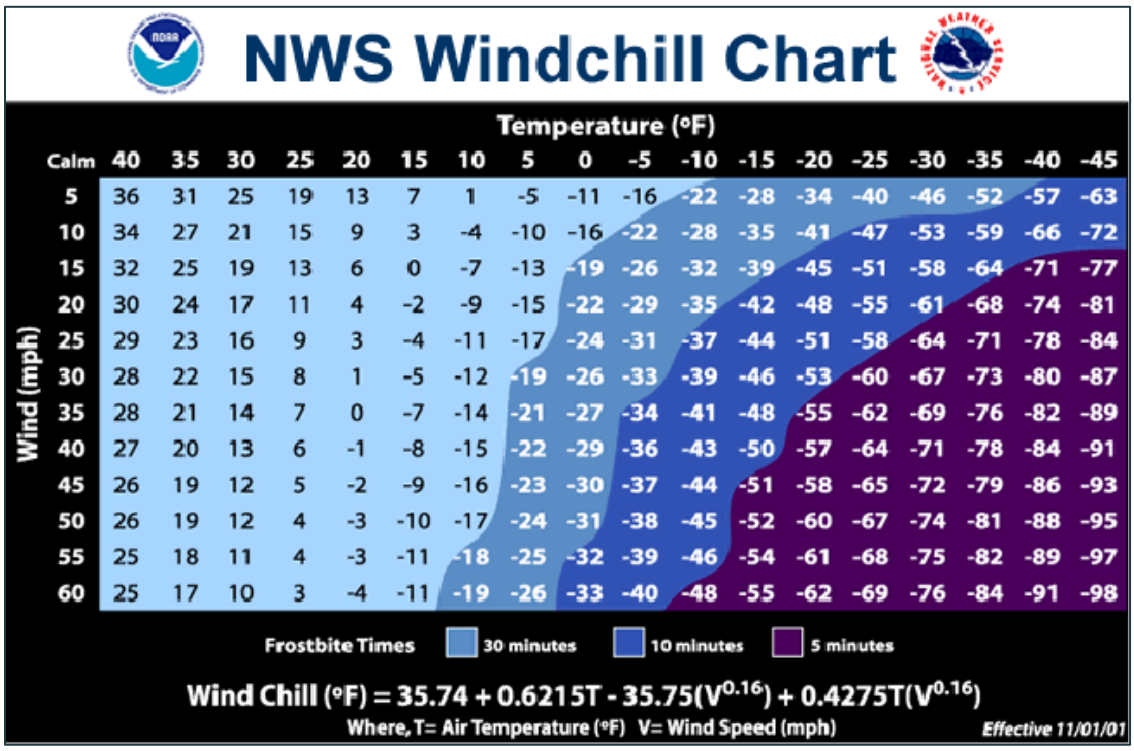
Location

Severe winter storms are usually a countywide or regional hazard, impacting the entire county at the same time. The risk of a severe winter storm occurring is uniform across the County.

Extent

Severe winter storms often involve a mix of hazardous weather conditions. The magnitude of an event can be defined based on the severity of each of the involved factors, including precipitation type, precipitation accumulation amounts, temperature, and wind. The NWS Wind Chill Temperature Index, shown in Figure 4.18, provides a formula for calculating the dangers of winter winds and freezing temperatures.

Figure 4.18 – NWS Wind Chill Temperature Index



Source: http://www.nws.noaa.gov/om/winter/windchill.shtml

The greatest snowfall amount recorded in the Wake County planning area was 17.8 inches, recorded on March 2, 1927 at the Raleigh weather station.

Impact: 2 – Limited

Spatial Extent: 4 – Large

The entirety of North Carolina is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. Wake County is accustomed to smaller scale severe winter weather conditions and often receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire County has uniform exposure to a winter storm.

Historical Occurrences

To get a full picture of the range of impacts of a severe winter storm, data for the following weather types as defined by the National Weather Service (NWS) Raleigh Forecast Office and tracked by NCEI were collected:

- **Blizzard** – A winter storm which produces the following conditions for 3 consecutive hours or longer: (1) sustained winds or frequent gusts 30 knots (35 mph) or greater, and (2) falling and/or blowing snow reducing visibility frequently to less than 1/4 mile.
- **Cold/Wind Chill** – Period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory conditions of 0°F to -14°F with wind speeds 10 mph (9 kt) or greater.

- **Extreme Cold/Wind Chill** – A period of extremely low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined warning criteria, defined as wind chill -15°F or lower with wind speeds 10 mph (9 kt) or greater.
- **Frost/Freeze** – A surface air temperature of 32°F or lower, or the formation of ice crystals on the ground or other surfaces, for a period of time long enough to cause human or economic impact, during the locally defined growing season.
- **Heavy Snow** – Snow accumulation meeting or exceeding 12 and/or 24 hour warning criteria of 3 and 4 inches, respectively.
- **Ice Storm** – Ice accretion meeting or exceeding locally/regionally defined warning criteria of ¼ inch or greater resulting in significant, widespread power outages, tree damage and dangerous travel. Issued only in those rare instances where just heavy freezing rain is expected and there will be no "mixed bag" precipitation meaning no snow, sleet or rain.
- **Sleet** – Sleet accumulations meeting or exceeding locally/regionally defined warning criteria of ½ inch or more.
- **Winter Storm** – A winter weather event that has more than one significant hazard and meets or exceeds locally/regionally defined 12 and/or 24 hour warning criteria for at least one of the precipitation elements. Defined by NWS Raleigh Forecast Office as snow accumulations 3 inches or greater in 12 hours (4 inches or more in 24 hours); Freezing rain accumulations ¼ inch (6 mm) or greater; Sleet accumulations ½ inch (13 mm) or more. Issued when there is at least a 60% forecast confidence of any one of the three criteria being met.
- **Winter Weather** – A winter precipitation event that causes a death, injury, or a significant impact to commerce or transportation, but does not meet locally/regionally defined warning criteria.

Summarized impacts from data collected for 1998 through 2017 are included in Table 4.68. Cumulatively, severe winter storms caused over $1 million in property damage. In this timeframe, the county experienced no fatalities, injuries or crop damage from severe winter storm, though these types of impacts are possible in future events. No blizzard, cold/wind chill, extreme cold/wind chill, frost/freeze, or sleet events were recorded. Impacts in Wake County by incident are recorded in Table 4.69.

Table 4.68 – Total Severe Winter Storm Impacts in Wake County, 1998-2017

Event Type	Number of Recorded Incidents	Total Fatalities	Total Injuries	Total Property Damage	Total Crop Damage
Winter Storm	25	0	0	$1,000,000	$0
Winter Weather	19	0	0	$40,000	$0
Ice Storm	1	0	0	0	$0
Heavy Snow	1	0	0	0	$0
Total	**46**	**0**	**0**	**$1,040,000**	**$0**

Source: NCEI

Table 4.69 – Recorded Severe Winter Storm Impacts in Wake County, 1998-2017

Date	Event Type	Fatalities	Injuries	Property Damage	Crop Damage
1/19/1998	Heavy Snow	0	0	0	0
12/23/1998	Ice Storm	0	0	0	0
1/18/2000	Winter Storm	0	0	0	0
1/20/2000	Winter Storm	0	0	0	0
1/22/2000	Winter Storm	0	0	0	0
1/24/2000	Winter Storm	0	0	0	0
1/28/2000	Winter Storm	0	0	0	0

Date	Event Type	Fatalities	Injuries	Property Damage	Crop Damage
11/19/2000	Heavy Snow	0	0	0	0
1/3/2002	Winter Storm	0	0	0	0
12/4/2002	Winter Storm	0	0	0	0
2/16/2003	Winter Storm	0	0	0	0
2/27/2003	Winter Storm	0	0	0	0
1/26/2004	Winter Storm	0	0	0	0
2/15/2004	Winter Storm	0	0	0	0
2/26/2004	Winter Storm	0	0	0	0
12/26/2004	Winter Storm	0	0	0	0
1/18/2007	Winter Weather	0	0	0	0
2/1/2007	Winter Weather	0	0	0	0
12/7/2007	Winter Weather	0	0	30,000	0
1/17/2008	Winter Weather	0	0	0	0
1/20/2009	Winter Storm	0	0	0	0
3/2/2009	Winter Storm	0	0	0	0
12/18/2009	Winter Weather	0	0	0	0
1/29/2010	Winter Storm	0	0	0	0
2/12/2010	Winter Storm	0	0	0	0
3/2/2010	Winter Storm	0	0	0	0
12/4/2010	Winter Weather	0	0	0	0
12/16/2010	Winter Weather	0	0	0	0
12/25/2010	Winter Storm	0	0	0	0
1/10/2011	Winter Weather	0	0	0	0
12/26/2013	Winter Weather	0	0	0	0
1/21/2014	Winter Weather	0	0	0	0
1/28/2014	Winter Storm	0	0	0	0
2/11/2014	Winter Weather	0	0	0	0
2/12/2014	Winter Storm	0	0	0	0
3/3/2014	Winter Weather	0	0	0	0
3/17/2014	Winter Weather	0	0	0	0
1/13/2015	Winter Weather	0	0	0	0
2/16/2015	Winter Storm	0	0	0	0
2/24/2015	Winter Weather	0	0	0	0
2/25/2015	Winter Storm	0	0	$1,000,000	0
3/1/2015	Winter Weather	0	0	0	0
1/22/2016	Winter Storm	0	0	0	0
2/7/2016	Winter Weather	0	0	$10,000	0
2/15/2016	Winter Weather	0	0	0	0
1/7/2017	Winter Storm	0	0	0	0
12/8/2017	Winter Weather	0	0	0	0
	Total	**0**	**0**	**$1,010,000**	**0**

Source: NCEI

Several storm impacts from NCEI are summarized below:

December 7, 2007 – A brief period of light freezing rain fell across central North Carolina. Most of the freezing rain accumulation occurred from southern Wake County, east to Smithfield and north to Wilson, Rock Mount and Roanoke Rapids. Portions of Interstate 40 and Highway 70 in Johnston County were

closed due to numerous accidents. Over 150 automobile accidents were reported across central North Carolina due to icy bridges. The storm caused $415,000 in damage across the region; Wake County itself suffered $30,000 in recorded damage.

February 25-26, 2015 – As a low pressure system tracked along the southeast coast, wintry precipitation spread into central North Carolina. Much of the impacted area received 2-4 inches of snow and sleet, with norther counties receiving up to 7-9 inches. In addition to the snow, some areas also saw ice accumulations. The heavy, wet snow caused extensive power outages, with some outages extending beyond 24 hours. In Wake County, snowfall/sleet amounts of 2 to 6 inches fell across the county. The heavy wet snow caused widespread power outages from falling trees and power lines. At the peak of the storm, over 92,000 customers were without power in the county.

February 7, 2016 – A deepening low pressure system tracking along the southeast coast spread precipitation into the eastern portions of North Carolina. A trace to a couple tenths of an inch of snow and sleet fell across Wake County. This brief burst of wintry weather caused numerous traffic accidents.

Wake County received six emergency declarations and presidential disaster declarations since 1968 for incidents related to severe winter storms. As a state, North Carolina received eight disaster declarations related to severe winter storms during this timeframe.

Table 4.70 – Emergency & Disaster Declarations in Wake County due to Severe Winter Storms

Disaster Number	Date	Disaster Type	Incident Start	Incident End
234	1968	Severe Ice Storm	2/10/1968	2/10/1968
3033	1977	Snow	3/2/1977	3/2/1977
3110	1993	Severe Snow and Winter Storm	3/13/1993	3/17/1993
1087	1996	Blizzard	1/6/1996	1/12/1996
1312	2000	Severe Winter Storm	1/24/2000	2/1/2000
1448	2003	Severe Ice Storm	12/4/2002	12/6/2002

Source: FEMA, December 20, 2018

Probability of Future Occurrence

NCEI records 46 severe winter storm related events during the 20-year period from 1998 through 2017, which is an average of 2.3 events per year or more than 100 percent probability in any given year.

Probability: 4 – Highly Likely

Climate Change

Per the 2018 North Carolina Hazard Mitigation Plan, there is uncertainty associated with climate change impacts on future severe winter storms. Global temperature rise could cause shorter and warmer winters in many areas; however, the likelihood of dangerously low temperatures may increase due to continuing trends of temperature extremes. Warmer winters, however, mean that precipitation that would normally fall as snow may begin to fall as rain or freezing rain instead.

Vulnerability Assessment

People

Winter storms are considered deceptive killers because most deaths are indirectly related to the storm event. The leading cause of death during winter storms is from automobile or other transportation accidents due to poor visibility and/or slippery roads. Additionally, exhaustion and heart attacks caused by overexertion may result from winter storms.

Power outages during very cold winter storm conditions can also create potentially dangerous situations. Elderly people account for the largest percentage of hypothermia victims. In addition, if the power is out for an extended period, residents are forced to find alternative means to heat their homes. The danger arises from carbon monoxide released from improperly ventilated heating sources such as space or kerosene heaters, furnaces, and blocked chimneys. House fires also occur more frequently in the winter due to lack of proper safety precautions when using an alternative heating source.

Property

According to reported data of storm impacts recorded by the NCEI, between 1998 and 2017 Wake County experienced $1.04 million in property damage related to the impacts of severe winter storm. Based on this data, Wake County experiences average annual losses of $52,000 due to severe winter storm events.

Environment

Winter storm events may include ice or snow accumulation on trees which can cause large limbs, or even whole trees, to snap and potentially fall on buildings, cars, or power lines. This potential for winter debris creates a dangerous environment to be outside in; significant injury or fatality may occur if a large limb snaps while a local resident is out driving or walking underneath it.

Consequence Analysis

Table 4.68 summarizes the potential negative consequences of severe winter storm.

Table 4.71 – Consequence Analysis – Severe Winter Storm

Category	Consequences
Public	Localized impact expected to be severe for affected areas and moderate to light for other less affected areas.
Responders	Adverse impact expected to be severe for unprotected personnel and moderate to light for trained, equipped, and protected personnel.
Continuity of Operations (including Continued Delivery of Services)	Localized disruption of roads and/or utilities caused by incident may postpone delivery of some services.
Property, Facilities and Infrastructure	Localized impact to facilities and infrastructure in the areas of the incident. Power lines and roads most adversely affected.
Environment	Environmental damage to trees, bushes, etc.
Economic Condition of the Jurisdiction	Local economy and finances may be adversely affected, depending on damage.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

Hazard Summary by Jurisdiction

The following table summarizes severe winter storm hazard risk by jurisdiction. Severe winter storm risk does not vary substantially by jurisdiction because these events are typically regional in nature.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	4	2	4	1	3	3.0	H
Apex	4	2	4	1	3	3.0	H
Cary	4	2	4	1	3	3.0	H
Fuquay-Varina	4	2	4	1	3	3.0	H
Garner	4	2	4	1	3	3.0	H
Holly Springs	4	2	4	1	3	3.0	H

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Knightdale	4	2	4	1	3	3.0	H
Morrisville	4	2	4	1	3	3.0	H
Raleigh	4	2	4	1	3	3.0	H
Rolesville	4	2	4	1	3	3.0	H
Wake Forest	4	2	4	1	3	3.0	H
Wendell	4	2	4	1	3	3.0	H
Zebulon	4	2	4	1	3	3.0	H

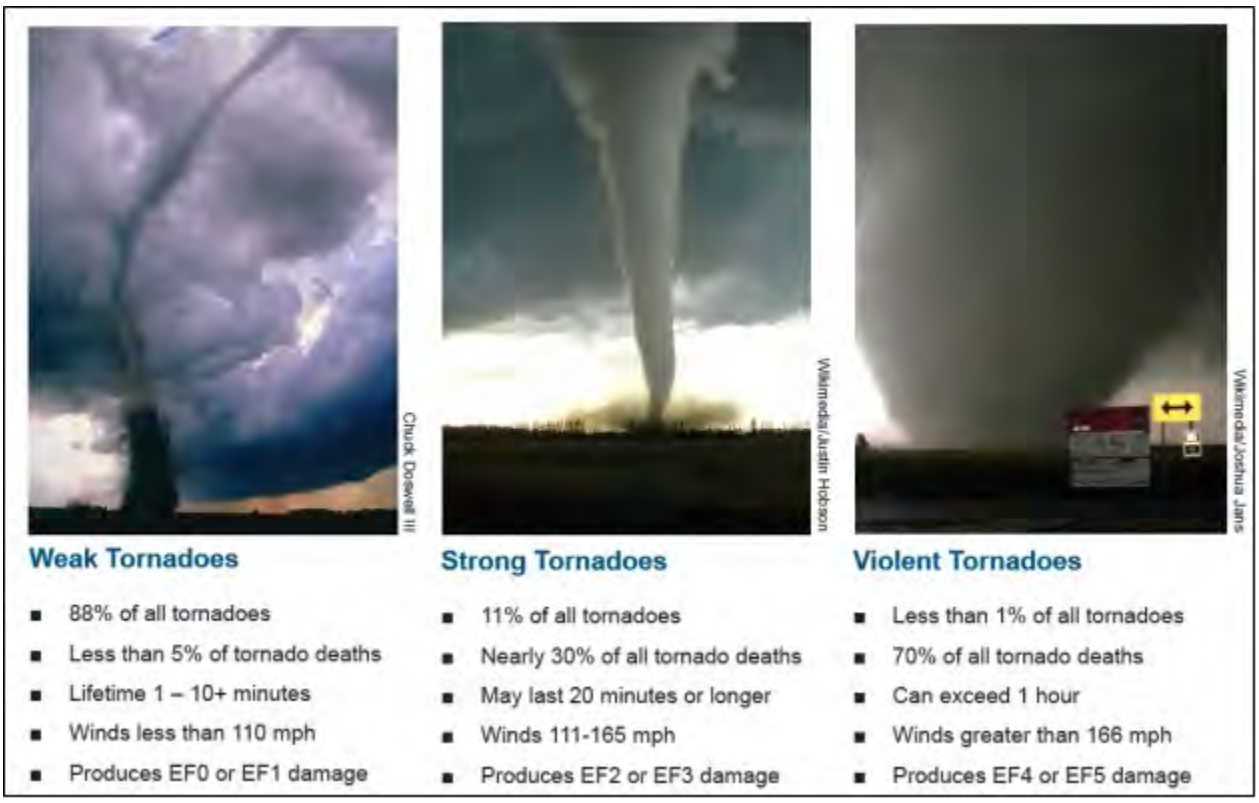
4.5.10 Tornado

Hazard Background

According to the Glossary of Meteorology (AMS 2000), a tornado is "a violently rotating column of air, pendant from a cumuliform cloud or underneath a cumuliform cloud, and often (but not always) visible as a funnel cloud." Tornadoes can appear from any direction. Most move from southwest to northeast, or west to east. Some tornadoes have changed direction amid path, or even backtracked.

Tornadoes are commonly produced by land falling tropical cyclones. Those making landfall along the Gulf coast traditionally produce more tornadoes than those making landfall along the Atlantic coast. Tornadoes that form within hurricanes are more common in the right front quadrant with respect to the forward direction but can occur in other areas as well. According to the NHC, about 10% of the tropical cyclone-related fatalities are caused by tornadoes. Tornadoes are more likely to be spawned within 24 hours of landfall and are usually within 30 miles of the tropical cyclone's center.

Tornadoes have the potential to produce winds in excess of 200 mph (EF5 on the Enhanced Fujita Scale) and can be very expansive – some in the Great Plains have exceeded two miles in width. Tornadoes associated with tropical cyclones, however, tend to be of lower intensity (EF0 to EF2) and much smaller in size than ones that form in the Great Plains.



Source: NOAA National Weather Service

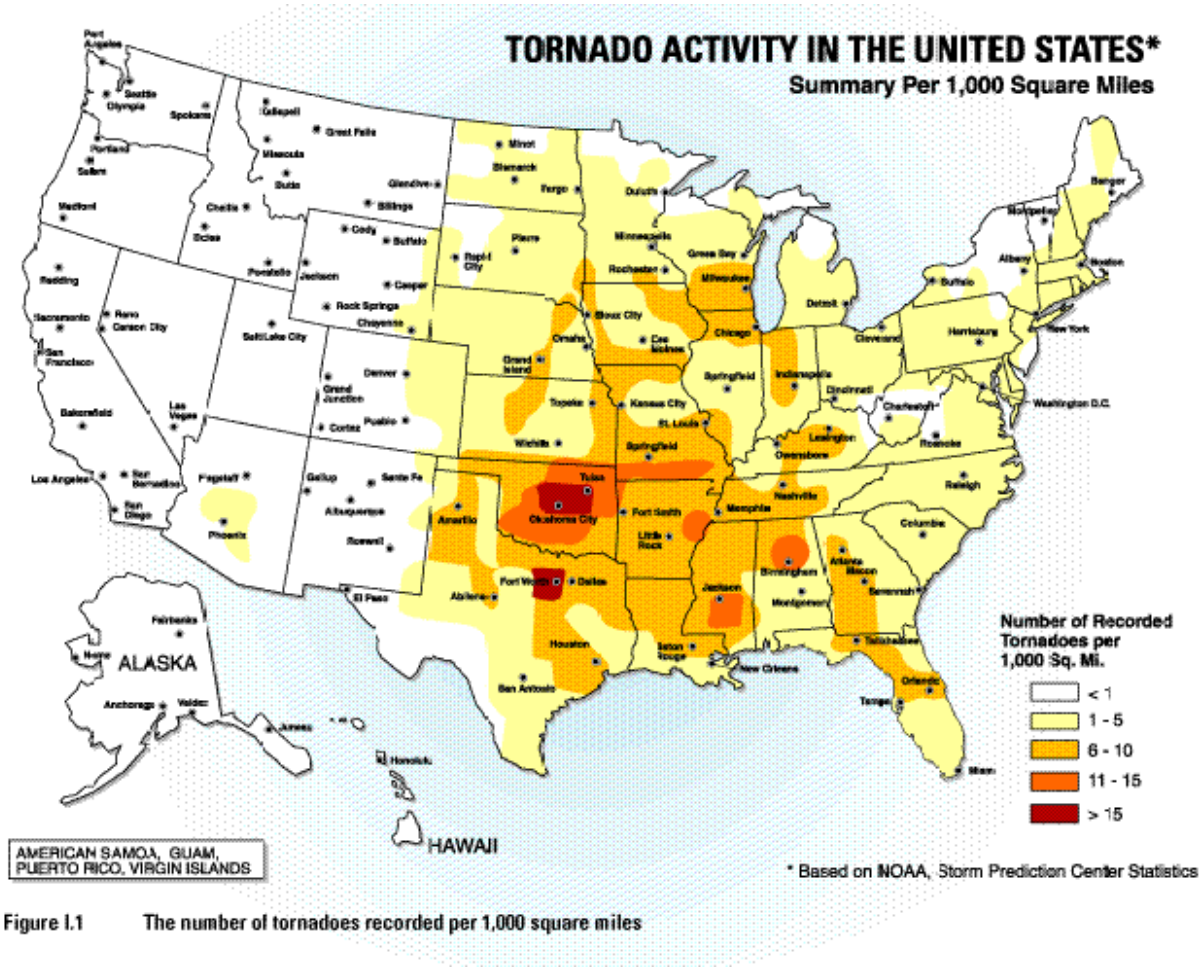
Warning Time: 4 – Less than 6 hours

Duration: 1 – Less than 6 hours

According to the NOAA Storm Prediction Center (SPC), the highest concentration of tornadoes in the United States has been in Oklahoma, Texas, Kansas and Florida respectively. Although the Great Plains region of the Central United States does favor the development of the largest and most dangerous

tornadoes (earning the designation of "tornado alley"), Florida experiences the greatest number of tornadoes per square mile of all U.S. states (SPC, 2002). The below figure shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles.

Figure 4.19 – Tornado Activity in the U.S.

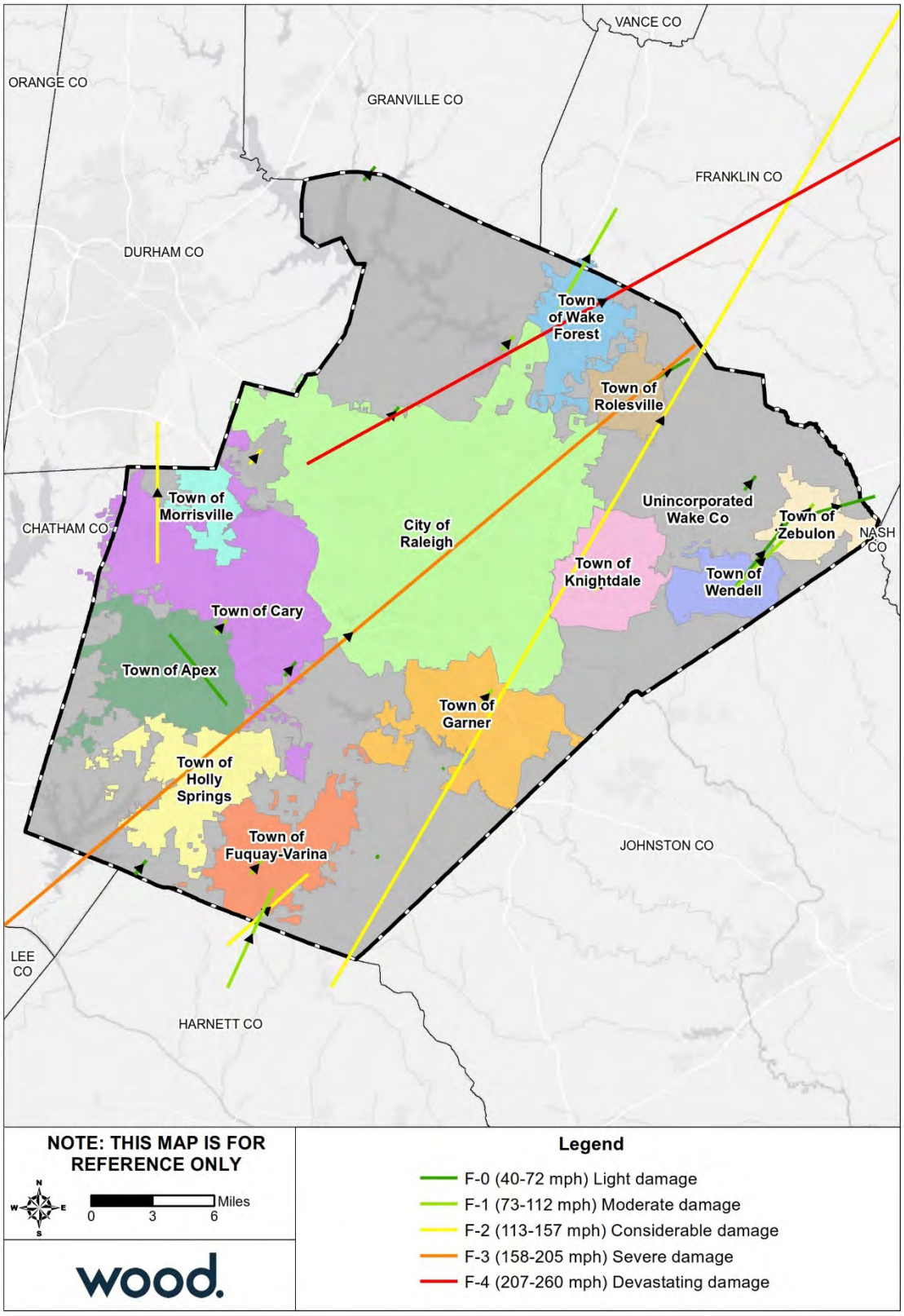


Source: American Society of Civil Engineers

Location

Figure 4.20 reflects the tracks of past tornados that passed through Wake County from 1950 through 2017 according to data from the NOAA/National Weather Service Storm Prediction Center.

Figure 4.20 – Tornado Paths Through Wake County, 1950-2017



Source: NOAA/NWS Storm Prediction Center

Tornados can occur anywhere in the County. Tornadoes typically impact a small area, but damage may be extensive. Tornado locations are completely random, meaning risk to tornado isn't increased in one area of the county versus another. All of Wake County is uniformly exposed to this hazard.

Extent

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita (EF) scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. Table 4.5 shows the wind speeds associated with the enhanced Fujita scale ratings and the damage that could result at different levels of intensity.

Table 4.72 – Enhanced Fujita Scale

EF Number	3 Second Gust (mph)	Damage
0	65-85	**Light damage.** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
1	96-110	**Moderate damage.** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
2	111-135	**Considerable damage.** Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
3	136-165	**Severe damage.** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
4	166-200	**Devastating damage.** Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
5	Over 200	**Incredible damage.** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m; high-rise buildings have significant structural deformation; incredible phenomena will occur.

The most intense tornado to pass through Wake County was an F4 in 1988; this tornado also had the longest path (83 miles) and resulted in the most injuries (154 people). An F2 tornado in 1981 had the widest observed path in the county at 800 yards. An F3 tornado in 2011 resulted in the most fatalities, killing six people. An EF3 tornado in 2011 caused $115 million in recordable property damage.

Impact: 3 – Critical

Spatial Extent: 2 – Small

Historical Occurrences

NCEI storm reports were reviewed from 1988 through 2017 to assess whether recent trends varied from the longer historical record. According to NCEI, Wake County experienced 19 tornado incidents between 1988 and 2017, causing 6 fatalities, 201 injuries, $369 million in property damage and $25,000 in crop damage. Table 4.72 shows historical tornadoes in Wake County during this time period.

Table 4.73 – Recorded Tornadoes in Wake County, 1988-2017

Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Wake Co.	3/26/1988	1955	F0	0	0	$0	$0
Wake Co.	11/28/1988	0	F4	2	105	$250,000,000	$0
Wake Co.	10/23/1990	218	F1	0	0	$0	$0
Raleigh	3/27/1993	1605	F0	0	0	$0	$0
Wendell	4/15/1996	1708	F0	0	0	$10,000	$0
Wendell	4/15/1996	1725	F1	0	26	$3,000,000	$0
Cary	7/12/1996	1325	F0	0	0	$50,000	$0
Holly Springs	3/20/1998	1815	F0	0	0	$0	$0
Garner	3/20/1998	1840	F2	0	2	$650,000	$0
Raleigh	3/20/1998	1845	F0	0	0	$15,000	$0
Cary	6/1/2001	1300	F0	0	0	$0	$0
Apex	9/27/2004	1830	F0	0	0	$0	$0
Garner	9/14/2007	1825	EF0	0	0	$0	$0
Rockton	4/25/2010	1859	EF0	0	0	$250,000	$25,000
Rolesville	3/6/2011	1710	EF0	0	1	$100,000	$0
Burt	4/16/2011	1427	EF3	4	67	$115,000,000	$0
Zebulon	9/18/2012	1438	EF0	0	0	$0	$0
South Raleigh Airport	3/29/2014	1957	EF0	0	0	$8,000	$0
Williams Crossroads	3/29/2014	2008	EF0	0	0	$5,000	$0
Total				**6**	**201**	**$369,088,000**	**$25,000**

Source: NCEI

Specific incidents with some level of impact include:

March 20, 1998 – a cell of tornadoes broke out during the 6 pm hour, with a tornado each in Holly Springs, Garner and Raleigh. In Garner, several trees fell on homes and outbuildings. The tornado touched down of Highway 70 near a church; the roof of one section was taken off and the steeple was blown off the chapel. The debris from the church took out windows at a car lot across the street. A block away, the wind removed several large siding sheets from a business. The storm caused two direct injuries and $650,000 in damages. The storm produced another tornado six miles to the northeast on the east side of Raleigh. Damage began just off US64 at Wake Medical Center and the Tower Shopping Center. Cars were overturned, trees were damaged and a steal-beamed billboard was twisted. The tornado then crossed the highway where it lifted the roof off the business office of a tree nursery, damaged two sheds and destroyed five greenhouses. Insulation and debris was strewn up in the trees well away from the tornado's path.

April 25, 2010 – a storm produced a weak EF0 tornado near Zebulon in eastern Wake County. The tornado damaged buildings on its way east, where it caused minor damage to several businesses and vehicles in the Triangle East Center. The storm was responsible for $250,000 in property damage and $25,000 in crop damage.

March 6, 2011 – a weak EF-0 tornado touched down just northeast of downtown Rolesville along NC Highway 401 (Main Street). The tornado tracked to the northeast for two miles, causing damage to trees, homes and other infrastructure, resulting in $100,000 in property damage. An elderly man was injured from the tornado due to a house fire.

April 16, 2011 – A strong storm system produced nine tornadoes in the Raleigh CWA, including two EF3s and four EF2s. The tornadoes left eight dead with approximately 275 injuries. In Burt, an EF0 tornado entered southwest Wake County and tracked northeast, causing tree, roof and infrastructure damage. In total, 2,270 homes were damaged, including 67 homes that were destroyed and 184 homes that suffered major damage; additionally, 34 businesses were damaged. NCEI recorded four fatalities in a trailer park, 67 injuries and $115 million in property damage.

November 28, 1988 – A powerful tornado touched down in Umstead State Park in the northwest part of Raleigh, three miles southeast of the center of Raleigh-Durham Airport. The tornado tracked across one of the most densely populated parts of the City of Raleigh, destroying hundreds of homes and damaging thousands of others. Two people were killed in Raleigh. The strongest damage, mostly F3 with some very weak F4, occurred along a 4 mile long portion of the path extending northeast from where it crossed U.S. Highway 70, four miles east of Raleigh Airport. Numerous businesses along U.S. Highway 70 were destroyed, including a K-mart.

The tornado destroyed a total of 426 residences and 78 businesses. It damaged 2,057 residences, leaving 978 people homeless. Four people were killed and 154 were injured; total damage was near $77.2 million. The track of the tornado was almost continuous for 83 miles.

Outside of the above time period, NCEI also records an F2 tornado on November 2, 1966 that caused nine injuries and $250,000 in damage.

November 2, 1966 – In the area east and south of Raleigh, two homes and five house trailers were destroyed, three trailers and six homes severely damaged, and minor damage to approximately twenty other homes and business buildings, with trees twisted off and power poles broken.

Probability of Future Occurrence

Probability of future occurrence was calculated based on past occurrences and was assumed to be uniform across the county.

In a thirty-year span between 1988 and 2017, Wake County experienced 19 separate tornado incidents over 15 separate days. This correlates to a 63 percent annual probability that the county will experience a tornado somewhere in its boundaries. Only three of these past tornado events was a magnitude EF2 or greater; therefore, the annual probability of a significant tornado event is approximately 10 percent.

Probability: 3 – Likely

Climate Change

There presently is not enough data or research to quantify the magnitude of change that climate change may have related to tornado frequency and intensity. NASA's Earth Observatory has conducted studies which aim to understand the interaction between climate change and tornadoes. Based on these studies meteorologists are unsure why some thunderstorms generate tornadoes and others don't, beyond knowing that they require a certain type of wind shear. Tornadoes spawn from approximately one percent of thunderstorms, usually supercell thunderstorms that are in a wind shear environment that promotes rotation. Some studies show a potential for a decrease in wind shear in mid-latitude areas. Because of uncertainty with the influence of climate change on tornadoes, future updates to the mitigation plan

should include the latest research on how the tornado hazard frequency and severity could change. The level of significance of this hazard should be revisited over time.

Vulnerability Assessment

People

People and populations exposed to the elements are most vulnerable to tornados. The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. According to the 2017 American Community Survey (ACS), 12,321 occupied housing units (3.2%) in Wake County are classified as "mobile homes or other types of housing." Based on an estimated average of 2.62 persons per household from the 2017 ACS, there are approximately 32,281 people in Wake County living in mobile homes.

Since 1950, the NCEI records seven fatalities and 213 injuries attributed to tornadoes in Wake County; these fatalities and injuries were the result of tornadoes rated as low as EF0, illustrating the destructive power of tornadoes and the dangers they pose to exposed populations without proper shelter.

Property

General damages to property are both direct (what the tornado physically destroys) and indirect, which focuses on additional costs, damages and losses attributed to secondary hazards spawned by the tornado, or due to the damages caused by the tornado. Depending on the size of the tornado and its path, a tornado is capable of damaging and eventually destroying almost anything. Construction practices and building codes can help maximize the resistance of the structures to damage.

Secondary impacts of tornado damage often result from damage to infrastructure. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. These indirect impacts of a tornado put tremendous strain on a community. In the immediate aftermath, the focus is on emergency services.

Since 1950, damaging tornadoes in the County are directly responsible for $370 million worth of damage to property, and no reported damage to crops, according to NCEI data.

Table 4.74 through Table 4.78 detail the estimated buildings impacted from tornado events of magnitudes ranging from EF0 to EF4. Note that these tables provide an estimate of building damages should all exposed property be impacted by an event of the stated magnitude. Actual damages resulting from a tornado event of each magnitude would be lower because the event would impact only a fraction of the county.

Table 4.74 – Estimated Buildings Impacted by EF0 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$1,462,925,632	6,345	5%	$667,919,732	2,272	1.8%	$214,085,079	128,056	100%	$2,344,930,443
Apex	14,554	13,758	94.5%	$167,077,777	648	4.5%	$38,257,406	148	1%	$11,421,669	14,554	100%	$216,756,852
Cary	45,306	42,944	94.8%	$657,611,160	1,872	4.1%	$203,740,695	462	1%	$47,457,113	45,278	99.9%	$908,808,968
Fuquay-Varina	10,244	9,524	93%	$97,488,272	585	5.7%	$34,843,445	130	1.3%	$8,400,807	10,239	100%	$140,732,524
Garner	11,975	11,103	92.7%	$103,663,128	687	5.7%	$47,520,768	181	1.5%	$11,042,172	11,971	100%	$162,226,068
Holly Springs	9,178	8,887	96.8%	$110,820,398	226	2.5%	$21,378,787	62	0.7%	$9,299,019	9,175	100%	$141,498,204
Knightdale	7,144	6,811	95.3%	$61,152,204	265	3.7%	$14,122,395	67	0.9%	$7,528,413	7,143	100%	$82,803,012
Morrisville	5,181	4,793	92.5%	$78,337,848	340	6.6%	$53,973,286	48	0.9%	$3,355,118	5,181	100%	$135,666,253
Rolesville	2,103	1,983	94.3%	$23,246,517	91	4.3%	$2,529,057	29	1.4%	$1,599,689	2,103	100%	$27,375,263
Wake Forest	10,547	9,852	93.4%	$131,630,797	541	5.1%	$31,561,165	151	1.4%	$13,282,846	10,544	100%	$176,474,808
Wendell	3,728	3,378	90.6%	$24,235,870	277	7.4%	$9,493,528	73	2%	$4,099,871	3,728	100%	$37,829,269
Zebulon	3,074	2,677	87.1%	$18,281,713	316	10.3%	$23,491,799	79	2.6%	$4,733,857	3,072	99.9%	$46,507,369
Unincorporated Wake County	59,372	55,779	93.9%	$697,627,719	3,122	5.3%	$113,926,950	402	0.7%	$21,225,286	59,303	99.9%	$832,779,955
Total	**310,482**	**290,928**	**93.7%**	**$3,634,099,035**	**15,315**	**4.9%**	**$1,262,759,013**	**4,104**	**1.3%**	**$357,530,939**	**310,347**	**100%**	**$5,254,388,988**

Source: NCEM Risk Management Tool

Table 4.75 – Estimated Buildings Impacted by EF1 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$10,416,918,277	6,345	5%	$4,342,524,798	2,272	1.8%	$1,294,088,485	128,056	100%	$16,053,531,561
Apex	14,554	13,758	94.5%	$1,212,459,960	648	4.5%	$247,461,915	148	1%	$57,987,422	14,554	100%	$1,517,909,297
Cary	45,306	42,944	94.8%	$4,768,157,932	1,872	4.1%	$1,241,329,992	462	1%	$233,753,318	45,278	99.9%	$6,243,241,243
Fuquay-Varina	10,244	9,524	93%	$712,500,120	585	5.7%	$236,976,212	130	1.3%	$44,272,459	10,239	100%	$993,748,792
Garner	11,975	11,103	92.7%	$745,557,084	687	5.7%	$303,719,474	181	1.5%	$56,578,357	11,971	100%	$1,105,854,914
Holly Springs	9,178	8,887	96.8%	$813,713,743	226	2.5%	$148,789,896	62	0.7%	$41,802,214	9,175	100%	$1,004,305,852
Knightdale	7,144	6,811	95.3%	$438,850,279	265	3.7%	$85,966,313	67	0.9%	$36,373,280	7,143	100%	$561,189,872
Morrisville	5,181	4,793	92.5%	$552,947,796	340	6.6%	$361,606,818	48	0.9%	$17,676,783	5,181	100%	$932,231,397
Rolesville	2,103	1,983	94.3%	$168,823,830	91	4.3%	$17,561,438	29	1.4%	$7,800,376	2,103	100%	$194,185,643
Wake Forest	10,547	9,852	93.4%	$955,729,364	541	5.1%	$204,624,734	151	1.4%	$63,651,869	10,544	100%	$1,224,005,967
Wendell	3,728	3,378	90.6%	$176,238,985	277	7.4%	$66,293,935	73	2%	$21,394,247	3,728	100%	$263,927,166
Zebulon	3,074	2,677	87.1%	$131,872,300	316	10.3%	$164,254,888	79	2.6%	$23,118,401	3,072	99.9%	$319,245,589
Unincorporated Wake County	59,372	55,779	93.9%	$5,114,080,529	3,122	5.3%	$733,546,995	402	0.7%	$120,924,291	59,303	99.9%	$5,968,551,815
Total	**310,482**	**290,928**	**93.7%**	**$26,207,850,199**	**15,315**	**4.9%**	**$8,154,657,408**	**4,104**	**1.3%**	**$2,019,421,502**	**310,347**	**100%**	**$36,381,929,108**

Source: NCEM Risk Management Tool

Table 4.76 – Estimated Buildings Impacted by EF2 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$21,223,313,072	6,345	5%	$10,355,437,329	2,272	1.8%	$4,239,533,660	128,056	100%	$35,818,284,061
Apex	14,554	13,758	94.5%	$2,353,454,802	648	4.5%	$591,211,502	148	1%	$174,678,795	14,554	100%	$3,119,345,099
Cary	45,306	42,944	94.8%	$9,381,294,545	1,872	4.1%	$2,893,508,918	462	1%	$692,355,748	45,278	99.9%	$12,967,159,211
Fuquay-Varina	10,244	9,524	93%	$1,357,961,297	585	5.7%	$557,139,075	130	1.3%	$136,026,227	10,239	100%	$2,051,126,598
Garner	11,975	11,103	92.7%	$1,457,940,926	687	5.7%	$711,512,671	181	1.5%	$171,283,720	11,971	100%	$2,340,737,317
Holly Springs	9,178	8,887	96.8%	$1,547,349,959	226	2.5%	$341,843,391	62	0.7%	$117,046,571	9,175	100%	$2,006,239,921
Knightdale	7,144	6,811	95.3%	$851,176,294	265	3.7%	$217,744,762	67	0.9%	$106,535,991	7,143	100%	$1,175,457,047
Morrisville	5,181	4,793	92.5%	$1,146,781,961	340	6.6%	$813,377,540	48	0.9%	$54,304,009	5,181	100%	$2,014,463,510
Rolesville	2,103	1,983	94.3%	$308,264,199	91	4.3%	$39,097,268	29	1.4%	$22,970,375	2,103	100%	$370,331,842
Wake Forest	10,547	9,852	93.4%	$1,870,172,080	541	5.1%	$488,179,917	151	1.4%	$185,530,682	10,544	100%	$2,543,882,679
Wendell	3,728	3,378	90.6%	$335,995,281	277	7.4%	$150,755,331	73	2%	$65,397,923	3,728	100%	$552,148,535
Zebulon	3,074	2,677	87.1%	$252,784,640	316	10.3%	$375,997,487	79	2.6%	$68,138,793	3,072	99.9%	$696,920,920
Unincorporated Wake County	59,372	55,779	93.9%	$9,548,933,764	3,122	5.3%	$1,588,978,607	402	0.7%	$385,872,314	59,303	99.9%	$11,523,784,685
Total	**310,482**	**290,928**	**93.7%**	**$51,635,422,820**	**15,315**	**4.9%**	**$19,124,783,798**	**4,104**	**1.3%**	**$6,419,674,808**	**310,347**	**100%**	**$77,179,881,425**

Source: NCEM Risk Management Tool

Table 4.77 – Estimated Buildings Impacted by EF3 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$28,576,604,430	6,345	5%	$13,504,553,706	2,272	1.8%	$6,642,125,388	128,056	100%	$48,723,283,524
Apex	14,554	13,758	94.5%	$2,923,595,780	648	4.5%	$724,986,285	148	1%	$269,979,885	14,554	100%	$3,918,561,950
Cary	45,306	42,944	94.8%	$11,829,754,049	1,872	4.1%	$3,864,515,984	462	1%	$1,066,920,830	45,278	99.9%	$16,761,190,862
Fuquay-Varina	10,244	9,524	93%	$1,631,307,520	585	5.7%	$659,165,839	130	1.3%	$210,954,786	10,239	100%	$2,501,428,145
Garner	11,975	11,103	92.7%	$1,857,319,426	687	5.7%	$853,420,096	181	1.5%	$264,960,887	11,971	100%	$2,975,700,409
Holly Springs	9,178	8,887	96.8%	$1,835,972,479	226	2.5%	$387,175,562	62	0.7%	$178,518,663	9,175	100%	$2,401,666,703
Knightdale	7,144	6,811	95.3%	$1,080,680,577	265	3.7%	$277,956,147	67	0.9%	$163,844,433	7,143	100%	$1,522,481,156
Morrisville	5,181	4,793	92.5%	$1,591,480,162	340	6.6%	$999,330,152	48	0.9%	$84,214,790	5,181	100%	$2,675,025,104
Rolesville	2,103	1,983	94.3%	$358,315,781	91	4.3%	$46,907,622	29	1.4%	$35,360,834	2,103	100%	$440,584,236
Wake Forest	10,547	9,852	93.4%	$2,339,356,223	541	5.1%	$607,802,624	151	1.4%	$285,082,674	10,544	100%	$3,232,241,521
Wendell	3,728	3,378	90.6%	$408,087,164	277	7.4%	$174,844,420	73	2%	$101,333,244	3,728	100%	$684,264,828
Zebulon	3,074	2,677	87.1%	$313,983,232	316	10.3%	$426,760,361	79	2.6%	$104,910,127	3,072	99.9%	$845,653,721
Unincorporated Wake County	59,372	55,779	93.9%	$11,143,245,954	3,122	5.3%	$2,045,383,452	402	0.7%	$602,203,730	59,303	99.9%	$13,790,833,135
Total	**310,482**	**290,928**	**93.7%**	**$65,889,702,777**	**15,315**	**4.9%**	**$24,572,802,250**	**4,104**	**1.3%**	**$10,010,410,271**	**310,347**	**100%**	**$100,472,915,294**

Source: NCEM Risk Management Tool

Table 4.78 – Estimated Buildings Impacted by EF4 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	119,439	93.3%	$29,468,067,648	6,345	5%	$14,005,762,959	2,272	1.8%	$7,061,665,278	128,056	100%	$50,535,495,885
Apex	14,554	13,758	94.5%	$2,965,533,313	648	4.5%	$750,339,784	148	1%	$294,007,286	14,554	100%	$4,009,880,383
Cary	45,306	42,944	94.8%	$12,033,926,207	1,872	4.1%	$4,040,134,449	462	1%	$1,167,820,191	45,278	99.9%	$17,241,880,847
Fuquay-Varina	10,244	9,524	93%	$1,642,621,151	585	5.7%	$674,061,968	130	1.3%	$228,386,862	10,239	100%	$2,545,069,981
Garner	11,975	11,103	92.7%	$1,894,788,588	687	5.7%	$880,357,811	181	1.5%	$288,113,216	11,971	100%	$3,063,259,615
Holly Springs	9,178	8,887	96.8%	$1,843,041,904	226	2.5%	$393,774,934	62	0.7%	$198,882,516	9,175	100%	$2,435,699,353
Knightdale	7,144	6,811	95.3%	$1,102,127,131	265	3.7%	$291,500,076	67	0.9%	$179,955,706	7,143	100%	$1,573,582,913
Morrisville	5,181	4,793	92.5%	$1,650,698,135	340	6.6%	$1,025,653,699	48	0.9%	$91,177,528	5,181	100%	$2,767,529,362
Rolesville	2,103	1,983	94.3%	$358,765,272	91	4.3%	$48,227,632	29	1.4%	$38,773,663	2,103	100%	$445,766,568
Wake Forest	10,547	9,852	93.4%	$2,375,799,550	541	5.1%	$631,897,853	151	1.4%	$313,586,439	10,544	100%	$3,321,283,842
Wendell	3,728	3,378	90.6%	$412,070,013	277	7.4%	$178,076,927	73	2%	$109,872,126	3,728	100%	$700,019,067
Zebulon	3,074	2,677	87.1%	$318,729,205	316	10.3%	$432,971,166	79	2.6%	$115,004,270	3,072	99.9%	$866,704,641
Unincorporated Wake County	59,372	55,779	93.9%	$11,151,176,373	3,122	5.3%	$2,101,325,727	402	0.7%	$644,903,139	59,303	99.9%	$13,897,405,239
Total	**310,482**	**290,928**	**93.7%**	**$67,217,344,490**	**15,315**	**4.9%**	**$25,454,084,985**	**4,104**	**1.3%**	**$10,732,148,220**	**310,347**	**100%**	**$103,403,577,696**

Source: NCEM Risk Management Tool

Environment

Tornadoes can cause massive damage to the natural environment, uprooting trees and other debris within the tornado's path. This is part of a natural process, however, and the environment will return to its original state in time.

Consequence Analysis

Table 4.79 summarizes the potential negative consequences of tornado.

Table 4.79 – Consequence Analysis - Tornado

Category	Consequences
Public	Injuries; fatalities
Responders	Injuries; fatalities; potential impacts to response capabilities due to storm impacts
Continuity of Operations (including Continued Delivery of Services)	Potential impacts to continuity of operations due to storm impacts; delays in providing services
Property, Facilities and Infrastructure	The weakest tornadoes, EF0, can cause minor roof damage, while strong tornadoes can destroy frame buildings and even badly damage steel reinforced concrete structures. Buildings are vulnerable to direct impact from tornadoes and also from wind borne debris. Mobile homes are particularly susceptible to damage during tornadoes.
Environment	Potential devastating impacts in storm's path
Economic Condition of the Jurisdiction	Contingent on tornado's path; can severely impact/destroy critical infrastructure and other economic drivers
Public Confidence in the Jurisdiction's Governance	Public confidence in the jurisdiction's governance may be influenced by severe tornado events if response and recovery are not timely and effective.

Hazard Summary by Jurisdiction

The following table summarizes tornado hazard risk by jurisdiction. Tornado hazard risk does not vary substantially by jurisdiction.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	3	3	2	4	1	2.7	H
Apex	3	3	2	4	1	2.7	H
Cary	3	3	2	4	1	2.7	H
Fuquay-Varina	3	3	2	4	1	2.7	H
Garner	3	3	2	4	1	2.7	H
Holly Springs	3	3	2	4	1	2.7	H
Knightdale	3	3	2	4	1	2.7	H
Morrisville	3	3	2	4	1	2.7	H
Raleigh	3	3	2	4	1	2.7	H
Rolesville	3	3	2	4	1	2.7	H
Wake Forest	3	3	2	4	1	2.7	H
Wendell	3	3	2	4	1	2.7	H
Zebulon	3	3	2	4	1	2.7	H

4.5.11 Wildfire

Hazard Background

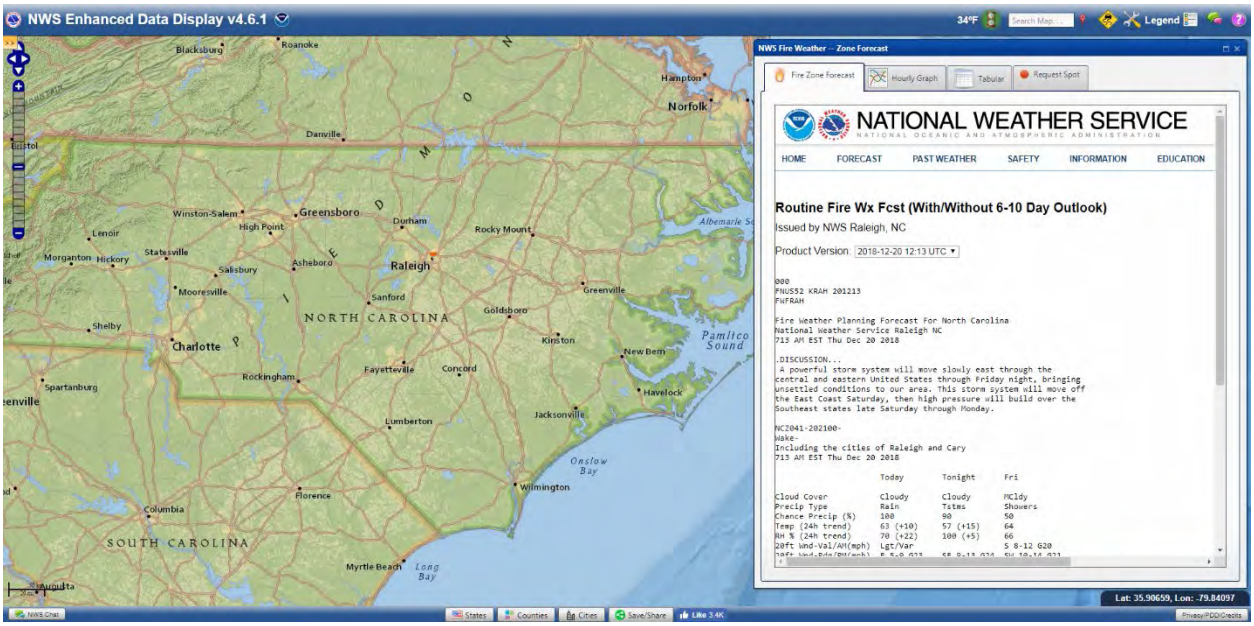
A wildfire is an uncontained fire that spreads through the environment. Wildfires have the ability to consume large areas, including infrastructure, property, and resources. When massive fires, or conflagrations, develop near populated areas, evacuations possibly ensue. Not only do the flames impact the environment, but the massive volumes of smoke spread by certain atmospheric conditions also impact the health of nearby populations. There are three general types of fire spread that are recognized.

- **Ground fires** – burn organic matter in the soil beneath surface litter and are sustained by glowing combustion.
- **Surface fires** – spread with a flaming front and burn leaf litter, fallen branches and other fuels located at ground level.
- **Crown fires** – burn through the top layer of foliage on a tree, known as the canopy or crown fires. Crown fires, the most intense type of fire and often the most difficult to contain, need strong winds, steep slopes and a heavy fuel load to continue burning.

Generally, wildfires are started by humans, either through arson or carelessness. Fire intensity is controlled by both short-term weather conditions and longer-term vegetation conditions. During intense fires, understory vegetation, such as leaves, small branches, and other organic materials that accumulate on the ground, can become additional fuel for the fire. The most explosive conditions occur when dry, gusty winds blow across dry vegetation.

Weather plays a major role in the birth, growth and death of a wildfire. In support of forecasting for fire weather, the National Weather Service Fire Weather Program emerged in response to a need for weather support to large and dangerous wildfires. This service is provided to federal and state land management agencies for the prevention, suppression, and management of forest and rangeland fires. As shown in Figure 4.21, the National Weather Service Raleigh Forecast Office provides year-round fire weather forecasts for Wake County.

Figure 4.21 – Fire Weather Forecast, Wake County



Source: National Weather Service

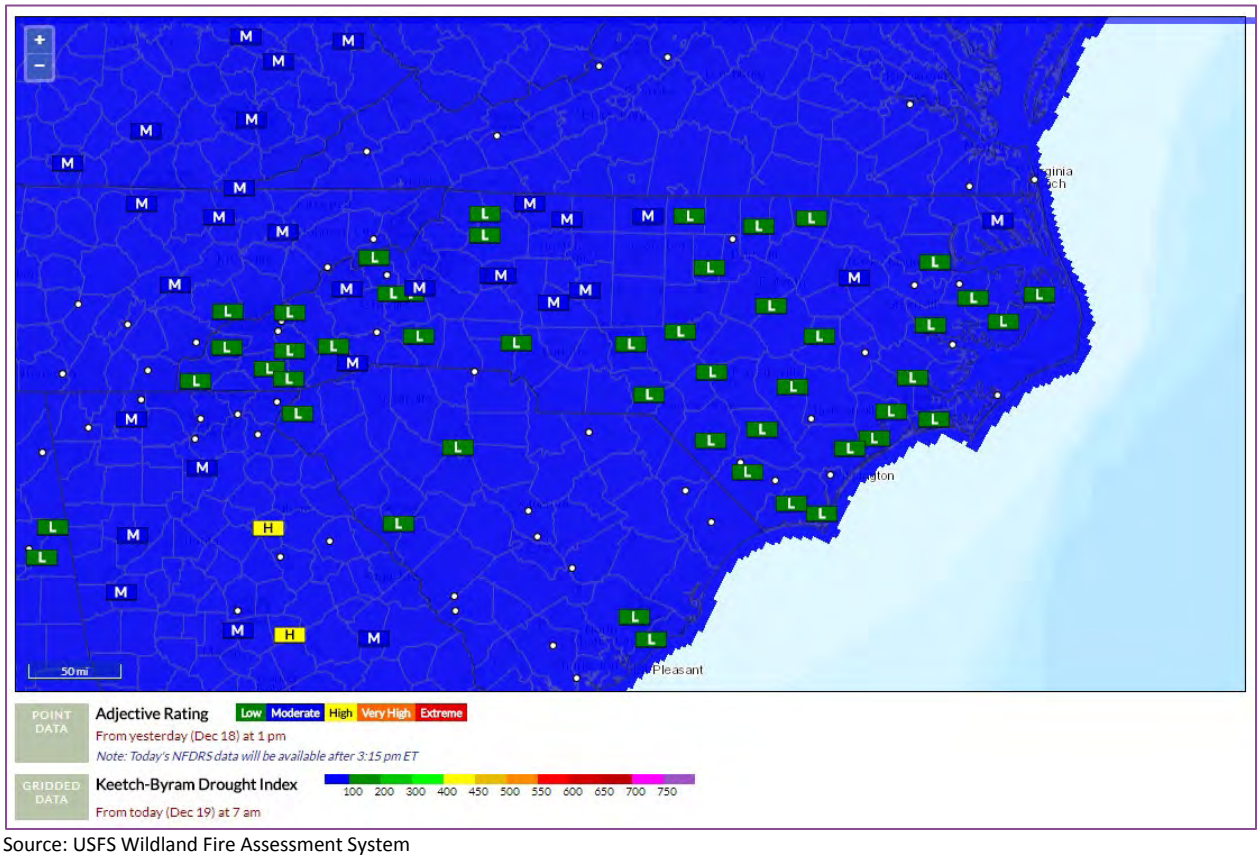
Weather conditions favorable to wildfire include drought, which increases flammability of surface fuels, and winds, which aid a wildfire's progress. The combination of wind, temperature, and humidity affects how fast wildland fires can spread. Rapid response can contain wildfires and limit their threat to property.

Wake County experiences a variety of wildfire conditions found in the Keetch-Byram Drought Index, which is described in Table 4.80. The Keetch-Byram Drought Index (KBDI) for December 19, 2018 is shown in Figure 4.22 along with a Daily Fire Danger Estimate Adjective Rating for certain points across the state. The KBDI for Wake County at this time was below 100, and the Fire Danger Estimate for the nearby area was "Low."

Table 4.80 – Keetch-Byram Drought Index Fire Danger Rating System

KBDI	Description
0-200	Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in sports and patches.
200-400	Fires more readily burn and will carry across an area with no gaps. Heavier fuels will still not readily ignite and burn. Also, expect smoldering and the resulting smoke to carry into and possibly through the night.
400-600	Fire intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.
600-800	Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

Figure 4.22 – Keetch-Byram Drought Index, December 2018



Source: USFS Wildland Fire Assessment System

Warning Time: 4 – Less than 6 hours

Duration: 3 – Less than 1 week

Location

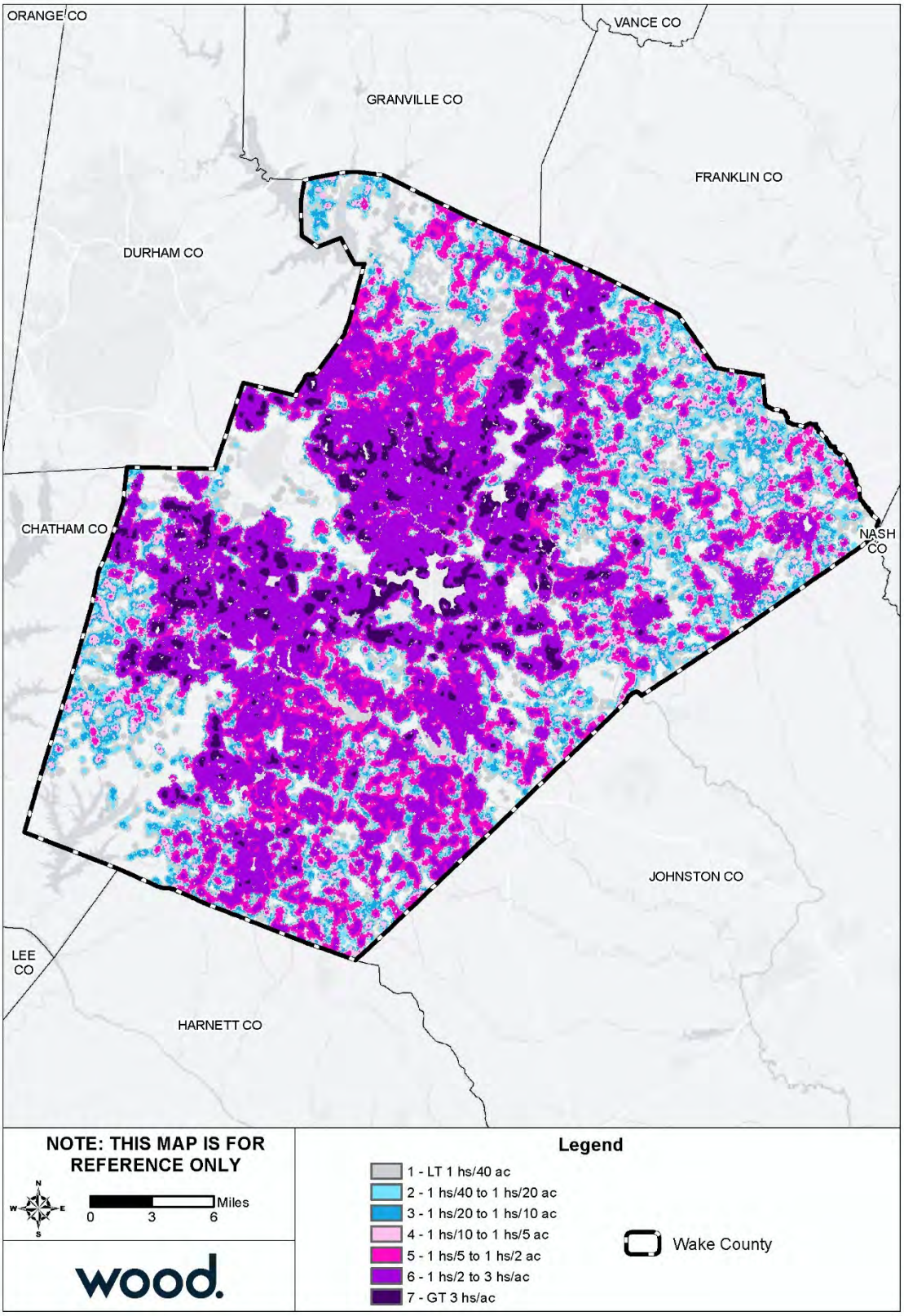
The location of wildfire risk can be defined by the acreage of Wildland Urban Interface (WUI). The WUI is described as the area where structures and other human improvements meet and intermingle with undeveloped wildland or vegetative fuels, and thus demarcates the spatial extent of wildfire risk. The WUI is essentially all the land in the county that is not heavily urbanized. The Southern Wildfire Risk Assessment (SWRA) estimates that 96 percent of the Wake County population lives within the WUI. The expansion of residential development from urban centers out into rural landscapes increases the potential for wildland fire threat to public safety and the potential for damage to forest resources and dependent industries. Population growth within the WUI substantially increases the risk of wildfire. Table 4.81 details the extent of the WUI in Wake County, and Figure 4.23 maps the WUI.

Table 4.81 – Wildland Urban Interface, Population and Acres

	Housing Density	WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
	LT 1hs/40ac	943	0.1 %	42,258	9.7 %
	1hs/40ac to 1hs/20ac	1,975	0.2 %	33,961	7.8 %
	1hs/20ac to 1hs/10ac	5,417	0.6 %	44,188	10.1 %
	1hs/10ac to 1hs/5ac	13,722	1.6 %	52,621	12.1 %
	1hs/5ac to 1hs/2ac	49,907	5.8 %	76,831	17.6 %
	1hs/2ac to 3hs/1ac	511,813	59.1 %	161,007	36.9 %
	GT 3hs/1ac	281,706	32.5 %	24,986	5.7 %
	Total	**865,483**	**100.0 %**	**435,852**	**100.0 %**

Source: Southern Wildfire Risk Assessment

Figure 4.23 – Wildland Urban Interface, Wake County



Source: Southern Wildfire Risk Assessment

Extent

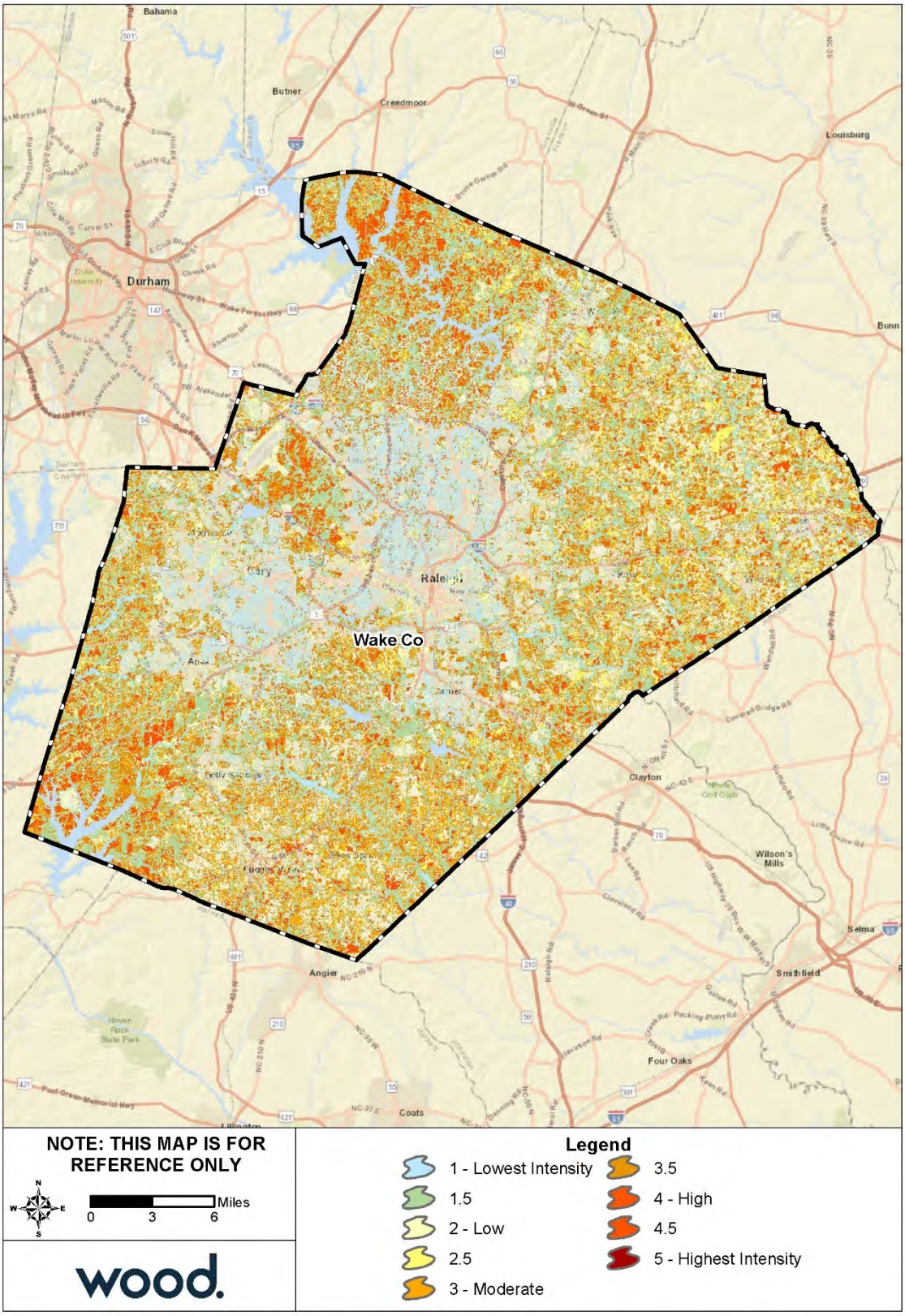
Wildfire extent can be defined by the fire's intensity and measured by the Characteristic Fire Intensity Scale, which identifies areas where significant fuel hazards which could produce dangerous fires exist. Fire Intensity ratings identify where significant fuel hazards and dangerous fire behavior potential exist based on fuels, topography, and a weighted average of four percentile weather categories. The Fire Intensity Scale consists of five classes, as defined by Southern Wildfire Risk Assessment. Figure 4.24 shows the potential fire intensity within the WUI across Wake County.

Table 4.82 – Fire Intensity Scale

Class	Description
1, Very Low	Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
2, Low	Small flames, usually less than two feet long; small amount of very short range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
3, Moderate	Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
4, High	Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
5, Very High	Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

Source: Southern Wildfire Risk Assessment

Figure 4.24 – Characteristic Fire Intensity, Wake County



Source: Southern Wildfire Risk Assessment

A small portion, approximately 7 percent, of Wake County may experience up to a Class 4 Fire Intensity, which poses significant harm or damage to life and property. Over 22 percent of Wake County may experience Class 3 Fire Intensity, which has potential for harm to life and property but is easier to suppress with dozer and plows. The remainder of the county is either non-burnable (26.4%) or would face a Class 1 or Class 2 Fire Intensity, which are easily suppressed.

Impact: 2 – Limited

Spatial Extent: 3 – Moderate

Historical Occurrences

The North Carolina Forest Service (NCFS) began keeping records of fire occurrence on private and state-owned lands in 1928. Since this time, there has been an average of approximately 4,000 fires burning more than 115,000 acres annually. Recently, within the last 10 years, the State has averaged closer to 3,200 fires per year and 15,000 acres burned annually.

Table 5.17 lists past occurrences of wildfire in Wake County since 2009 as provided by the North Carolina Forest Service (NCFS) in January 2019. This data only accounts for occurrences within unincorporated Wake County, which fall under the NCFS jurisdiction, as well as larger events in incorporated areas where local fire departments requested NCFS support for fire suppression. Actual number of fires and acreage burned are higher than what can be reported here.

Table 4.83 – Records for Wildfire in Wake County, 2009-2018

Year	Number of Fires	Acreage Burned
2009	2	17.3
2010	21	130.2
2011	17	225.0
2012	13	101.0
2013	1	2.5
2014	3	5.1
2015	3	32.1
2016	23	75.4
2017	27	148.3
2018	11	40.2
Total	**101**	**777.1**

Source: NC Forest Service

Wake County experienced prolonged periods of severe drought in 2010 and 2011, as well as moderate drought in 2009, 2012, 2013, 2015, and 2017. These periods of drought may explain some of the annual variation in fires and acreage burned.

On average, Wake County experiences 10.1 fires and 77.7 acres burned annually from fires that require the North Carolina Forest Service to respond. Actual number of fires and acreage burned is likely higher because smaller fires within jurisdictional boundaries are managed by local fire departments.

Probability of Future Occurrence

The Southern Wildfire Risk Assessment provides a Burn Probability analysis which predicts the probability of an area burning based on landscape conditions, weather, historical ignition patterns, and historical fire prevention and suppression efforts. Burn Probability data is generated by simulating fires under different weather, fire intensity, and other conditions. Values in the Burn Probability (BP) data layer indicate, for

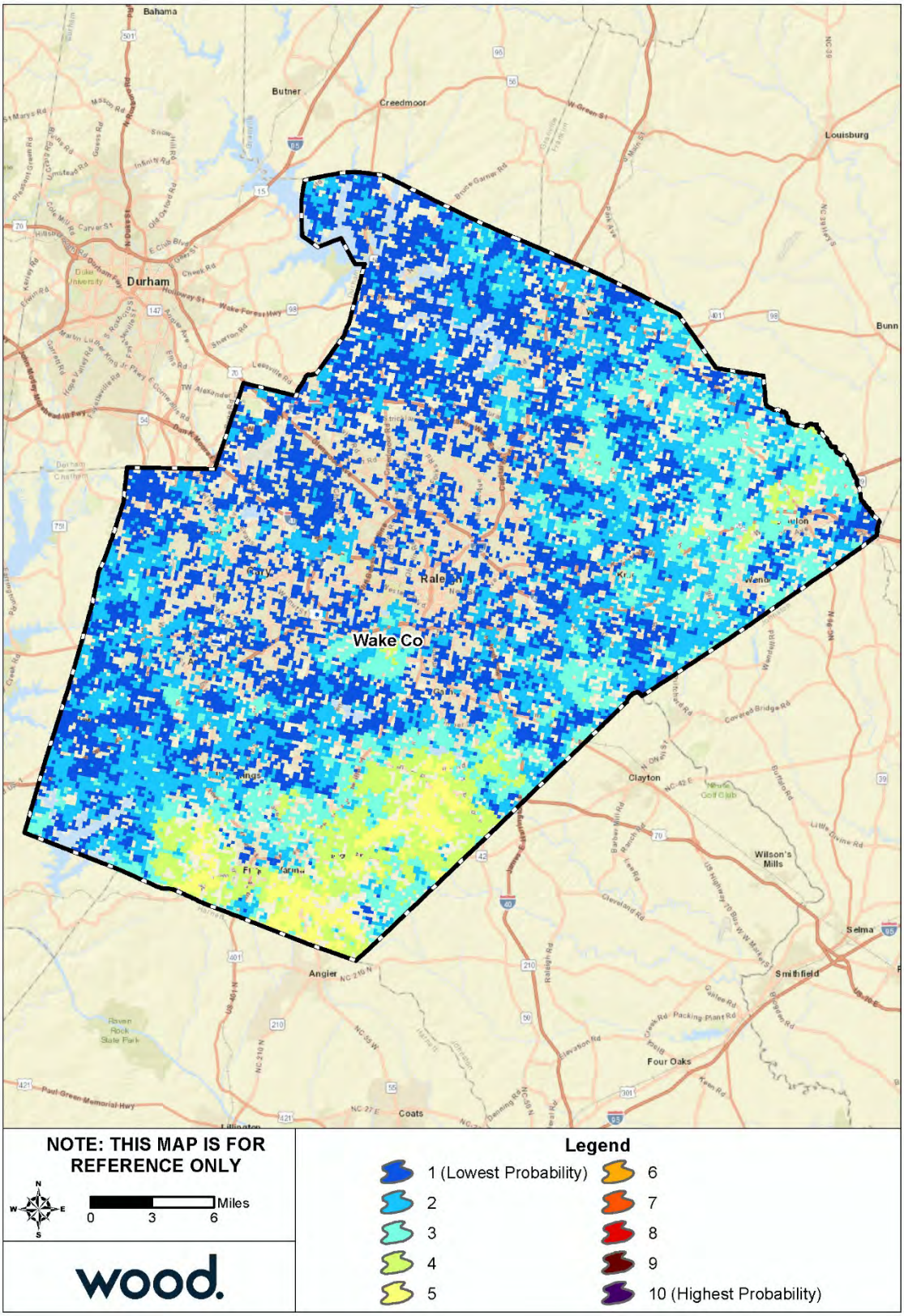
each pixel, the number of times that cell was burned by a modeled fire, divided by the total number of annual weather scenarios simulated. The simulations are calibrated to historical fire size distributions. The Burn Probability for Wake County is presented in Table 4.84 and illustrated in Fig.

Table 4.84 – Burn Probability, Wake County

Class	Acres	Percent
1	146,796	39.8 %
2	125,323	34.0 %
3	59,446	16.1 %
4	25,400	6.9 %
5	11,763	3.2 %
6	0	0.0 %
7	0	0.0 %
8	0	0.0 %
9	0	0.0 %
10	0	0.0 %
Total	**368.728**	**100.0 %**

Source: Southern Wildfire Risk Assessment

Figure 4.25 – Burn Probability, Wake County



Source: Southern Wildfire Risk Assessment

All of Wake County has a relatively low burn probability, with the highest probabilities reaching a rating of 5 or less. The areas of moderate burn probability are located primarily in the southeast of the county in Fuquay-Varina, Garner, and the unincorporated county, with an additional small cluster in the northeast in and around Zebulon. The probability of wildfire across the county is considered possible, defined as between a 1% and 10% annual chance of occurrence. While all jurisdictions fall within this threshold, the communities containing moderate burn probability, noted above, have a comparatively higher probability of occurrence.

Probability: 2 – Possible

Climate Change

Wildfires are usually prevalent with a combination of high temperatures and dry conditions, combustible fuels and an ignition source. Climate change has been linked to longer, warmer and drier conditions in the Southeast, exacerbating key potential conditions for a wildfire to spread.

Vulnerability Assessment

Methodologies and Assumptions

Population and property at risk to wildfire was estimated using data from the North Carolina Emergency Management (NCEM) IRISK database, which was compiled in NCEM's Risk Management Tool.

Within IRISK, wildfire hazard areas were determined using the Wildland Fire Susceptibility Index (WFSI). The following parameters were applied:

- Areas with a WFSI value of 0.01 – 0.05 were considered to be at moderate risk.
- Areas with a WFSI value greater than 0.05 were considered to be at high risk.
- Areas with a WFSI value less than 0.01 were considered to not be at risk.

The WFSI integrates the probability of an acre igniting and the expected final fire size based on the rate of spread in four weather percentile categories into a single measure of wildland fire susceptibility. Due to some necessary assumptions, mainly fuel homogeneity, it is not the true probability. But since all areas of the state have this value determined consistently, it allows for comparison and ordination of areas of the state as to the likelihood of an acre burning.

People

Wildfire can cause fatalities and human health hazards. Ensuring procedures are in place for rapid warning and evacuation are essential to reducing vulnerability. Table 4.85 details the population estimated to be at risk to wildfire according to the NCEM IRISK database.

Table 4.85 – Estimated Population Impacted by Wildfire

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Raleigh	419,053	14	0%	35,611	1	0%	30,469	1	0%
Apex	41,724	0	0%	3,546	0	0%	3,034	0	0%
Cary	136,260	0	0%	11,579	0	0%	9,907	0	0%
Fuquay-Varina	25,023	527	2.10%	2,126	45	2.10%	1,819	38	2.10%
Garner	30,981	0	0%	2,633	0	0%	2,253	0	0%

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Holly Springs	25,790	0	0%	2,192	0	0%	1,875	0	0%
Knightdale	18,501	92	0.50%	1,572	8	0.50%	1,345	7	0.50%
Morrisville	18,655	0	0%	1,585	0	0%	1,356	0	0%
Rolesville	5,199	0	0%	442	0	0%	378	0	0%
Wake Forest	30,382	0	0%	2,582	0	0%	2,209	0	0%
Wendell	7,889	89	1.10%	670	8	1.20%	574	6	1%
Zebulon	6,102	71	1.20%	519	6	1.20%	444	5	1.10%
Unincorporated Wake County	135,124	470	0.30%	11,483	40	0.30%	9,825	34	0.30%
Total	**900,683**	**1,263**	**0.14%**	**76,540**	**108**	**0.14%**	**65,488**	**91**	**0.14%**

Source: NCEM Risk Management Tool

Property

Wildfire can cause direct property losses, including damage to buildings, vehicles, landscaped areas, agricultural lands, and livestock. Construction practices and building codes can increase fire resistance and fire safety of structures. Techniques for reducing vulnerability to wildfire include using street design to ensure accessibility to fire trucks, incorporating fire resistant materials in building construction, and using landscaping practices to reduce flammability and the ability for fire to spread.

Table 4.87 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings across all jurisdictions, by sector. The sectors facing the greatest risk to wildfire in Wake County are critical manufacturing, commercial facilities, food and agriculture, and transportation systems.

Table 4.86 details the buildings at risk to wildfire in Wake County.

Table 4.86 – Estimated Buildings Impacted by Wildfire

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Raleigh	128,076	4	0%	$472,031	2	0%	$381,965	0	0%	$0	6	0%	$853,996
Apex	14,554	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Cary	45,306	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Fuquay-Varina	10,244	201	2%	$42,797,092	3	0%	$7,290,895	0	0%	$0	204	2%	$50,087,987
Garner	11,975	0	0%	$0	1	0%	$19,571,810	0	0%	$0	1	0%	$19,571,810
Holly Springs	9,178	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Knightdale	7,144	34	0.5%	$3,182,975	3	0%	$157,144	0	0%	$0	37	0.5%	$3,340,119
Morrisville	5,181	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Rolesville	2,103	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Wake Forest	10,547	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Wendell	3,728	38	1%	$4,977,285	0	0%	$0	0	0%	$0	38	1%	$4,977,285
Zebulon	3,074	31	1%	$1,978,442	1	0%	$71,156	0	0%	$0	32	1%	$2,049,598
Unincorporated Wake County	59,372	194	0.3%	$36,581,396	60	0.1%	$7,760,387	3	0%	$3,453,114	257	0.4%	$47,794,897
Total	**310,482**	**502**	**0.2%**	**$89,989,221**	**70**	**0%**	**$35,233,357**	**3**	**0%**	**$3,453,114**	**575**	**0.2%**	**$128,675,692**

Source: NCEM Risk Management Tool

Table 4.87 – Critical Infrastructure and Key Resources Buildings at Risk to Wildfire by Sector

Sector	Number of Buildings at Risk	Estimated Damages
Commercial Facilities	7	$11,385,851
Critical manufacturing	7	$24,434,636
Food and Agriculture	57	$2,484,018
Transportation Systems	2	$381,965
All Categories	**73**	**$38,686,470**

Source: NCEM Risk Management Tool

Environment

Wildfires have the potential to destroy forest and forage resources and damage natural habitats. Wildfire can also damage agricultural crops on private land. Wildfire is part of a natural process, however, and the environment will return to its original state in time.

Consequence Analysis

Table 4.88 summarizes the potential detrimental consequences of wildfire.

Table 4.88 – Consequence Analysis - Wildfire

Category	Consequences
Public	In addition to the potential for fatalities, wildfire and the resulting diminished air quality pose health risks. Exposure to wildfire smoke can cause serious health problems within a community, including asthma attacks and pneumonia, and can worsen chronic heart and lung diseases. Vulnerable populations include children, the elderly, people with respiratory problems or with heart disease. Even healthy citizens may experience minor symptoms, such as sore throats and itchy eyes.
Responders	Public and firefighter safety is the first priority in all wildland fire management activities. Wildfires are a real threat to the health and safety of the emergency services. Most fire-fighters in rural areas are 'retained'. This means that they are part-time and can be called away from their normal work to attend to fires.
Continuity of Operations (including Continued Delivery of Services)	Wildfire events can result in a loss of power which may impact operations. Downed trees, power lines and damaged road conditions may prevent access to critical facilities and/or emergency equipment.
Property, Facilities and Infrastructure	Wildfires frequently damage community infrastructure, including roadways, communication networks and facilities, power lines, and water distribution systems. Restoring basic services is critical and a top priority. Efforts to restore roadways include the costs of maintenance and damage assessment teams, field data collection, and replacement or repair costs. Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground distribution lines, and soil erosion or debris deposits into waterways after the fire. Utilities and communications repairs are also necessary for equipment damaged by a fire. This includes power lines, transformers, cell phone towers, and phone lines.
Environment	Wildfires cause damage to the natural environment, killing vegetation and animals. The risk of floods and debris flows increases after wildfires due to the exposure of bare ground and the loss of vegetation. In addition, the secondary effects of wildfires, including erosion, landslides, introduction of invasive species, and changes in water quality, are often more disastrous than the fire itself.
Economic Condition of the Jurisdiction	Wildfires can have significant short-term and long-term effects on the local economy. Wildfires, and extreme fire danger, may reduce recreation and tourism in and near the fires. If aesthetics are impaired, local property values can decline. Extensive fire

	damage to trees can significantly alter the timber supply, both through a short-term surplus from timber salvage and a longer-term decline while the trees regrow. Water supplies can be degraded by post-fire erosion and stream sedimentation. Wildfires can also have positive effects on local economies. Positive effects come from economic activity generated in the community during fire suppression and post-fire rebuilding. These may include forestry support work, such as building fire lines and performing other defenses, or providing firefighting teams with food, ice, and amenities such as temporary shelters and washing machines.
Public Confidence in the Jurisdiction's Governance	Wildfire events may cause issues with public confidence because they have very visible impacts on the community. Public confidence in the jurisdiction's governance may be influenced by: • The jurisdiction's actions taken pre-disaster to mitigate and prepare for impacts, including the amount of public education provided • The jurisdiction's efforts to provide warning to residents • The jurisdiction's actions taken to respond to the event • The jurisdiction's actions taken to recover from the impacts and return impacted communities to the same or better state before the wildfire occurred

Hazard Summary by Jurisdiction

The following table summarizes wildfire hazard risk by jurisdiction. Wildfire warning time and duration do not vary by jurisdiction. Spatial extent ratings were based on the proportion of area within the WUI; all jurisdictions have at least 50% of their area in the WUI and were assigned a rating of 3. Impact ratings were based on fire intensity data from SWRA. Jurisdictions with significant clusters of moderate to high fire intensity were assigned a rating of 3; all other jurisdictions were assigned a rating of 2. Probability ratings were determined based on burn probability data from SWRA. Jurisdictions with clusters of moderate burn probability were assigned a rating of 3; all other jurisdictions were assigned a probability of 2.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Wake County	3	3	3	4	3	3.1	H
Apex	2	2	3	4	3	2.5	H
Cary	2	2	3	4	3	2.5	H
Fuquay-Varina	3	2	3	4	3	2.8	H
Garner	3	2	3	4	3	2.8	H
Holly Springs	3	2	3	4	3	2.8	H
Knightdale	2	3	3	4	3	2.8	H
Morrisville	2	2	3	4	3	2.5	H
Raleigh	2	2	3	4	3	2.5	H
Rolesville	2	3	3	4	3	2.8	H
Wake Forest	2	2	3	4	3	2.5	H
Wendell	2	2	3	4	3	2.5	H
Zebulon	3	2	3	4	3	2.8	H

4.5.12 Hazardous Materials Incident

Hazard Background

A hazardous substance is any substance that may cause harm to persons, property, or the environment when released to soil, water, or air. Chemicals are manufactured and used in increasing types and quantities. Each year over 1,000 new synthetic chemicals are introduced and as many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals". Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous material incidents generally affect a localized area.

Fixed Hazardous Materials Incident

A fixed hazardous materials incident is the accidental release of chemical substances or mixtures during production or handling at a fixed facility.

Transportation Hazardous Materials Incident

A transportation hazardous materials incident is the accidental release of chemical substances or mixtures during transport. Transportation Hazardous Materials Incidents in Wake County can occur during highway or air transport. Highway accidents involving hazardous materials pose a great potential for public exposures. Both nearby populations and motorists can be impacted and become exposed by accidents and releases. If airplanes carrying hazardous cargo crash, or otherwise leak contaminated cargo, populations and the environment in the impacted area can become exposed.

Pipeline Incident

A pipeline transportation incident occurs when a break in a pipeline creates the potential for an explosion or leak of a dangerous substance (oil, gas, etc.) possibly requiring evacuation. An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small, slow leak to a large rupture where an explosion is possible. Inspection and maintenance of the pipeline system along with marked gas line locations and an early warning and response procedure can lessen the risk to those near the pipelines.

Warning Time Score: 4 – Less than six hours

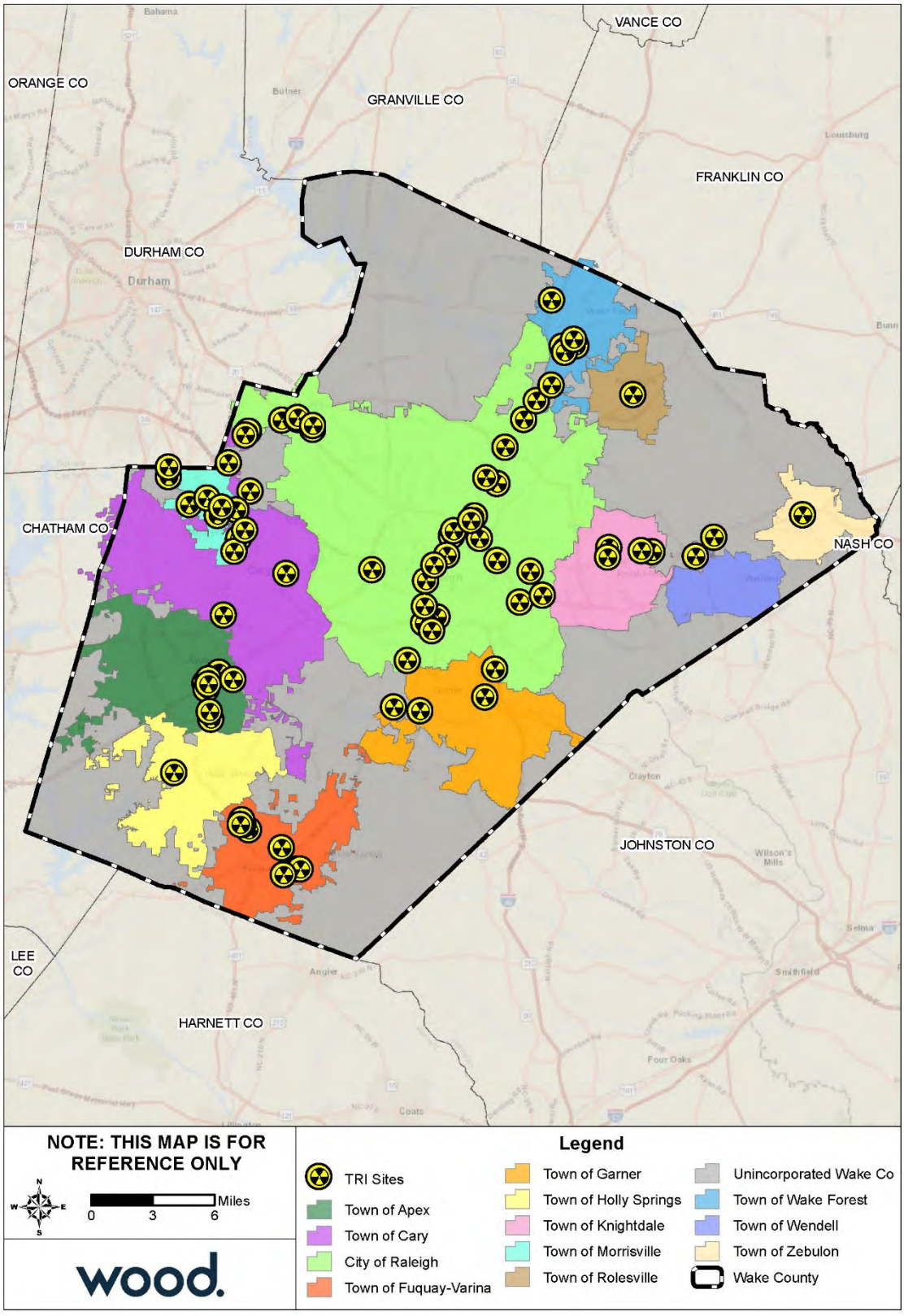
Duration Score: 2 – Less than 24 hours

Location

The Toxics Release Inventory (TRI) Program run by the U.S. Environmental Protection Agency (EPA) maintains a database of industrial facilities across the country and the type and quantity of toxic chemicals they release. The program also tracks pollution prevention activities and which facilities are reducing toxic releases. The Toxic Release Inventory reports 35 sites with hazardous materials in Wake County. These sites are shown in Figure 4.26.

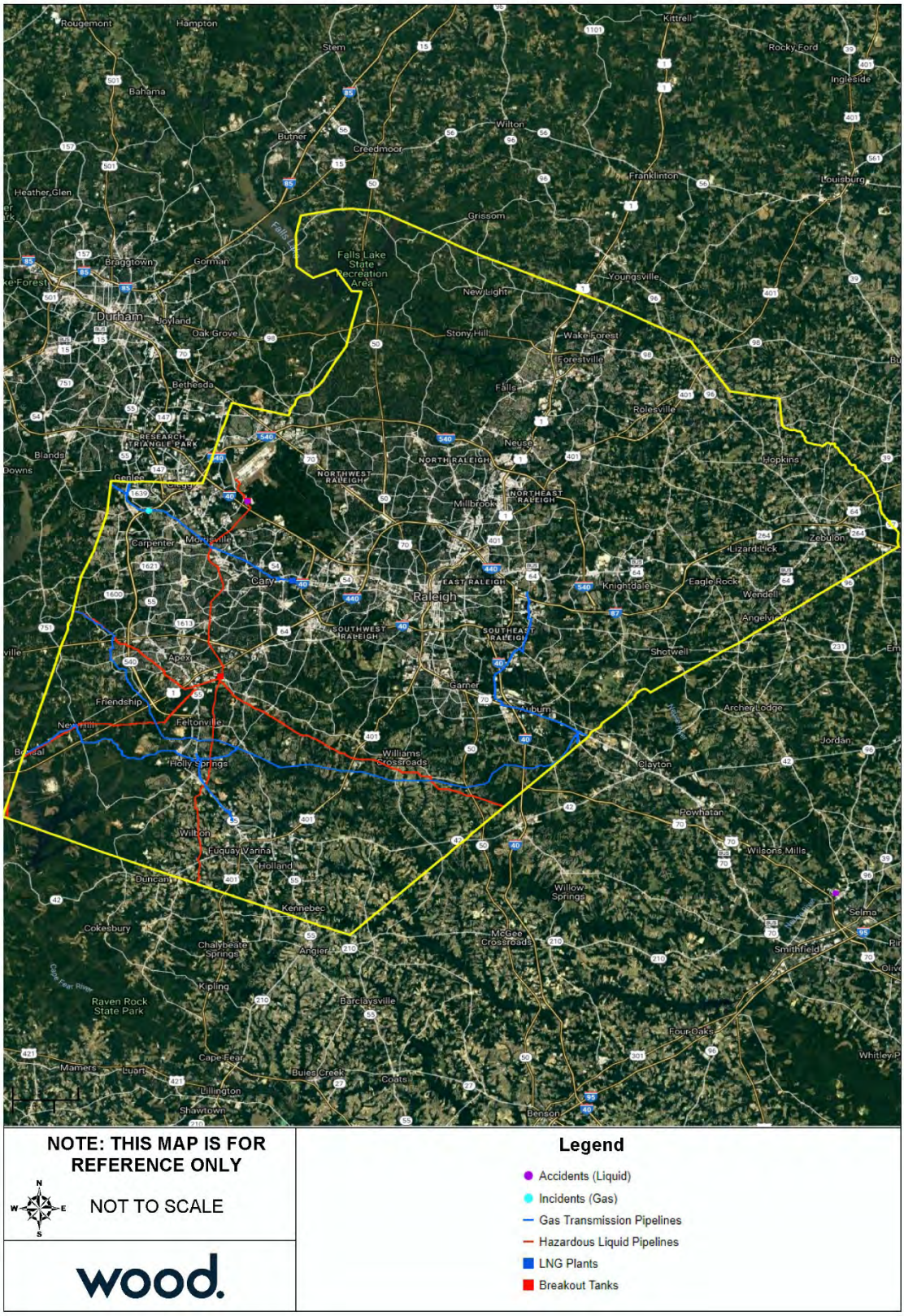
The U.S. Department of Transportation (USDOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) maintains an inventory of the location of all gas transmission and hazardous liquid pipelines as well as liquid natural gas plants and hazardous liquid breakout tanks. The location of pipelines and pipeline infrastructure in Wake County are shown in Figure 4.27, as reported in the public viewer of the National Pipeline Mapping System.

Figure 4.26 – Toxic Release Inventory Sites in Wake County



Source: EPA Toxic Release Inventory

Figure 4.27 – Pipelines and Pipeline Infrastructure in Wake County



Source: US Department of Transportation, Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System

Extent

The magnitude of a hazardous materials incident can be defined by the material type, the amount released, and the location of the release. The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA), which records hazardous material incidents across the country, defines a "serious incident" as a hazardous materials incident that involves:

- a fatality or major injury caused by the release of a hazardous material,
- the evacuation of 25 or more persons as a result of release of a hazardous material or exposure to fire,
- a release or exposure to fire which results in the closure of a major transportation artery,
- the alteration of an aircraft flight plan or operation,
- the release of radioactive materials from Type B packaging,
- the release of over 11.9 galls or 88.2 pounds of a severe marine pollutant, or
- the release of a bulk quantity (over 199 gallons or 882 pounds) of a hazardous material.

Impact: 1 – Minor

Spatial Extent: 1 – Negligible

Historical Occurrences

The USDOT PHMSA's National Pipeline Mapping System records two events within Wake County:

April 6, 2005 – Excavation damage recorded on a PSNC Energy pipeline. No fatalities or injuries occurred.

September 16, 2009 – Damage occurred on to a Colonial Pipeline Co. pipeline causing 0.90 barrels of aviation kerosene to be released. The cause of the accident was reported as "Material/Weld/Equipment Failure".

PHMSA also maintains a database of other reported hazardous materials incidents, which are summarized in Table 4.89 by hazard class and mode of transport. According to PHMSA records, there were 589 recorded releases in Wake County from 1999 through 2018. Fifteen events were considered serious incidents, of which 13 were serious bulk releases; 6 events were flagged for serious evacuation.

Table 4.89 – Hazardous Materials Releases in Wake County, 1999 – 2018

	Mode of Release	Hazard Class	Incident Count
Wake County			**2**
	Highway	Miscellaneous Hazardous Material	1
	Highway	Flammable - Combustible Liquid	1
Raleigh-Durham Airport			**2**
	Air	Flammable - Combustible Liquid	1
	Air	Miscellaneous Hazardous Material	1
Apex			**1**
	Highway	Corrosive Material	1
Cary			**4**
	Highway	Corrosive Material	2
	Highway	Flammable - Combustible Liquid	2
Fuquay Varina			**2**
	Highway	Corrosive Material	1
	Highway	Oxidizer	1
Garner			**7**
	Highway	Corrosive Material	**5**
	Highway	Flammable - Combustible Liquid	2

	Mode of Release	Hazard Class	Incident Count
Holly Springs			**1**
	Highway	Flammable - Combustible Liquid	1
Knightdale			**1**
	Highway	Flammable - Combustible Liquid	1
Morrisville			**183**
	Air	Corrosive Material	2
	Air	Flammable - Combustible Liquid	7
	Air	Flammable Gas	2
	Air	Infectious Substance (Etiologic)	1
	Air	Miscellaneous Hazardous Material	2
	Air	Nonflammable Compressed Gas	1
	Air	(Not Defined)	3
Air Subtotal			*18*
	Highway	Combustible Liquid	2
	Highway	Corrosive Material	70
	Highway	Flammable - Combustible Liquid	63
	Highway	Flammable Gas	1
	Highway	Flammable Solid	1
	Highway	Nonflammable Compressed Gas	7
	Highway	Organic Peroxide	3
	Highway	Oxidizer	3
	Highway	Poisonous Gas	2
	Highway	Poisonous Materials	13
Highway Subtotal			*165*
Raleigh			**370**
	Air	Corrosive Material	11
	Air	Flammable - Combustible Liquid	8
	Air	Flammable Gas	1
	Air	Miscellaneous Hazardous Material	5
	Air	Nonflammable Compressed Gas	1
	Air	Organic Peroxide	1
	Air	Poisonous Materials	4
	Air	(Not Defined)	1
Air Subtotal			*32*
	Highway	Combustible Liquid	3
	Highway	Corrosive Material	121
	Highway	Flammable - Combustible Liquid	148
	Highway	Flammable Gas	3
	Highway	Flammable Solid	1
	Highway	Miscellaneous Hazardous Material	7
	Highway	Nonflammable Compressed Gas	13
	Highway	Organic Peroxide	5
	Highway	Oxidizer	17
	Highway	Poisonous Materials	6
	Highway	Spontaneously Combustible	1
	Highway	(Not Defined)	1
Highway Subtotal			*326*
	Rail	Corrosive Material	3
	Rail	Flammable - Combustible Liquid	5

	Mode of Release	Hazard Class	Incident Count
	Rail	Miscellaneous Hazardous Material	2
	Rail	Nonflammable Compressed Gas	1
	Rail	Oxidizer	1
Rail Subtotal			*12*
Rolesville			**3**
	Highway	Combustible Liquid	2
	Highway	Flammable - Combustible Liquid	1
Wake Forest			**4**
	Highway	Corrosive Material	1
	Highway	Flammable - Combustible Liquid	3
Wendell			**2**
	Highway	Corrosive Material	1
	Highway	Very Insensitive Explosive	1
Zebulon			**7**
	Highway	Corrosive Material	2
	Highway	Flammable - Combustible Liquid	2
	Highway	Flammable Gas	2
	Highway	Poisonous Materials	1
Grand Total			**589**

Source: PHMSA Incident Reports, Office of Hazardous Materials Safety, Incident Reports Database Search, data as of Feb 19, 2019.

The following narratives, recorded in the PHMSA database, are for a selection of past releases deemed serious incidents, and illustrate the types of spills and damages that may occur:

Zebulon, March 24, 2003 – A transport truck was involved in a single vehicle accident which caused the load to shift and the bulk tank to rollover. The tank ruptured, which caused the loss of approx. 3000 gallons of gasoline. The spill was contained by Wendell Fire Department Hazmat Unit. Reclamation and renovation of the site was performed by eastern environmental. The driver was the only injury. He was hospitalized but recovered fully.

Zebulon, July 14, 2004 – delivery driver had finished his delivery to this customer. Driver was doing his normal vehicle walk around check, he heard a noise, looked under the unit and noticed a leak out of the belly valve area. He tried the emergency shut-off but the leak was past this area. Driver was able to manually shut this leak down. Driver had noted that after his delivery unit was @ 35% after he shut off the leak it was at 30% this is how we determined the gallon of release. Driver called the local fire department and hazmat team they evacuated approximately 10 people from about 300 yds away. They had a small two-lane road closed for about 3 hours. No property damages. No injuries.

Cary, July 10, 2013 – While entering parking lot at Ace Hardware in Cary North Carolina it appears the freight shifted and punctured one 300-gallon tote of caustic soda 50% being shipped as sodium hydroxide solution. Approximately 250 gallons of free product released to the trailer floor and asphalt parking lot. Cary Fire Department responded to assess the site and proceeded to wash the parking lot with excessive amounts of water. As a result, free product and water affected the asphalt parking lot entrance around to back of store and impacted outside pallets and debris being held outside the hardware store. Environmental Restoration and Hepaco were dispatched to perform the cleanup. Upon arrival on site absorbent material was applied to the affected area in an effort to contain. Due to the large area of impact as a result of the fire department water placement a vacuum truck was dispatched to recover free liquids from the lot. Environmental Restoration and Hepaco personnel proceeded to recover free product and wash waters from the parking lot while neutralizing the caustic material. Once the parking lot was secure Hepaco Inc. proceeded to offload trailer clean impacted trailer floor and surrounding areas and

containerize remaining free product. Freight was loaded onto a recovery trailer provided by Wilson Trucking Corporation to be sent on to its destination. Following a rain event in the area Hepaco returned to the site collected residual product and site was deemed for closure. Disposal was coordinated in accordance with local state and federal regulations. There were no injuries or exposures reported.

Probability of Future Occurrence

Based on historical occurrences recorded by PHMSA, there have been 15 serious incidents of hazardous materials release in the 20-year period from 1999 through 2018. Using historical occurrences as an indication of future probability, there is a 75 percent annual probability of a serious incident occurring.

Probability: 3 – Likely

Vulnerability Assessment

People

People near facilities storing or transporting hazardous materials are at higher risk of exposure to a release incident. Additionally, any individuals working with or transporting hazardous materials are also at heightened risk. Depending on the materials, they may pose certain health hazards. If hazardous materials contaminate soils or water supply, people may be at risk of exposure through food or water.

Property

A radiological incident could cause severe damage to the power station itself but would not cause direct property damage outside the station. However, property values could drop substantially if a radiological incident resulted in contamination of nearby areas.

Environment

A radiological incident could result in the spread of radioactive material into the environment, which could contaminate water and food sources and harm animal and plant life.

Consequence Analysis

Table 4.91 summarizes the potential detrimental consequences of hazardous materials incident.

Table 4.90 – Consequence Analysis – Hazardous Materials Incident

Category	Consequences
Public	Contact with hazardous materials could cause serious illness or death. Those living and working closest to hazardous materials sites face the greatest risk of exposure. Exposure may also occur through contamination of food or water supplies.
Responders	Responders face similar risks as the general public but a heightened potential for exposure to hazardous materials.
Continuity of Operations (including Continued Delivery of Services)	A hazardous materials incident may cause temporary road closures or other localized impacts but is unlikely to affect continuity of operations.
Property, Facilities and Infrastructure	Some hazardous materials are flammable, explosive, and/or corrosive, which could result in structural damages to property. Impacts would be highly localized.
Environment	Consequences depend on the type of material released. Possible ecological impacts include loss of wildlife, loss of habitat, and degradation of air and/or water quality.
Economic Condition of the Jurisdiction	Clean up, remediation, and/or litigation costs may apply. Long-term economic damage is unlikely.
Public Confidence in the Jurisdiction's Governance	A hazardous materials incident may affect public confidence if the environmental or health impacts are enduring.

4.5.13 Radiological Incident

Hazard Background

A radiological incident is an occurrence resulting in the release of radiological material at a fixed facility (such as power plants, hospitals, laboratories, etc.) or in transit.

Radiological incidents related to transportation are described as an incident resulting in a release of radioactive material during transportation. Transportation of radioactive materials through North Carolina over the interstate highway system is considered a radiological hazard. The transportation of radioactive material by any means of transport is licensed and regulated by the federal government. As a rule, there are two categories of radioactive materials that are shipped over the interstate highways:

- Low level waste consists of primarily of materials that have been contaminated by low level radioactive substances but pose no serious threat except through long-term exposure. These materials are shipped in sealed drums within placarded trailers. The danger to the public is no more than a wide array of other hazardous materials.
- High level waste, usually in the form of spent fuel from nuclear power plants, is transported in specially constructed casks that are built to withstand a direct hit from a locomotive.

Radiological emergencies at nuclear power plants are divided into classifications. **Table 4.91** shows these classifications, as well as descriptions of each.

Table 4.91 – Radiological Emergency Classifications

Emergency Classification	Description
Notification of Unusual Event (NOUE)	Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.
Alert	Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the Environmental Protection Agency (EPA) Protective Action Guides (PAGs)
Site Area Emergency (SAE)	Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or hostile action that results in intentional damage or malicious acts; 1) toward site personnel or equipment that could lead to the likely failure of or; 2) that prevent effective access to, equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.
General Emergency	Events are in progress or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or hostile action that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Warning Time: 4 – Less than 6 hours

Duration: 4 – More than one week

Location

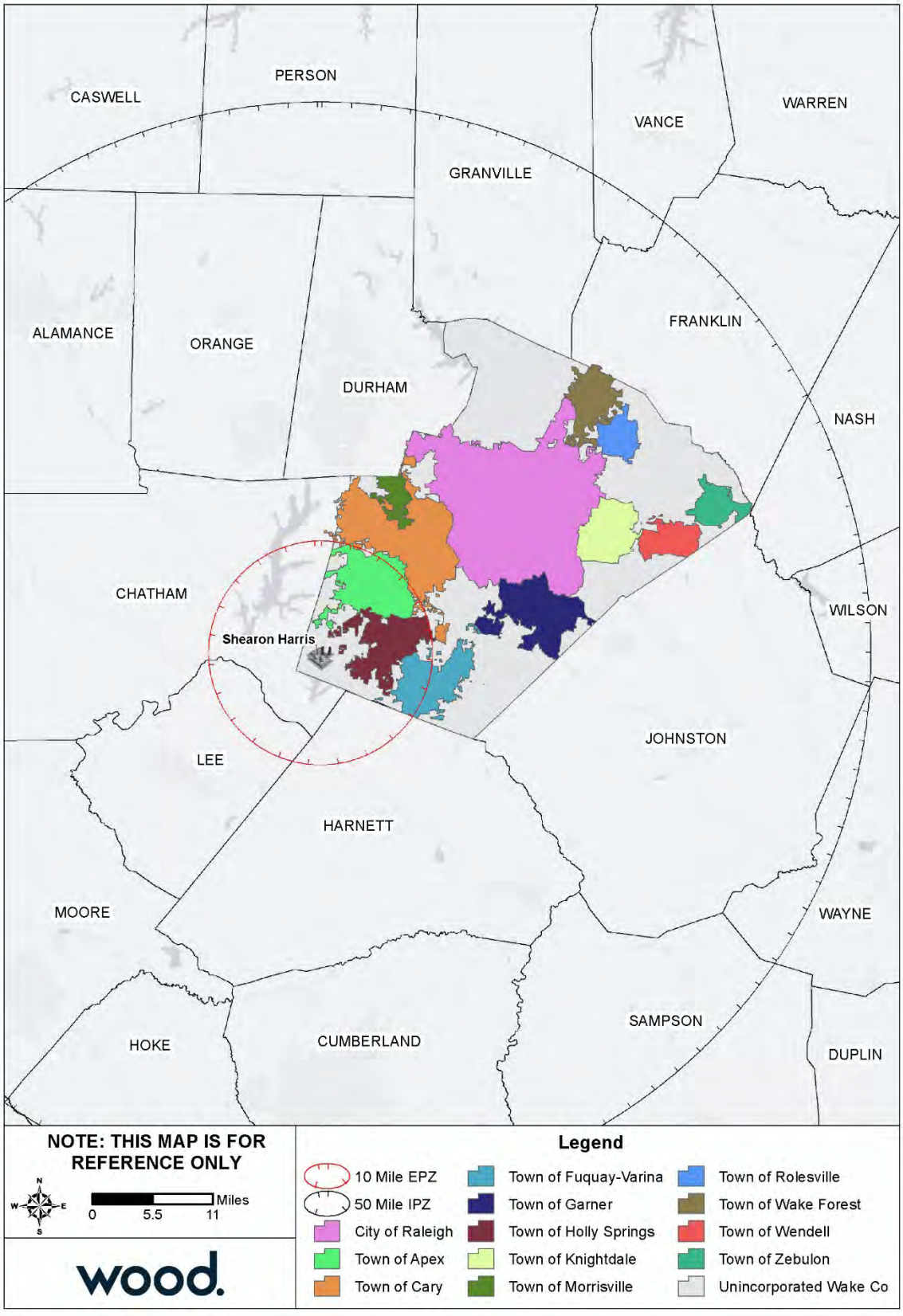
Harris Nuclear Plant, which is located in southwest Wake County, is a single-unit 928-megawatt power plant. The plant began commercial operation in 1987 and now employs approximately 800 people. Its reactor is a pressurized water reactor and the plant operates with a very high level of security. This is the location from which the most catastrophic nuclear accident might occur in Wake County and will be the focal point of the nuclear analysis in this plan. However, it should also be noted that there is a 1-megawatt PULSTAR research reactor located on North Carolina State University's campus in downtown Raleigh. Although its impacts would potentially be less far-reaching than Harris Nuclear Plant's in the event of an accident, it should still be noted that the effects could be extremely detrimental, especially to citizens and property within Raleigh.

The Nuclear Regulatory Commission defines two emergency planning zones around nuclear plants:

- **Emergency Planning Zone (EPZ)** – The EPZ is a 10-mile radius around nuclear facilities. It is also known as the Plume Exposure Pathway. Areas located within this zone are considered to be at highest risk of exposure to radioactive materials. Within this zone, the primary concern is exposure to and inhalation of radioactive contamination. Predetermined action plans within the EPZ are designed to avoid or reduce dose from such exposure. Residents within this zone would be expected to evacuate in the event of an emergency. Other actions such as sheltering, evacuation, and the use of potassium-iodide must be taken to avoid or reduce exposure in the event of a nuclear incident.
- **Ingestion Pathway Zone (IPZ)** – The IPZ is delineated by a 50-mile radius around nuclear facilities as defined by the federal government. Also known as the Ingestion Exposure Pathway, the IPZ has been designated to mitigate contamination in the human food change resulting from a radiological accident at a nuclear power facility. Contamination to fresh produce, water supplies, and other food produce may occur when radionuclides are deposited on surfaces.

Figure 4.28 shows the location of Harris Nuclear Plant and the approximate 10-mile Emergency Planning Zone (EPZ) buffer and 50-mile Ingestion Pathway Zone (IPZ) around the plant. Nearly all of Apex and Holly Springs, and much of western Fuquay-Varina fall within the EPZ for Harris Nuclear Plant. All of Wake County falls within the IPZ for Harris Nuclear Plant.

Figure 4.28 – Harris Nuclear Plant Location

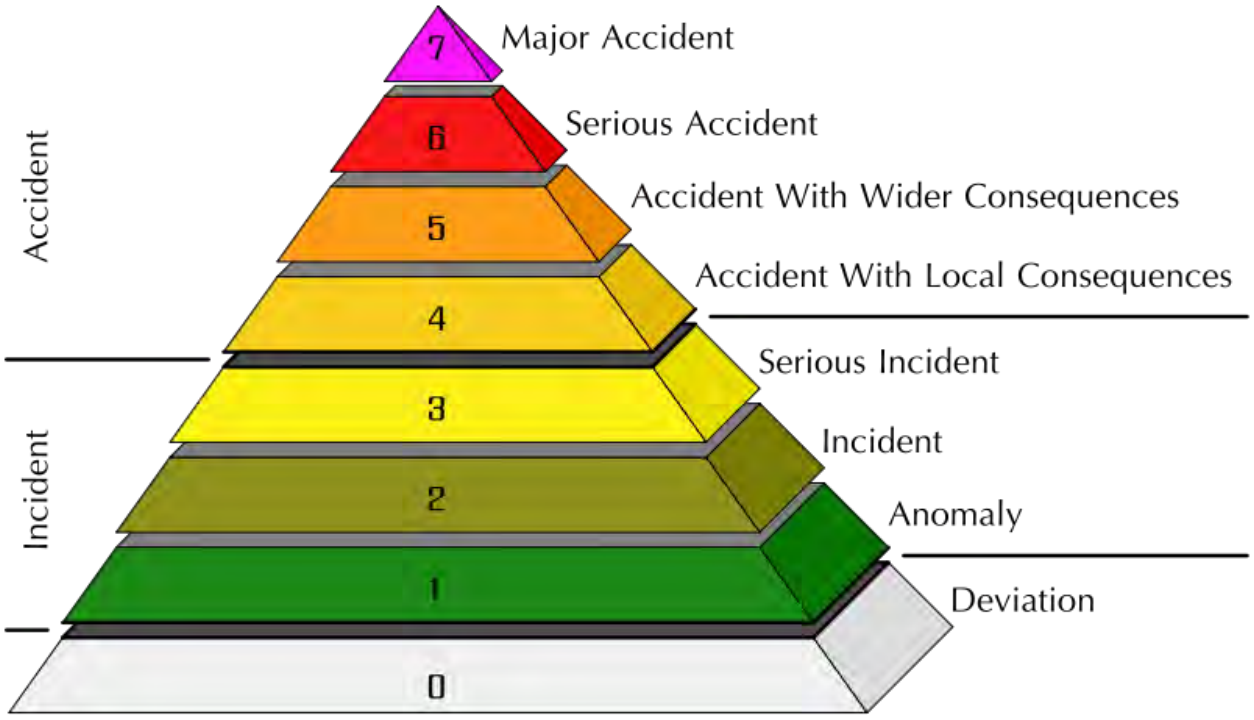


The entire county is at risk to a nuclear incident. However, areas in the southwest part of the region are more susceptible due to their proximity to the Harris Nuclear Plant and its 10-mile EPZ.

The Nuclear Regulatory Commission defines two emergency planning zones around nuclear plants. Areas located within 10 miles of the station are considered to be within the zone of highest risk to a nuclear incident and this radius is the designated evacuation radius recommended by the Nuclear Regulatory Commission. Within the 10-mile zone, the primary concern is exposure to and inhalation of radioactive contamination. The most concerning effects in the secondary 50-mile zone are related to ingestion of food and liquids that may have been contaminated. All areas of the county that are not located within the 10-mile radius are located within this 50-mile radius that is still considered to be at risk from a nuclear incident.

Extent

The International Atomic Energy Association (IAEA) developed the International Nuclear and Radiological Event Scale to quantify the magnitude of radiological events. This scale is logarithmic, meaning each increasing level represents a 10-fold increase in severity compared to the previous level.



Source: International Atomic Energy Association

Impact: 4 – Catastrophic

Spatial Extent: 2 – Small

Historical Occurrences

As reported in the 2018 State Hazard Mitigation Plan, Harris Nuclear Plant is one of only three plants in the country to have had no Nuclear Regulatory Commission findings as of September 2017. Therefore, there are no recent historical occurrences of any serious incidents at the Harris Plant. However, there have been events that warranted emergency declarations at both the Harris Nuclear Plant and the

PULSTAR research reactor at North Carolina State University. Table 4.92 lists emergency declarations reported in the 2015 Wake County Multi-Jurisdictional Hazard Mitigation Plan.

Table 4.92 – Emergency Declarations at Harris Nuclear Plant, 1986 – 2015

Emergency Declaration	Date	Description
Alert	08/12/1988	Loss of greater than 50% of main control board (MCB) alarms due to electrical problems; normal power supply to annunciator panel failed and did not transfer to its backup inverter.
Alert	10/09/1988	Fire on "B" Main Electrical Transformer; release of flammable gas in the Protected Area.
Unusual Event	11/28/1986	Loss of ERFIS computer system to display Safety Parameter Display System (SPDS) (55 lapsed minutes).
Unusual Event	11/29/1986	Loss of ERFIS computer system to display SPDS (58 lapsed minutes).
Unusual Event	11/30/1986	Loss of ERFIS computer system to display SPDS (48 lapsed minutes).
Unusual Event	12/03/1986	Loss of ERFIS computer system to display SPDS (27 lapsed minutes).
Unusual Event	12/11/1986	Safety Injection (an Emergency Core Cooling System) actuated while testing electronic circuitry.
Unusual Event	01/27/1987	Loss of ERFIS computer system to display SPDS (23 lapsed minutes).
Unusual Event	07/11/1987	Loss of ERFIS computer system to display SPDS (22 lapsed minutes).
Unusual Event	07/24/1987	Loss of ERFIS computer system to display SPDS (32 lapsed minutes).
Unusual Event	07/25/1987	Loss of ERFIS computer system to display SPDS (28 lapsed minute).
Unusual Event	02/04/1988	Fire within the Protected Area greater than 10 minutes; smoke observed coming from the motor for the reactor auxiliary building supply fan.
Unusual Event	10/06/1988	RCS leakage in excess of Tech Specs (unidentified leakage > 1.0 gpm).
Unusual Event	10/20/1988	RCS leakage in excess of Tech Specs; pressure operated relief valve opened and admitted RCS inventory to the pressurized relief tank (PRT).
Unusual Event	11/17/1988	Loss of ERFIS computer system to display SPDS for > 60 minutes.
Unusual Event	12/01/1988	Reactor coolant system (RCS) leakage in excess of Tech Specs (unidentified leakage > 1.0 gpm).
Unusual Event	12/16/1988	High level alarm on radiological effluent release monitor the (Treated Laundry and Hot Shower high level alarm was set just above background).
Unusual Event	03/13/1989	Loss of ERFIS computer system to display SPDS for > 60 minutes.
Unusual Event	01/24/1991	Plant shutdown required by Technical Specifications. Excessive leakage of a containment penetration; leakage discovered during surveillance testing.
Unusual Event	02/15/1991	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	03/05/1991	Plant shutdown required by Technical Specifications (testing of "A" Reactor Coolant Pump (RCP) electrical protection function).
Unusual Event	04/14/1992	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	02/06/1993	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	02/17/1994	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	07/22/1994	Loss of both emergency diesel generators - "B" diesel generator was being worked on; in accordance with test procedures, "A" diesel generator is required to be tested within 24 hours following having redundant diesel out-of-service; did not pass test.
Unusual Event	11/05/1995	Unplanned emergency core cooling system (ECCS) discharge to the reactor vessel; reactor trip and safety injection (SI) occurred during the performance of testing.
Unusual Event	12/14/1995	Train derailment on site - while removing empty cask car from the Protected Area, the rail cars were moved onto the Engine Spur to allow passage of the CSX engine on adjacent Plant Spur; cask car shifted; 4 wheels of the car left the rails.

Emergency Declaration	Date	Description
Unusual Event	01/22/1997	Security Event - while working Work Request and Authorization (WR&A), I&C Tech investigation found cut wire in a Turbine Building radiation monitor. Later determined to not be vandalism (i.e., not a security threat).
Unusual Event	04/02/2000	Loss of Emergency Response Facility Information System (ERFIS) computer system to display Safety Parameter Display System (SPDS) for more than 4 hours.
Unusual Event	08/23/2011	Seismic activity at the site due to a magnitude 5.8 earthquake near Mineral, VA.

Source: 2015 Wake County Multi-Jurisdictional Hazard Mitigation Plan

Table 4.93 – Emergency Declarations at the PULSTAR Research Reactor, 1986 – 2015

Emergency Declaration	Date	Description
None	12/13/2010	A radiography technician walked in front of a 30 REM per hour beam of radiation for 60 seconds due to a shutter being left open. This incident was reported to the Nuclear Regulatory Commission (NRC), but no assistance was required from the City of Raleigh or Wake County.
None	07/02/2011	PULSTAR shut down due to a 10 gallon per hour leak. No emergency was declared (less than 350 gallons per hour reporting threshold), and no action was required from the City of Raleigh or Wake County.
Unusual Event	08/23/2011	Seismic activity at the site due to a magnitude 5.8 earthquake near Mineral, VA.

Source: 2015 Wake County Multi-Jurisdictional Hazard Mitigation Plan

Probability of Future Occurrence

Radiological hazards are highly unpredictable. Nuclear reactors present the possibility of catastrophic damages, yet the industry is highly regulated and historical precedence suggests an incident is unlikely.

Probability: 1 – Unlikely

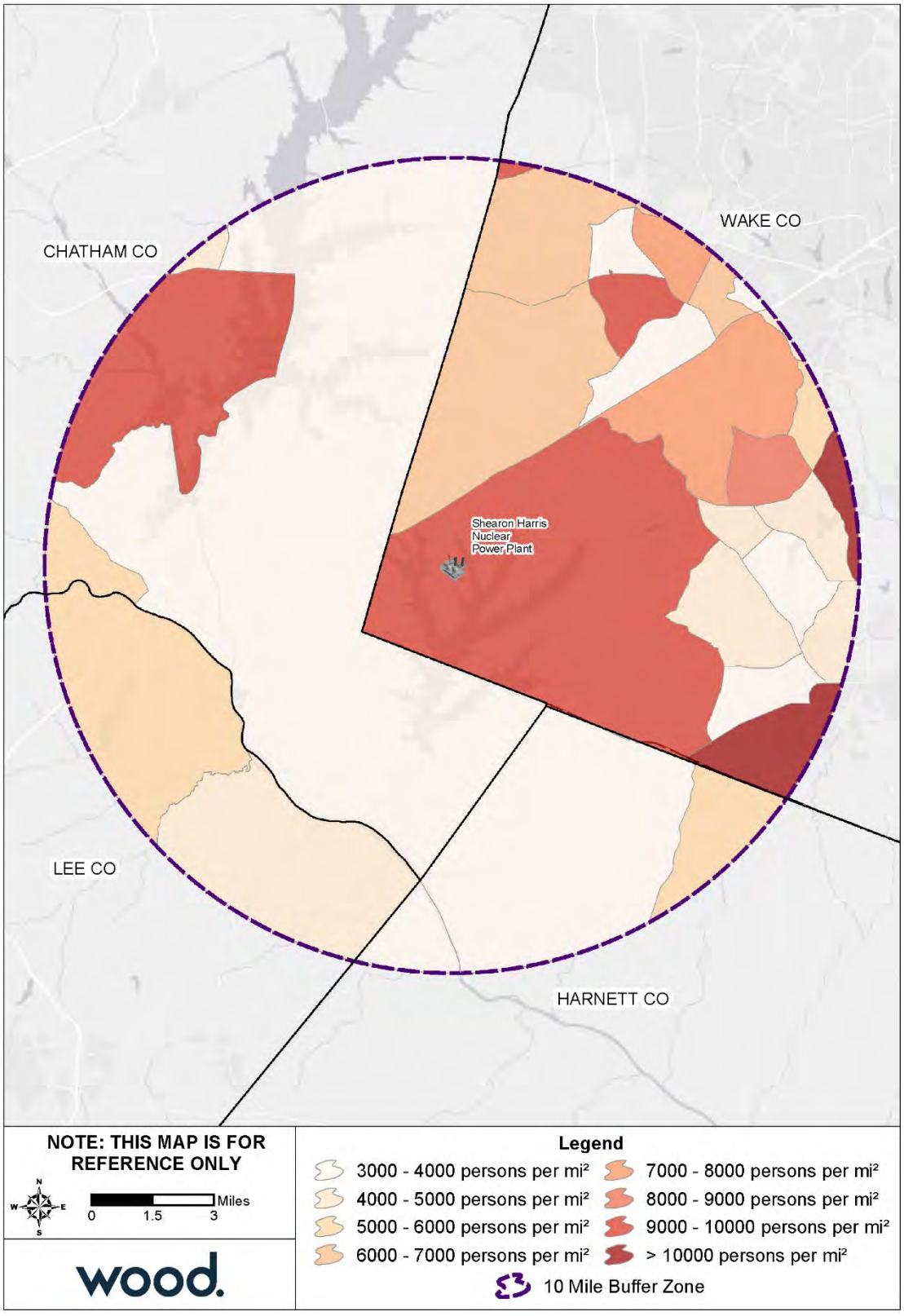
Vulnerability Assessment

People

People within the 10-mile EPZ are at risk of direct exposure to radioactive material. People within the 50-mile EPZ are at risk of exposure through ingestion of contaminated food and water. Low levels of radiation are not considered harmful, but a high exposure to radiation can cause serious illness or death.

Figure 4.29 reflects the population density of census block groups within the 10-mile EPZ of Harris Nuclear Plant and indicates the potential vulnerability of people to a radiological incident.

Figure 4.29 – Population Density by Census Block Group within the Harris Nuclear Plant 10-Mile EPZ



Source: U.S. Census Bureau, GIS Analysis

Property

A radiological incident could cause severe damage to the power station itself but would not cause direct property damage outside the station. However, property values could drop substantially if a radiological incident resulted in contamination of nearby areas.

A GIS analysis was completed to determine the vulnerability of critical facilities to radiological incident by overlaying the Emergency Planning Zone area with the critical facilities inventory. The resulting vulnerability of critical facilities is summarized in Table 4.11.

Table 4.94 – Critical Facilities Vulnerable to Radiological Incident, Wake County

Sector	Asset	Count
Emergency Management	Fire	8
	Police	1
Government	School	84
Energy	Utility	24
	Substation	1
Water	Treatment Plant	15

Source: NCEM IRISK Database; GIS analysis

Environment

A radiological incident could result in the spread of radioactive material into the environment, which could contaminate water and food sources and harm animal and plant life.

Consequence Analysis

Table 4.95 summarizes the potential detrimental consequences of radiological incident.

Table 4.95 – Consequence Analysis – Radiological Incident

Category	Consequences
Public	High levels of radiation could cause serious illness or death. Those living and working closest to the nuclear plant would face the greatest risk of exposure.
Responders	Responders face potential for heightened exposure to radiation, which could cause severe chronic illness and death.
Continuity of Operations (including Continued Delivery of Services)	An incident at the nuclear plant could interrupt power generation and cause power shortages. Regular operations would likely be affected by the response effort an event would require.
Property, Facilities and Infrastructure	The plant itself could be damaged by a radiological incident. Nearby property and facilities could be affected by contamination.
Environment	Water supplies, food crops, and livestock within 50 miles of the nuclear plant could be contaminated by radioactive material in the event of a major incident.
Economic Condition of the Jurisdiction	The local economy could be affected if a radiological incident caused contamination of nearby areas. Property values and economic activity could decline as a result.
Public Confidence in the Jurisdiction's Governance	A radiological incident would likely cause severe loss of public confidence given that the hazard is human-caused and highly regulated. Public confidence can also be affected by false alarms.

4.5.14 Terrorism

Hazard Background

There is no universal globally agreed-upon definition of terrorism. In a broad sense, terrorism is the use of violence and threats to intimidate or coerce, especially against civilians, in the pursuit of political aims. Terrorism is defined in the United States by the Code of Federal Regulations as "the unlawful use of force or violence against persons or property to intimidate or coerce a government, civilian population, or any segment thereof, in furtherance of political or social objectives."

For this analysis, this hazard encompasses the following sub-hazards: enemy attack, biological terrorism, chemical terrorism, conventional terrorism, cyber-attack, radiological terrorism, and public disorder. These hazards can occur anywhere and demonstrate unlawful force, violence, and/or threat against persons or property causing intentional harm for purposes of intimidation, coercion or ransom in violation of the criminal laws of the United States. These actions may cause massive destruction and/or extensive casualties. The threat of terrorism, both international and domestic, is ever present, and an attack can occur when least expected.

Enemy attack is an incident that could cause massive destruction and extensive casualties throughout the world. Some areas could experience direct weapons' effects: blast and heat; others could experience indirect weapons' effect. International political and military activities of other nations are closely monitored by the federal government and the State of North Carolina would be notified of any escalating military threats.

The use of biological agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom can be described as biological terrorism. Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point of line sources such as munitions, covert deposits and moving sprayers. Biological agents vary in the amount of time they pose a threat. They can be a threat for hours to years depending upon the agent and the conditions in which it exists.

Chemical terrorism involves the use or threat of chemical agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. Effects of chemical contaminants are similar to biological agents.

Use of conventional weapons and explosives against persons or property in violation of the criminal laws of the United States for purposes of intimidations, coercion, or ransom is conventional terrorism. Hazard effects are instantaneous; additional secondary devices may be used, lengthening the time duration of the hazard until the attack site is determined to be clear. The extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences and incremental structural failures. Conventional terrorism can also include tactical assault or sniping from remote locations.

Electronic attack using one computer system against another in order to intimidate people or disrupt other systems is a cyber-attack. All governments, businesses and citizens that conduct business utilizing computers face these threats. Cyber-security and critical infrastructure protection are among the most important national security issues facing our country today. The North Carolina State Bureau of investigation' Computer Crime Unit helps law enforcement across North Carolina solve sophisticated crimes involving digital evidence.

Radiological terrorism is the use of radiological materials against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as

munitions, covert deposits and moving sprayers or by the detonation of a nuclear device underground, at the surface, in the air or at high altitude.

Mass demonstrations, or direct conflict by large groups of citizens, as in riots and non-peaceful strikes, are examples of public disorder. These are assembling of people together in a manner to substantially interfere with public peace to constitute a threat, and with use of unlawful force or violence against another person, or causing property damage or attempting to interfere with, disrupting, or destroying the government, political subdivision, or group of people. Labor strikes and work stoppages are not considered in this hazard unless they escalate into a threat to the community. Vandalism is usually initiated by a small number of individuals and limited to a small target or institution. Most events are within the capacity of local law enforcement.

The Southern Poverty Law Center reports 32 active hate groups in North Carolina. Table 4.96 shows active hate groups in North Carolina, according to the Southern Poverty Law Center (SPLC). The SPLC defines a hate group as any group with "beliefs or practices that attack or malign an entire class of people – particularly when the characteristics being maligned are immutable." It is important to note that inclusion on the SPLC list is not meant to imply that a group advocates or engages in violence or other criminal activity.

Table 4.96 – Hate Groups Active in North Carolina

Group	Type	Location
Nation of Islam	Black Nationalist, Nation of Islam	Greensboro
ACTBAC NC	Neo-confederate	Snow Camp
Israelite Church of God in Jesus Christ	Black Nationalist	Greensboro
American Guard	General Hate	Statewide
Traditionalist Worker Party	Neo-Nazi; Traditionalist Worker Party	Statewide
Vinlanders Social Club	Racist Skinhead; Vinlanders Social Club	Statewide
Vanguard America	Neo-Nazi	Statewide
Israelite School of Universal Practical Knowledge	Black Nationalist	Statewide
Crew 38	Racist Skinhead	Statewide
Soldiers of Odin	Anti-Muslim	Statewide
Blood and Honour Social Club	Racist Skinhead; Blood and Honour	Statewide
The Daily Stormer	Neo-Nazi	Statewide
Confederate Hammerskins	Racist Skinhead	Statewide
Blood and Honour U.S.A.	Racist Skinhead; Blood and Honour	Statewide
East Coast Nights of the True Invisible Empire	Ku Klux Klan	Statewide
Israel United in Christ	Black Nationalist	Concord
Nation of Islam	Black Nationalist; Nation of Islam	Durham
Nation of Islam	Black Nationalist; Nation of Islam	Charlotte
Great Millstone	Black Nationalist	Charlotte
Loyal White Knights of the Ku Klux Klan	Ku Klux Klan	Pelham
Americans for Legal Immigration (ALIPAC)	Anti-Immigrant	Raleigh
Identity Dixie	Neo-Confederate	Statewide
Loyal White Knights of the Ku Klux Klan	Ku Klux Klan	Pelham
ACT for America	Anti-Muslim; Act for America	Fayetteville
Nation of Islam	Black Nationalist; Nation of Islam	Raleigh
Cumberland Conservatives	Anti-Muslim	North Carolina
North Carolinians for Immigration Reform and Enforcement	Anti-Immigrant	Wade

Group	Type	Location
Confederate White Knights of the Ku Klux Klan	Ku Klux Klan	Vale
North Carolina Pastors Network	Anti-Muslim	Morgantown
Identity Evropa	White Nationalist; Identity Evropa	Boone
Revolutionary Black Panther Party	Black Nationalist	Wilmington
Nation of Islam	Black Nationalist; Nation of Islam	Wilmington

Source: Southern Poverty Law Center, https://www.splcenter.org/hate-map

Two hate groups identified by the SPLC have a footprint in Wake County – the Nation of Islam (Raleigh/Durham) and Americans for Legal Immigration (Raleigh).

Warning Time: 4 – Less than 6 hours

Duration: 4 – More than one week

Generally, no warning is given for specific acts of terrorism. Duration is dependent on the vehicle used during the terrorist attack. This score takes into account a prolonged scenario with continuous impacts.

Location

A terror threat could occur at any location in the County, but are more likely to target highly populated areas, critical infrastructure, or symbolic locations.

In terms of cyber-attack, our society is highly networked and interconnected. An attack could be launched from anywhere on earth and could range in impacts from small and localized to a far-reaching global scale. Depending on the attack vector and parameters, a cyber-attack could impact all of Wake County and its associated municipal jurisdictions.

Extent

The extent of a terrorist incident is tied to many factors, including the attack vector, location, time of day, and other circumstances; for this reason, it is difficult to put assess a single definition or conclusion of the extent of "terrorism." As a general rule, terrorism incidents are targeted to where they can do the most damage and have the maximum impact possible, though this impact is tempered by the weapon used in the attack itself.

Impact: 4 – Catastrophic

Spatial Extent: 1 – Negligible

Historical Occurrences

As noted in the 2018 North Carolina Hazard Mitigation Plan, there has never been a major terror attack in North Carolina, but several terror related incidents have been prevented through the arrest of terrorism suspects, the disruption of terrorism planning and training activities, and the response to lone suspect attacks. North Carolina has for decades dealt with homegrown extremists with a propensity for terror and violence. Examples of these extremists include militia groups, white supremacy groups, sovereign citizens, and left wing/right wing extremist groups.

The 2015 Wake County Multi-Jurisdictional Hazard Mitigation Plan noted that in 2009, seven longtime residents were arrested in the rural Wake County subdivision of Shadow Oaks on suspicion of plotting terrorism and for providing money, training, transportation, and men to help terrorists. All seven conspirators were found guilty and sentenced for terrorist activities documented between 2006 and 2009.

Probability of Future Occurrence

While difficult to estimate when a deliberate act like terrorism may occur, it can be inferred that the probability of a terrorism attack in any one area in the County is very low at any given time. When identified, credible threats may increase the probability of an incident; these threats are generally tracked by law enforcement.

Probability: 1 – Unlikely

Vulnerability Assessment

Methodologies and Assumptions

Vulnerability to terrorism was assessed through hypothetical scenarios. These scenarios were modeled using the Electronic Mass Casualty Assessment and Planning Scenarios (EMCAPS) tool developed by the Johns Hopkins Office of Critical Event Preparedness and Response, Johns Hopkins Applied Physics Laboratory, the U.S. Department of Homeland Security, and the National Center for the Study of Preparedness and Catastrophic Event Response.

People

People can suffer death or illness as a result of a terrorist attack. Symptoms of illness from a biological or chemical attack may go undetected for days or even weeks. Local healthcare workers may observe a pattern of unusual illness or early warning monitoring systems may detect airborne pathogens. People will face increased risk if a biological or chemical agent is released indoors, as this may result in exposure to a higher concentration of pathogens, whereas agents that are released outdoors would disperse in the direction of the wind. Physical harm from a weapons attack or explosive device is not dependent on location, but risk is greater in areas where higher numbers of people may gather. People could also be affected by an attack on food and water supply. In addition to impacts on physical health, any terrorist attack could cause significant stress and anxiety.

The following hypothetical scenarios illustrate the potential impacts of a chlorine gas release and an improvised explosive device (IED) attack on a location in the City of Raleigh, chosen due to its relatively high population density as well as the presence of multiple government buildings, culturally significant sites, and critical facilities and infrastructure. These scenarios were modeled using the Electronic Mass Casualty Assessment and Planning Scenarios (EMCAPS) tool developed by the Johns Hopkins Office of Critical Event Preparedness and Response, Johns Hopkins Applied Physics Laboratory, the U.S. Department of Homeland Security, and the National Center for the Study of Preparedness and Catastrophic Event Response.

Scenario #1 – Chemical Attack: Toxic Gas – Chlorine Release

Scenario Overview: A bomb is attached to a tractor trailer tanker carrying compressed chlorine. The entire contents of the tank escape to the atmosphere and the plume spreads to the surrounding area. The plume spreading and the effect on the population are calculated according to the following input variables: outdoor temperature is 60°F, wind speed is 9 mph, the setting is urban, and the population density is 2,800 persons per square mile. The following assumptions apply:

- 4,850-gallon tank, all contents released through 3-ft hole
- Partly cloudy, no precipitation
- 50% of people in plume area are indoors
- Effects of chlorine on population determined through evaluation of chlorine gas concentration zones, which were determined using ALOHA plume modeling software (see References)
- First effects on humans at concentration = 10 ppm

- Minimum lethal dose = 430 ppm for 30 min
- Median lethal dose (short-term exposure) = 1,000 ppm

Table 4.97 outlines the expected losses based on the above parameters.

Table 4.97 – Estimated Casualties from Chlorine Attack

Injury Description	Population affected
Fatality	59 persons
Eye pain & swelling, headache, restricted airflow – difficulty breathing, coughing, chest pain, lung inflammation and edema, bloody sputum, vomiting, skin irritation, possible chemical burns	89 persons
Eye pain & swelling, headache, throat irritation, rapid breathing, coughing, chest pain, lung inflammation and edema, bloody sputum, vomiting, skin irritation	203 persons
Eye pain & swelling, headache, throat irritation, rapid breathing, coughing, chest pain, skin irritation	422 persons
Eye irritation, headache, throat irritation, coughing, skin irritation	516 persons
Eye irritation, headache, coughing, skin irritation	476 persons
Total impacted population	1,765 persons
"Worried Well" Cases (assumed to be 9x affected population)	15,885 persons
Cost of Decontamination @ $12/person (assumes all persons with skin injuries will require decontamination and approximately 1/10 of the worried well will demand to be decontaminated). Total persons treated = 3,354	$40,248

Source: EMCAPS tool

Scenario #2 – IED: Truck Bomb

Scenario Overview: An Improvised Explosive Device (IED) utilizing an ammonium nitrate/fuel oil (ANFO) mixture is carried in a cargo truck to a populated area and detonated. The bomb size is assumed to be 1000 lbs ANFO and the population density is 1 person per 50 square feet, equivalent to a moderately crowded pedestrian area as might be found in an average large city or outside a stadium. It is assumed that the explosion takes place in a relatively open area (e.g. stadium parking lot, park, etc). The following assumptions apply:

- ANFO - TNT equivalence = 0.82
- Blast pressure damage impact taken from National Fire Protection Association (NFPA) 921 Guide for Fire and Explosion Investigations - 2001 Edition, Table 18.13.3.1[b]
- Buildings and other physical structures are not considered in these calculations

Table 4.98 outlines the expected losses based on the above parameters.

Table 4.98 – Estimated Casualties from IED Attack

Injury Description	Population affected
Total Dead	275 persons
Total Traumatic Injuries	483 persons
Total Urgent Care Injuries	2,367 persons
Injuries not Requiring Hospitalization	886 persons

Source: EMCAPS tool

Expected symptoms and injuries would include impact injuries (pulmonary blast), pulmonary contusion, barotrauma, fractures (internal, compound, spinal), smoke inhalation, GI blast injury (edema, hemorrhage, rupture), auditory blast injury (partial or total loss of hearing), lacerations, shrapnel, debris penetrations (glass, metal, etc.) and burns. Transportation would be limited or inaccessible near the blast, and services and utilities could be unavailable.

Property

The potential for damage to property is highly dependent on the type of attack. Buildings and infrastructure may be damaged by an explosive device or by contamination from a biological or chemical attack. Impacts are generally highly localized to the target of the attack.

Environment

Environmental impacts are also dependent on the type of attack. Impacts could be negligible or could require major clean-up and remediation.

Consequence Analysis

Table 4.99 summarizes the potential detrimental consequences of a terror threat.

Table 4.99 – Consequence Analysis – Terrorism

Category	Consequences
Public	Illness, injury, or fatality are possible; these impacts would be highly localized to the attack. Widespread stress and psychological suffering may occur.
Responders	Responders face increased risks during an effort to stop an attack or rescue others while an attack is underway.
Continuity of Operations (including Continued Delivery of Services)	Critical infrastructure may be targeted by an attack; therefore, continuity of operations may be affected. Long-term issues may arise if transportation or utility infrastructure is severely damaged.
Property, Facilities and Infrastructure	Impacts depend of the type of attack. Buildings and infrastructure could be unaffected or completely destroyed.
Environment	Water and food supply could be contaminated by a biological or chemical attack. Remediation could be required.
Economic Condition of the Jurisdiction	The local economy could be disrupted, depending on the location and scale of an attack.
Public Confidence in the Jurisdiction's Governance	Loss of public confidence likely should an attack be carried out; additional loss of confidence and trust may result if response and recovery are not swift and effective

4.6 CONCLUSIONS ON HAZARD RISK

Priority Risk Index

As discussed in Section 4.3 Risk Assessment Methodology and Assumptions, the Priority Risk Index was used to rate each hazard on a set of risk criteria and determine an overall standardized score for each hazard. The conclusions drawn from this process are summarized below.

Table 4.100 summarizes the degree of risk assigned to each identified hazard using the PRI method.

Table 4.100 – Summary of PRI Results

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Dam Failure	Possible	Critical	Negligible	Less than 6 hrs	Less than 1 week	2.4
Drought	Likely	Minor	Large	More than 24 hrs	More than 1 week	2.5
Earthquake	Unlikely	Minor	Large	Less than 6 hrs	Less than 6 hrs	1.9
Extreme Heat	Highly Likely	Critical	Large	More than 24 hrs	Less than 1 week	3.3
Flood	Likely	Critical	Small	6 to 12 hrs	Less than 1 week	2.8
Hurricane & Tropical Storm	Likely	Critical	Large	More than 24 hrs	Less than 24 hrs	2.9
Landslide	Unlikely	Minor	Negligible	6 to 12 hours	Less than 6 hrs	1.2
Severe Weather: Hail[1]	Highly Likely	Minor	Small	6 to 12 hrs	Less than 6 hours	2.3
Severe Weather: Lightning[1]	Highly Likely	Minor	Negligible	6 to 12 hrs	Less than 6 hours	2.1
Severe Weather: Thunderstorm Winds[1]	Highly Likely	Limited	Large	6 to 12 hrs	Less than 6 hours	3.0
Severe Winter Storm	Highly Likely	Limited	Large	More than 24 hrs	More than 1 week	3.0
Tornado	Likely	Critical	Small	Less than 6 hrs	Less than 6 hours	2.7
Wildfire	Possible	Limited	Moderate	Less than 6 hrs	Less than 1 week	2.5
Hazardous Materials Incident	Highly Likely	Minor	Negligible	Less than 6 hrs	Less than 24 hrs	2.3
Radiological Emergency	Unlikely	Catastrophic	Small	Less than 6 hrs	More than 1 week	2.7
Terrorism	Unlikely	Catastrophic	Negligible	Less than 6 hrs	Less than 6 hrs	2.2

[1]Note: Severe Weather hazards average to a score of 2.5 and are therefore considered together as a high risk hazard.

The results from the PRI have been classified into three categories based on the assigned risk value which are summarized in Table 4.101:

- **High Risk** – Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread.
- **Medium Risk** – Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **Low Risk** – Minimal potential impact. The occurrence and potential cost of damage to life and property is negligible or nonexistent. This is not a priority hazard for mitigation projects.

Table 4.101 – Summary of Hazard Risk Classification

High Risk (> 2.4)	Extreme Heat Severe Weather Severe Winter Storm Hurricane & Tropical Storm Flood Tornado Radiological Emergency Drought Wildfire
Moderate Risk (2.0 – 2.4)	Dam Failure Hazardous Materials Incident Terrorism
Low Risk (< 2.0)	Earthquake Landslide

Note: Low risk hazards are not prioritized for mitigation.

5 Capability Assessment

This section discusses the capability of the Wake County planning area to implement hazard mitigation activities. It consists of the following four subsections:

5.1 Overview
5.2 Methodology
5.3 Capability Assessment Findings
5.4 Conclusions on Local Capability

5.1 OVERVIEW

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects. As in any planning process, it is important to try to establish which goals, objectives, and actions are feasible, based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical and likely to be implemented over time given a local government's planning and regulatory framework, level of administrative and technical support, amount of fiscal resources, and current political climate.

A capability assessment has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances, and programs already in place; and 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. The capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts.

The capability assessment completed for the Wake County planning area serves as a critical planning step toward developing an effective mitigation strategy. Coupled with the risk assessment, the capability assessment helps identify and target effective goals, objectives, and mitigation actions that are realistically achievable under given local conditions.

5.2 METHODOLOGY

To facilitate the inventory and analysis of local government capabilities within the planning area, a detailed Local Capability Self-Assessment worksheet was distributed to members of the HMPC after the first planning committee meeting. The survey questionnaire requested information on a variety of "capability indicators" such as existing local plans, policies, programs, or ordinances that contribute to and/or hinder the region's ability to implement hazard mitigation actions. Other indicators included information related to the region's fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes, and existing education and outreach programs that can be used to promote mitigation. Communities were also asked to comment on the current political climate with respect to hazard mitigation, an important consideration for any local planning or decision-making process.

At a minimum, the survey results provide an extensive and consolidated inventory of existing local plans, ordinances, programs, and resources in place or under development. With this information, inferences can be made about the overall effect on hazard loss reduction in each community. In completing the

survey, local officials were also asked to rate their jurisdiction's specific capabilities. The survey instrument thereby not only helps accurately assess the degree of local capability, but it also serves as a good source of introspection for counties and local jurisdictions that want to improve their capabilities. Identified gaps, weaknesses, or conflicts can be recast as opportunities for specific actions to be proposed as part of the mitigation strategy.

The information provided in response to the survey questionnaire was incorporated into a database for further analysis. A general scoring methodology was then applied to quantify each jurisdiction's overall capability. According to the scoring system, each capability indicator was assigned a point value based on its relevance to hazard mitigation. Additional points were added based on the jurisdiction's self-assessment of their own planning and regulatory capability, administrative and technical capability, fiscal capability, education and outreach capability, and political capability.

Using this scoring methodology, a total score and an overall capability rating of "High," "Moderate," or "Limited" could be determined according to the total number of points received. These classifications are designed to provide nothing more than a general assessment of local government capability. In combination with the narrative responses provided by local officials, the results of this capability assessment provide critical information for developing an effective and meaningful mitigation strategy.

5.3 CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this plan to provide insight into the relevant capacity of the Wake County Planning Area to implement hazard mitigation activities. All information is based upon the input provided by local government officials through the Local Capability Self-Assessment.

5.3.1 Planning and Regulatory Capability

Planning and regulatory capability is based on the implementation of plans, ordinances, and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development, and redevelopment in a responsible manner, while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning, and transportation planning. Regulatory capability also includes the enforcement of zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built, as well as protecting environmental, historic, and cultural resources in the community. Although some conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision-making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools or programs in place or under development for the Wake County planning area, along with their potential effect on loss reduction. This information will help identify opportunities to address gaps, weaknesses, or conflicts with other initiatives and integrate the implementation of this plan with existing planning mechanisms where appropriate.

Table 5.1 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for the Wake County planning area. A checkmark (v) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A plus sign (+) indicates that a jurisdiction is covered for that item under a county-implemented version. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Hazard Mitigation Plan.

Table 5.1 – Relevant Plans, Ordinances, and Programs

Jurisdiction	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan	Stormwater Management Plan	Emergency Operations Plan	SARA Title III Plan	Radiological Emergency Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Transportation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Site Plan Review Requirements	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	Community Wildfire Protection Plan	National Flood Insurance Program	Community Rating System
Wake County	✓	✓	✓	✓	✓	✓	✓	✓	*	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	
Town of Apex	✓	✓	✓	✓	✓	✓	+	+	✓	+		✓	*	+	✓	✓	✓	✓	✓	✓		✓	✓		✓	
Town of Cary	✓	✓		✓	✓	✓	+	+	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
Town of Fuquay-Varina	✓	✓	✓	✓	✓	✓	+	+	✓	+		✓	✓	+	✓	✓	✓	✓	✓	✓		✓	✓		✓	
Town of Garner	✓	✓	✓	✓	✓	✓	+	+	✓	+		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	
Town of Holly Springs	✓	✓	✓	✓	✓	✓	+	+	✓	✓		✓	✓	+	✓	✓	✓	✓	✓	✓	√	✓	✓		✓	
Town of Knightdale	✓	✓	✓	✓	*	✓	+	+				*		+	✓	✓	✓	✓	✓	✓		+	✓		✓	
Town of Morrisville	✓	✓	✓	✓	✓	✓	+	+	✓			✓			✓	✓	✓	✓	✓	✓	√	✓	✓		✓	
City of Raleigh	✓	✓			✓	✓	+	+	*		✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓		✓	
Town of Rolesville	✓	✓	✓	✓	✓	✓	+	+	✓			✓	✓	+	✓	✓	✓	✓	✓	✓		✓	✓		✓	
Town of Wake Forest	✓		✓	✓	✓	*	+	+	*		*	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	
Town of Wendell	✓	✓	✓	✓	✓	+	+	+				*	*	+	✓	✓	✓	✓	✓	✓		+	+		✓	
Town of Zebulon	✓	✓	✓	✓	✓	✓	+	+				✓		+	✓	✓	✓	✓	✓	*		✓	✓		✓	

A more detailed discussion on the region's planning and regulatory capability follows, along with the incorporation of additional information based on the narrative comments provided by local officials in response to the survey questionnaire.

5.3.1.1 Emergency Management

Hazard mitigation is widely recognized as one of the four primary phases of emergency management, as is shown in Figure 5.1. In reality, mitigation is interconnected with all other phases and is an essential component of effective preparedness, response, and recovery. Opportunities to reduce potential losses through mitigation practices are most often implemented before a disaster event, such as through the elevation of flood-prone structures or by regular enforcement of policies that regulate development. However, mitigation opportunities can also be identified during immediate preparedness or response activities, such as installing storm shutters in advance of a hurricane. Furthermore, incorporating mitigation during the long-term recovery and redevelopment process following a disaster event is what enables a community to become more resilient.

Figure 5.1 – The Four Phases of Emergency Management



Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. As such, the Local Capability Self-Assessment asked several questions across a range of emergency management plans to assess the region's willingness to plan and their level of technical planning proficiency.

Hazard Mitigation Plan

A hazard mitigation plan is a community's blueprint for how it intends to reduce the impact of natural, and in some cases human-caused, hazards on people and the built environment. The essential elements of a hazard mitigation plan include a risk assessment, capability assessment, and mitigation strategy.

- 13 of the 13 participating jurisdictions in this regional planning effort have previously been covered by the Wake County Multi-Jurisdictional Hazard Mitigation Plan.

Disaster Recovery Plan

A disaster recovery plan serves to guide the physical, social, environmental, and economic recovery and reconstruction process following a disaster event. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing on

opportunities to break the cycle of repetitive disaster losses. Disaster recovery plans can also lead to the preparation of disaster redevelopment policies and ordinances to be enacted following a hazard event.

- 3 of the 13 participating jurisdictions have a disaster recovery plan either in place or under development. (2 jurisdictions have one in place; 1 has one under development)

Emergency Operations Plan

An emergency operations plan outlines responsibilities and how resources will be deployed during and following an emergency or disaster.

- 13 of the 13 participating jurisdictions have an emergency operations plan either in place or are covered under a county plan. (11 jurisdictions have one in place; 1 has one under development; 1 covered under a county plan)

Continuity of Operations Plan

A continuity of operations plan establishes a chain of command, line of succession, and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster event.

- 10 of the 13 participating jurisdictions have a continuity of operations plan in place.

5.3.1.2 General Planning

The implementation of hazard mitigation activities often involves agencies and individuals beyond the emergency management profession. Stakeholders may include local planners, public works officials, economic development specialists, and others. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals, even though they may not be designed as such. The Local Capability Self-Assessment asked questions regarding general planning capabilities and the degree to which hazard mitigation is integrated into other ongoing planning efforts in the region.

Comprehensive/General Plan

A comprehensive land use plan, or general plan, establishes the overall vision for what a community wants to be and serves as a guide for future governmental decision making. Typically a comprehensive plan contains sections on demographic conditions, land use, transportation elements, and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives, and actions.

- 12 of the 13 participating jurisdictions have a comprehensive land use plan in place.

Capital Improvements Plan

A capital improvements plan guides the scheduling of spending on public improvements. A capital improvements plan can serve as an important mechanism for guiding future development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

- 13 of the 13 participating jurisdictions have a capital improvements plan in place or under development (11 jurisdictions have one in place; 2 have one under development).

Historic Preservation Plan

A historic preservation plan is intended to preserve historic structures or districts within a community. An often-overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards, and the identification of ways to reduce future damages. This may

involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards or are within a historic district that cannot easily be relocated out of harm's way.

- 11 of the 13 participating jurisdictions have an historic preservation plan in place or are covered by a county plan.

Zoning Ordinance

Zoning represents the primary means by which land use is controlled by local governments. As part of a community's police power, zoning is used to protect the public health, safety, and welfare of those in a given jurisdiction that maintains zoning authority. A zoning ordinance is the mechanism through which zoning is typically implemented. Since zoning regulations enable municipal governments to limit the type and density of development, a zoning ordinance can serve as a powerful tool when applied in identified hazard areas.

- 13 of the 13 participating jurisdictions have a zoning ordinance in place.

Subdivision Ordinance

A subdivision ordinance is intended to regulate the development of residential, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development.

- 13 of the 13 participating jurisdictions have a subdivision ordinance in place.

Building Codes, Permitting, and Inspections

Building codes regulate construction standards. In many communities, permits and inspections are required for new construction. Decisions regarding the adoption of building codes (that account for hazard risk), the type of permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk faced by a community.

- 13 of the 13 participating jurisdictions have building codes in place.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program, developed by the Insurance Services Office, Inc. (ISO). In North Carolina, the North Carolina Department of Insurance assesses the building codes in effect in a particular community and how the community enforces its building codes, with special emphasis on mitigation of losses from natural hazards. The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which in turn may offer ratings credits for new buildings constructed in communities with strong BCEGS classifications. The expectation is that communities with well-enforced, up-to-date codes should experience fewer disaster-related losses, and as a result should have lower insurance rates.

In conducting the assessment, ISO collects information related to personnel qualification and continuing education, as well as number of inspections performed per day. This type of information combined with local building codes is used to determine a grade for that jurisdiction. The grades range from 1 to 10, with a BCEGS grade of 1 representing exemplary commitment to building code enforcement, and a grade of 10 indicating less than minimum recognized protection.

5.3.1.3 Floodplain Management

Flooding represents the greatest natural hazard facing the nation, yet the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards such as education, outreach, and the training of local officials, the National Flood Insurance Program (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments; however, program participation is strongly encouraged by FEMA as a first step for implementing and sustaining an effective hazard mitigation program. It is therefore used as part of this *Capability Assessment* as a key indicator for measuring local capability.

In order for a county or municipality to participate in the NFIP, they must adopt a local flood damage prevention ordinance that requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings be protected from damage by a 100-year flood event, and that new development in the floodplain not exacerbate existing flood problems or increase damage to other properties.

A key service provided by the NFIP is the mapping of identified flood hazard areas. Once completed, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials, and the private sector about the likelihood of flooding in their community.

Table 5.2 provides NFIP policy and claim information for each participating jurisdiction in the Wake County planning area.

All jurisdictions in the region participate in the NFIP and will continue to comply with all required provisions of the program. Floodplain management is managed through zoning ordinances, building code restrictions, and the county building inspection program. The jurisdictions will coordinate with NCEM and FEMA to develop maps and regulations related to Special Flood Hazard Areas within their jurisdictional boundaries and, through a consistent monitoring process, will design and improve their floodplain management program in a way that reduces the risk of flooding to people and property.

Community Rating System

An additional indicator of floodplain management capability is active participation in the Community Rating System (CRS). The CRS is an incentive-based program that encourages communities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP. Each of the CRS mitigation activities is assigned a point value. As a community earns points and reaches identified thresholds, they can apply for an improved CRS class. Class ratings, which range from 10 to 1 and increase on 500-point increments, are tied to flood insurance premium reductions. Every class improvement earns an additional 5 percent discount for NFIP policyholders, with a starting discount of 5 percent for Class 9 communities and a maximum possible discount of 45 percent for Class 1 communities.

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. The CRS application process has been greatly simplified over the past several years, based on community comments intended to make the CRS more user friendly, and extensive technical assistance available for communities who request it.

- The City of Raleigh and the Town of Cary were previously CRS participants but have since been rescinded and are now Class 10 communities.

Table 5.2 – NFIP Policy and Claim Information

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Written Premium in Force	Closed Losses	Total Payments
City of Raleigh	06/28/74	04/16/13	1,774	$494,165,600	$1,821,219	840	$23,269,081
Town of Apex	03/03/92	04/16/13	96	$28,479,400	$43,304	1	$1,299
Town of Cary	06/28/74	04/16/13	695	$205,652,100	$376,232	137	$2,424,510
Town of Fuquay-Varina	04/11/75	04/16/13	88	$23,759,100	$42,592	3	$107,051
Town of Garner	07/19/74	04/16/13	116	$29,600,400	$81,284	21	$167,744
Town of Holly Springs	03/03/92	04/16/13	70	$21,438,300	$31,255	11	$186,744
Town of Knightdale	04/12/74	04/16/13	35	$10,167,000	$17,907	3	$31,363
Town of Morrisville	10/29/78	04/16/13	78	$23,604,000	$35,687	4	$92,752
Town of Rolesville	03/03/92	04/16/13	11	$3,227,000	$4,009	0	$0
Town of Wake Forest	03/15/74	04/16/13	120	$35,040,700	$48,537	0	$0
Town of Wendell	03/08/74	04/16/13	19	$4,928,000	$8,754	8	$144,907
Town of Zebulon	03/08/74	04/16/13	21	$3,668,000	$9,158	10	$187,065
Wake County (Unincorporated Area)	11/15/78	04/16/13	370	$100,313,300	$143,940	70	$996,074
TOTAL PLAN	-	-	**3,493**	**$984,042,900**	**$2,663,878**	**1,108**	**$27,608,590**

Source: FEMA NFIP Policy Statistics, NCEM Risk Management Tool

Floodplain Management Plan

A floodplain management plan (or a flood mitigation plan) provides a framework for action regarding corrective and preventative measures to reduce flood-related impacts.

- 11 of the 13 participating jurisdictions have a floodplain management plan in place.

Open Space Management Plan

An open space management plan is designed to preserve, protect, and restore largely undeveloped lands in their natural state, and to expand or connect areas in the public domain such as parks, greenways, and other outdoor recreation areas. In many instances open space management practices are consistent with the goals of reducing hazard losses, such as the preservation of wetlands or other flood-prone areas in their natural state in perpetuity.

- 12 of the 13 participating jurisdictions have an open space management plan in place or under development.

Stormwater Management Plan

A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of more frequently occurring minor urban flooding.

- 13 of the 13 participating jurisdictions have a stormwater management plan in place.

5.3.2 Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using geographic information systems (GIS) to analyze and assess community hazard vulnerability. The Local Capability Self-Assessment was used to capture information on administrative and technical capability through the identification of available staff and personnel resources.

Table 5.3 provides a summary of the Local Capability Self-Assessment results for the region with regard to relevant staff and personnel resources. A checkmark indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

Table 5.3 – Relevant Staff/Personnel Resources

Jurisdiction	Planners with knowledge of land development and land management practices	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human-caused hazards	Building Official	Emergency manager	Floodplain manager	Land surveyors	Scientist familiar with the hazards of the community	Staff with education or expertise to assess the community vulnerability to hazards	Personnel skilled in Geographic Information Systems (GIS) and/or HAZUS	Resource development staff or grant writers	Maintenance programs to reduce risk	Warning systems/services	Mutual Aid Agreements
Wake County	✓	✓		✓	✓	✓		✓	✓	✓			✓	✓
Town of Apex	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓
Town of Cary	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Town of Fuquay-Varina	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Town of Garner	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓
Town of Holly Springs	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
Town of Knightdale	✓	✓	✓	✓	✓	✓				✓				✓
Town of Morrisville	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
City of Raleigh	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Town of Rolesville	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	✓
Town of Wake Forest	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
Town of Wendell	✓	✓	✓	✓		✓			✓	✓			✓	✓
Town of Zebulon	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓

Source: Local Capability Assessment Survey

5.3.3 Fiscal Capability

The ability of a local government to implement mitigation actions is often dependent on the amount of money available. This may take the form of outside grant funding awards or locally based revenue and financing. The costs associated with mitigation policy and project implementation vary widely. In some cases, policies are tied primarily to staff time or administrative costs associated with the creation and monitoring of a given program. In other cases, direct expenses are linked to an actual project such as the acquisition of flood-prone houses, which can require a substantial commitment from local, state, and federal funding sources.

The Local Capability Self-Assessment was used to capture information on the region's fiscal capability through the identification of locally available financial resources.

Table 5.4 provides a summary of the results for the region with regard to relevant fiscal resources. A checkmark indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

Table 5.4 – Relevant Fiscal Resources

Jurisdiction	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation Bonds	Revenue Bonds	Special Tax Bonds	Other
Wake County	✓	✓	✓					✓	✓	✓	
Town of Apex	✓	✓		✓	✓		✓	✓	✓		✓
Town of Cary	✓	✓			✓		✓	✓	✓		
Town of Fuquay-Varina	✓	✓	✓		✓			✓	✓		
Town of Garner	✓	✓			✓	✓	✓				
Town of Holly Springs	✓				✓	✓		✓	✓		
Town of Knightdale	✓	✓		✓	✓	✓	✓	✓			
Town of Morrisville	✓	✓	✓	✓		✓		✓	✓	✓	✓
City of Raleigh	✓	✓			✓	✓	✓	✓	✓	✓	
Town of Rolesville	✓	✓					✓	✓			
Town of Wake Forest	✓		✓	✓			✓	✓	✓		✓
Town of Wendell		✓			✓						
Town of Zebulon	✓	✓	✓			✓	✓				

Source: Local Capability Assessment Survey

5.3.4 Education and Outreach Capability

This type of local capability refers to education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Examples include natural disaster or safety related school programs; participation in community programs such as Firewise or StormReady; and activities conducted as part of hazard awareness campaigns such as a Tornado Awareness Month.

Table 5.5 provides a summary of the results for the region with regard to relevant education and outreach resources. A checkmark indicates that the given resource is locally available for hazard mitigation purposes.

Table 5.5 – Education and Outreach Resources

Jurisdiction	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Natural disaster or safety related school programs	StormReady certification	Firewise Communities certification	Public-private partnership initiatives addressing disaster-related issues	Other
Wake County	✓	✓	✓	✓		✓	
Town of Apex	✓	✓	✓				
Town of Cary	✓	✓					
Town of Fuquay-Varina	✓	✓	✓				
Town of Garner		✓				✓	
Town of Holly Springs	✓	✓	✓				
Town of Knightdale	✓	✓	✓				
Town of Morrisville	✓	✓	✓				
City of Raleigh	✓	✓	✓			✓	
Town of Rolesville		✓					
Town of Wake Forest		✓	✓			✓	
Town of Wendell		✓					
Town of Zebulon							

Source: Local Capability Assessment Survey

5.3.5 Mitigation Capability

This type of local capability refers to the mitigation strategies and actions that are developed by the communities in this plan.

Table 5.6 provides a summary of the results for the planning area with regard to relevant mitigation resources. A checkmark (√) indicates that the given resource is locally available for hazard mitigation purposes.

Table 5.6 – Mitigation Resources

Jurisdiction	Do you apply for mitigation grant funding?	Do you perform reconstruction projects?	Do you perform building elevations?	Do you perform acquisitions?
Wake County				
Town of Apex		✓		✓
Town of Cary	✓			✓
Town of Fuquay-Varina	✓	✓		
Town of Garner			✓	
Town of Holly Springs		✓		
Town of Knightdale			✓	
Town of Morrisville				
City of Raleigh	✓	✓	✓	✓
Town of Rolesville				
Town of Wake Forest	✓			✓
Town of Wendell				
Town of Zebulon	✓			

5.3.6 Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of future hazard events. Hazard mitigation may not be a local priority, or it may conflict with or be seen as an impediment to other goals of the community, such as growth and economic development. Therefore, the local political climate must be considered in designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing their adoption and implementation.

The Local Capability Self-Assessment was used to capture information on political capability of the region. Survey respondents were asked to rate political support as they perceive it and identify general examples of local political capability, such as guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development

standards that go beyond minimum state or federal requirements (e.g., building codes, floodplain management, etc.).

Most participating jurisdictions indicated that political leaders are willing to implement mitigation measures. However, fiscal limitations were noted as a limitation for garnering political support. Additionally, some jurisdictions noted that although their local leaders are willing to implement mitigation measures, current state legislation is not supportive of that effort, particularly in terms of environmental regulations.

Several jurisdictions have local standards in support of hazard mitigation that exceed state requirements. For example, in Garner and Wendell, not development is allowed in the 100-year floodplain. In Wake Forest, no development is allowed within the 500-year floodplain. Both Wake Forest and Morrisville have higher freeboard requirements for construction in the floodplain. Additionally, Morrisville requires stormwater detention for the 1-, 2-, and 10-year storm events despite the state only requiring detention for the 1-year event. These regulations are indicative of local political capability to implement mitigation measures.

Four jurisdictions responded in the Local Capability Self-Assessment that they do not have local standards for mitigation exceeding state requirements, which may suggest increased barriers to implementation of mitigation regulations in this jurisdictions.

5.3.7 Local Self-Assessment Rating

In addition to the inventory and analysis of specific local capabilities, the Local Capability Self-Assessment asked counties and local jurisdictions within the Wake County planning area to assign a rating of their perceived capability across each of the capability categories and overall as either “limited,” “moderate,” or “high.”

Table 5.7 summarizes the results of the self-assessment ratings for each community in the Wake County planning area.

Table 5.7 – Self-Assessment of Capability

Jurisdiction	Plans, Ordinances, Codes and Programs	Administrative and Technical Capability	Fiscal Capability	Education and Outreach Capability	Mitigation Capability	Political Capability	OVERALL CAPABILITY
Wake County	High	Moderate	Moderate	Limited	Unrated	Unrated	Moderate
Town of Apex	Moderate	High	High	Limited	High	High	High
Town of Cary	High	High	High	High	High	High	High
Town of Fuquay-Varina	High	High	High	High	High	High	High
Town of Garner	Moderate	Moderate	High	Moderate	Moderate	Moderate	Moderate
Town of Holly Springs	High	High	High	Moderate	Moderate	High	High
Town of Knightdale	High	Moderate	Limited	Limited	Limited	Moderate	Moderate

Jurisdiction	Plans, Ordinances, Codes and Programs	Administrative and Technical Capability	Fiscal Capability	Education and Outreach Capability	Mitigation Capability	Political Capability	OVERALL CAPABILITY
Town of Morrisville	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
City of Raleigh	High	High	High	High	High	High	High
Town of Rolesville	High	High	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Wake Forest	High	High	High	Moderate	Limited	High	High
Town of Wendell	High	Moderate	Limited	Limited	Limited	Limited	Limited
Town of Zebulon	Moderate	Moderate	Moderate	Moderate	Limited	Moderate	Moderate

Source: Local Capability Assessment Survey

5.4 CONCLUSIONS ON LOCAL CAPABILITY

In order to form meaningful conclusions on the assessment of local capability, a quantitative scoring methodology was designed and applied to results of the Local Capability Self-Assessment. This methodology attempts to assess the overall level of capability of the Wake County planning area to implement hazard mitigation actions.

Table 5.8 shows the results of the capability assessment using the designed scoring methodology. The capability score is based solely on the information provided by local officials in response to the Local Capability Self-Assessment. According to the assessment, the average local capability score for all responding jurisdictions is 95, which falls into the Moderate capability ranking.

Table 5.8 – Capability Assessment Results

Jurisdiction	Overall Capability Score	Overall Capability Rating
Wake County	98	Moderate
Town of Apex	102	High
Town of Cary	108	High
Town of Fuquay-Varina	107	High
Town of Garner	93	Moderate
Town of Holly Springs	106	High
Town of Knightdale	80	Moderate
Town of Morrisville	97	Moderate
City of Raleigh	106	High
Town of Rolesville	92	Moderate
Town of Wake Forest	97	Moderate
Town of Wendell	72	Moderate
Town of Zebulon	82	Moderate

Source: Local Capability Assessment Survey, NCEM Risk Management Tool

As previously discussed, one of the reasons for conducting a capability assessment is to examine local capabilities to detect any existing gaps or weaknesses within ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. These gaps or weaknesses have been identified, for each jurisdiction, in the tables found throughout this section. The participating jurisdictions used the capability assessment as part of the basis for the mitigation actions that are identified in Section 7; therefore, each jurisdiction addresses their ability to expand on and improve their existing capabilities through the identification of their mitigation actions.

6 Mitigation Strategy

Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section describes the process for developing the mitigation strategy for the Wake County Multi-Jurisdictional Hazard Mitigation Plan. It describes how the County met the requirements for Planning Step 6 (Set Goals), Planning Step 7 (Review Possible Activities), and Planning Step 8 (Draft an Action Plan). This section includes the following sub-sections:

- 6.1 Goals and Objectives
- 6.2 Identification & Analysis of Mitigation Activities

6.1 GOALS AND OBJECTIVES

Requirement §201.6(c)(3)(i): [The mitigation strategy section shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Goal setting builds upon the findings of Section 4, which documents the hazards and associated risks that threaten the Wake County planning area, and Section 5, which evaluates the capacity of the County to reduce the impact of those hazards. The intent of Goal Setting is to identify areas where improvements to existing capabilities can be made so that community vulnerability is reduced. Goals are also necessary to guide the review of possible mitigation measures. This plan needs to make sure that recommended actions are consistent with what is appropriate for the County and its incorporated municipalities. Mitigation goals need to reflect community priorities and should be consistent with other local plans.

- **Goals** are general guidelines that explain what is to be achieved. They are usually broad-based policy type statements, long term and represent global visions. Goals help define the benefits that the plan is trying to achieve.
- **Objectives** are short term aims that, when combined, form a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

6.1.1 Coordination with Other Planning Efforts

The goals of this plan need to be consistent with and complement the goals of other local planning efforts. The primary planning documents that the goals of this plan should complement and be consistent with are the county and participating jurisdictions' comprehensive plans. Comprehensive plans are important because they are developed and designed to guide future growth within their communities. Keeping the Hazard Mitigation Plan and Comprehensive Plans consistent ensures that land development is done with awareness and understanding of hazard risk and that mitigation projects complement rather than contradict community development objectives.

6.1.2 Goal Setting

At the second planning meetings, held on January 7, 2019 and January 9, 2019, the HMPC reviewed and discussed the goals from the 2015 Plan. The previous goals were as follows:

#1	Protect public health, life, safety, and welfare by increasing public awareness and education of hazards and by encouraging collective and individual responsibility for mitigating hazard risks.

#2	Improve technical capability to respond to hazards and to improve the effectiveness of hazard mitigation actions.
#3	Enhance existing or create new policies and ordinances that will help reduce the damaging effects of natural hazards.
#4	Minimize threats to life and property by protecting the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
#5	Generally reduce the impact of all natural hazards.
#6	Ensure that hazard mitigation is considered when redevelopment occurs after a natural disaster.
#7	Ensure that disaster response and recovery personnel have the necessary equipment and supplies available in order to serve the public in the event of a disaster.

The following changes were proposed to the HMPC:

- Re-word Goal #2 to emphasize implementing hazard mitigation in addition to hazard response.
- Delete Goal #3 and incorporate it as an objective under the existing Goal #6.
- Delete Goal #5.
- Modify Goal #6 to include new development in addition to post-disaster redevelopment. Emphasize recovery development and the need for resilience.
- Delete Goal #7 and incorporate it as an objective under the existing Goal #2.

There were three comments on the goal revisions. For Goal #2, the scope of technical capability was questioned and the group decided it should include administrative resources as well as tools, data, and equipment. For Goal #4, it was recommended that adaptation be included in addition to resiliency, to emphasize the need to consider future conditions during the development and redevelopment processes. For Goal #6, it was recommended that the action specifically include recovery because a current capability gap for the County and jurisdictions is the lack of a recovery plan. With the inclusion of these comments, the HMPC approved of the recommended goal revisions.

During the third planning meetings, held on March 4, 2019 and March 8, 2019, the HMPC discussed objectives within each goal in order to better facilitate the development of clearly defined mitigation actions.

The revised goals and the newly identified objectives of this plan update are detailed below in Section 6.1.3.

6.1.3 Resulting Goals and Objectives

The HMPC agreed upon four general goals for this planning effort and included specific objectives in support of each goal. The refined goals and objectives are as follows:

Goal 1 – Protect public health, life, safety, and welfare by increasing public awareness and education of hazards and by encouraging collective and individual responsibility for mitigating hazard risks.

Objective 1.1: Develop outreach materials and expand outreach platforms to identify hazard areas and explain risks.

Objective 1.2: Seek opportunities to improve warning and notification of hazard events.

Goal 2 – Improve technical capability (including administrative resources, tools, data, and equipment) to implement hazard mitigation and respond to hazard events.

Objective 2.1: Ensure that disaster response and recovery personnel have the necessary equipment and supplies available in order to serve the public in the event of a disaster.

Objective 2.2: Seek to fill gaps in local capabilities that will enable improved implementation of mitigation projects.

Goal 3 – Minimize threats to life and property by protecting the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.

Objective 3.1: Retrofit, harden, or otherwise protect critical facilities and infrastructure to protect against damages and ensure continuity of operations during hazard events.

Objective 3.2: Implement policies and projects that reduce vulnerabilities of key populations and property at risk.

Goal 4 – Incorporate resiliency into future growth by ensuring that hazard mitigation is considered for both new development and post-disaster redevelopment and recovery.

Objective 4.1: Enhance existing or create new policies and ordinances that will help reduce the damaging effects of natural hazards.

Objective 4.2: Integrate hazard mitigation into existing and new planning efforts.

6.2 IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIVITIES

Requirement §201.6(c)(3)(ii): [The mitigation strategy section shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

To identify and select mitigation projects that support the mitigation goals, each hazard identified in Section 4 Hazard Identification was evaluated. The following were determined based on the Priority Risk Index scores to be high and medium priority hazards:

- Extreme Heat
- Severe Weather
- Severe Winter Storm
- Hurricane & Tropical Storm
- Tornado
- Radiological Emergency
- Flood
- Drought
- Wildfire
- Hazardous Materials Incident
- Terrorism
- Dam Failure

Note: actions were also identified for Landslide despite it being a low priority hazard.

Once it was determined which hazards warranted the development of specific mitigation actions, the HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of mitigation categories which are utilized as part of the CRS planning process but are also applicable to multi-hazard mitigation.

- Prevention
- Property Protection
- Natural Resource Protection
- Emergency Services
- Structural Projects
- Public Information and Outreach

The HMPC was also provided with examples of potential mitigation actions for each of the above categories. The HMPC was instructed to consider both future and existing buildings in evaluating possible mitigation actions. Facilitated discussions took place to examine and analyze the options. The HMPC also considered which actions from the previous plan that were not already completed should be continued in this action plan.

6.2.1 Prioritization Process

In the process of identifying continuing and new mitigation actions, the HMPC was provided with a set of prioritization criteria to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. HMPC members were asked to rate each action on a set of criteria, which were grouped into three categories: Suitability, Risk Reduction, and Cost. The criteria for the prioritization process included the following:

- **Suitability**
  - Appropriateness of Action
  - Community Acceptance
  - Technical and Administrative Feasibility
  - Environmental Impact
  - Legal Conformance
  - Consistency with Existing Plans and Other Community Goals
- **Risk Reduction**
  - Scope of Benefits
  - Potential to Save Lives
  - Importance of Benefits
  - Level of Inconvenience or Unintended Consequence
  - Losses Avoided
  - Number of People to Benefit
- **Cost**
  - Estimate of Upfront Cost
  - Estimate of Ongoing Cost
  - Benefit to Cost Ratio
  - Financing Availability
  - Affordability
  - Elimination of Repetitive Damages

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority, as reflected in the prioritization criteria above. For each action, the HMPC considered the benefit-cost analysis in terms of:

- Ability of the action to address the problem
- Contribution of the action to save life or property
- Available technical and administrative resources for implementation
- Availability of funding and perceived cost-effectiveness

The consideration of these criteria helped to prioritize and refine mitigation actions but did not constitute a full benefit-cost analysis. The cost-effectiveness of any mitigation alternative will be considered in greater detail through performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

Using these prioritization criteria, the HMPC's ratings for each action were input into the North Carolina Emergency Management's Risk Management Tool (RMT), which provided a ranking of High, Medium, or Low priority. The prioritization ranking for each mitigation action considered by the HMPC is provided in Section 7 Mitigation Action Plans.

7 Mitigation Action Plans

Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include an] action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

This section provides the mitigation action plans for each participating jurisdiction. The plans are organized as follows:

- Wake County (Unincorporated Area)
- City of Raleigh
- Town of Apex
- Town of Cary
- Town of Fuquay-Varina
- Town of Garner
- Town of Holly Springs
- Town of Knightdale
- Town of Morrisville
- Town of Rolesville
- Town of Wake Forest
- Town of Wendell
- Town of Zebulon

Additional details on each mitigation action are provided by jurisdiction in their respective annex of this plan.

Table 7.1 – Mitigation Action Plan, Wake County (Unincorporated Area)

Wake County											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Conduct a groundwater assessment using a network of wells and leading to a groundwater model that can enhance the understanding of groundwater capacity, threats and vulnerabilities in response to growth and weather.	1	1	Drought	High	Wake Environmental Services, Wake Water Partnership, USGS	$1,565,000	Non-departmental operating expense and USGS	3-5 years	In-Progress – Carry Forward	Program scope established and project is underway. Wake County is partnering with USGS to conduct this study.
P-2	Oversee completion of planned reclaimed water projects per the County's approved Community Improvement Program (CIP).	4	2	Drought	Moderate	Raleigh, Wake County	$16,000,000	Annual budget process	2-3 years	In-Progress – Carry Forward	Completed several reclaimed water projects in RTP and others directly related to County facilities. Project has three phases; phases 1 and 2 are complete.
Property Protection											
PP-1	Identify road network segments no longer maintained by NCDOT and provide funding and planning resources for mitigation and recovery efforts to communities to ensure infrastructure and transportation resiliency. Assist in reinstating water and sewer services post disaster.	3	1	All	Moderate	Wake County Community Services	$100,000,000	Annual budget ordinance	Ongoing - Next 5 years	New	N/A
Natural Resource Protection											
NRP-1	Partner with other governmental units and other interested parties to jointly identify and acquire 30,000 acres of open space lands.	3	2	Flood, Drought, Landslide, Extreme Heat	High	Wake County Community Services	$335,000,000	Open Space Bonds	3-5 years	In-Progress – Carry Forward	The County has purchased approximately 7,634 acres since the program's inception. It will take several decades as indicated to complete. In 2018 voters approved $120m Parks, Greenways, Recreation and Open Space Bond. $26m available for 2019.
Structural Projects											
SP-1	Replace emergency generators located at facilities that serve as emergency shelter locations based on their scheduled end of life cycle.	3	1	All	Moderate	Wake County Facilities Design & Construction	$1,400,000	Local and Federal Grant	More than 5 years	New	N/A
SP-2	Construction of a new Emergency Operations Center adequate for the size and complexity of the jurisdiction	2	1	All	Moderate	Wake County Emergency Management	$6,500,000	Local	3-5 years	New	N/A
Emergency Services											
ES-1	Recovery Plan. Develop a comprehensive disaster recovery plan for Wake County consistent with the vision and goals described in PPD-8 and the National Disaster Recovery Framework.	4	2	All	Moderate	Wake County Emergency Management	$150,000	Local	3-5 years	New	N/A
ES-2	Upload dam failure inundation maps to Everbridge system for notification and evacuation.	1	2	Dam Failure	High	Wake County Emergency Management	Staff time	Local	1 year	New	N/A
Public Education and Awareness											
PEA-1	Emergency Planning and Community Right-to-Know Act (EPCRA) High Hazard Chemicals Awareness. Identify chem facilities, potential impact zones, and potentially affected communities. Inform public and provide resources and education.	1	1	Hazardous Material	Moderate	Wake County Local Emergency Planning Committee	$15,000	Local funding, donations	2-3 years	New	N/A
PEA-2	Increase public awareness and participation in the Ready Wake program and resources.	1	1	All	Moderate	Wake County Fire Services, Emergency Management	$10,000	Federal Grants and Local	2-3 years	New	N/A

Table 7.2 – Mitigation Action Plan, City of Raleigh

City of Raleigh											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Establish a Lake Preservation Policy that encourages private property owners to preserve existing lakes and ponds, and in certain circumstances provides for public assistance.	4	1	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local	1 year	In-Progress – Carry Forward	City Stormwater has also worked with the Stormwater Management Advisory Commission to develop recommendations to further enhance the lake preservation program. It is anticipated that the revised program will be considered by City Council during calendar year 2019. Enhancements would include the continued ability to restore and upgrade dams and spillways associated with safety improvements as well as removal of dams to protect safety and restore natural conditions
P-2	Develop ongoing multi-year program of detailed basin studies for each watershed in City's jurisdiction. Fifteen basin studies are complete with 10 additional studies budgeted in the capital program. (CRS 410).	2	2	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local	1 year	In-Progress – Carry Forward	City Stormwater is currently working on an Integrated Stormwater Management Master Plan. Basin studies will be reviewed and updated as needed with further improvement needs and opportunities identified and prioritized. Reduction of flooding hazards remains a key priority for improvement projects.
P-3	Planning Commission to consider program to develop future conditions floodplain mapping for all FEMA mapped areas (this is already done for non-FEMA mapped areas). The program would consist of a multi-year capital program for mapping for all FEMA streams in the ETJ and consideration of changes to development regulations in these areas. Future conditions would be based on expected development per the Comprehensive Plan and zoning maps.	4	2	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local	3-5 years	In-Progress – Carry Forward	The preliminary maps that have all FEMA floodplain in the city studied for future conditions. Our ordinance is already set up to enforce these areas. Once the maps are effective this effort will be complete.
P-4	Reallocation of Falls Lake water conservation pool; increased available storage for water supply by 4.1B gallons	2	1	Drought	High	Public Utilities Department	No cost	N/A	Ongoing - Next 5 years	New	N/A
P-5	Implementation of a regional mutual aid contract between local water utilities which would describe how the utilities would provide assistance if a partner utility experienced a water shortage	2	2	Drought	High	Public Utilities Department	Variable - depends on volume of water transferred between systems	Public Utilities Dept	Ongoing - Next 5 years	New	N/A
P-6	Develop a written Resiliency Plan for City of Raleigh operations and services, including infrastructure resilience, community resilience, ecosystem resilience and governance resilience.	4	1	All	High	Office of Sustainability	Less than $100,000	Unknown	2-3 years	New	N/A
P-7	Water Shortage Response Plan which uses a hydrologic model (OASIS) to establish risk based drought triggers that are designed to reduce water demand before severe drought conditions and also when to exit drought triggers when conditions improve.	2	2	Drought	Moderate	Public Utilities Department	No cost	N/A	Ongoing - Next 5 years	New	N/A
P-8	Update and maintain GIS data of building footprints, parcels, and critical facilities, and use it to regularly identify buildings in need of mitigation.	2	2	All	Moderate	Raleigh Information Technology, GIS staff	Staff time	Local	Ongoing - Next 5 years	New	Updated data will be used in future plan updates and risk assessments and to identify properties that should be prioritized for mitigation.
Property Protection											
PP-1	Develop ongoing program designed to utilize Federal grant resources to assist private property owners in relocating existing structures out of flood hazard zones. (CRS 500/510/520)	3	2	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local, Federal	3-5 years	In-Progress – Carry Forward	The city is cataloging potential candidates for relocation based on our current repetitive loss list. Staff has developed a scoring system based on cost benefit for relocation.

City of Raleigh											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
PP-2	Develop an ongoing program designed to utilize Federal grant resources to assist private property owners in elevating existing structures located within flood hazard zones. (CRS 510/530)	3	2	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local, Federal	3-5 years	In-Progress – Carry Forward	To further this initiative, the city is cataloging potential candidates for elevation based on our current repetitive loss list. Staff has developed a scoring system based on cost benefit for elevation that would compare the projects to relocation and retrofits.
PP-3	Develop an ongoing program designed to utilize Federal grant resources to assist private property owners in renovating and retrofitting existing structures in flood hazard zones to reduce vulnerability to flooding damage.	3	2	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local, Federal	Ongoing – next 5 years	In-Progress – Carry Forward	City staff evaluates potential candidates and approaches property owners for mitigation help.
PP-4	Program to install emergency electrical generators at all public utility facilities. Current focus on redundant generators at critical facilities, second fuel truck and completion of 100% generator coverage in Garner area.	3	1	All	High	Raleigh Public Utilities	$100,000 - $1m	Local	2-3 years	In-Progress – Carry Forward	We now have emergency backup power generators at all our critical facilities except for our South Raleigh Operations Facility. However, we can relocate supplies, material and teams to any of our other facilities per our emergency operational planning. Also, per our Hurricane Florence AAR we are conducting emergency fuel capacity studies for our generators at our largest wastewater treatment plant and both our water treatment plants. A fuel truck is not in the works but we have emergency fuel contracts with Red Star and also exploring dual use of natural gas to power some of our energy resiliency to give us an added layer.
Structural Projects											
SP-1	Install cameras in flood prone areas throughout the City of Raleigh to allow us to view these locations and make informed decisions as it relates to flooding	2	2	Flood, Hurricane	Moderate	City of Raleigh Transportation	$100,000 to $1m	Unknown	3-5 years	New	N/A
Emergency Services											
ES-1	Provide and enhance technical rescue capabilities more equitably throughout the City.	2	1	Dam Failure, Flood, Hurricane, Severe Weather, Severe Winter Storm, Tornado, Wildfire	High	Raleigh Fire	$100,000 - $1m	Local	2-3 years	In-Progress – Carry Forward	We continually look at our technical rescue capabilities and adjust as needed. The initiative to add 1 Heavy Rescue and 2 Squads has been completed. Additionally, we've added 1 company (12 personnel) to the team, upgraded water rescue equipment, increased water rescue certified personnel from 20 to 60, required 100% of members be Technical Rescuer and Vehicle Extrication certified and are working toward 100% certification for all members in all the other technical rescue disciplines.
ES-2	Provide after-action report of emergency response to severe weather events in order to improve planning for future disasters.	2	2	Hurricane, Severe Weather, Severe Winter Storm, Tornado	High	Raleigh Fire and Emergency Management	$100,000 - $1m	Local	Ongoing- Post Event	In-Progress – Carry Forward	After-action report made for Hurricane Florence and will continue to be made for all subsequent weather events.
ES-3	Maintain a standard operating guideline to direct operational planning prior to anticipated weather emergencies.	2	1	All	High	Raleigh Fire and Emergency Management	$100,000 - $1m	Local	Ongoing – next 5 years	In-Progress – Carry Forward	The City's Emergency Operation Plan outlines our standard operating guidelines and has been adopted as an official document used prior to and during weather emergencies.
ES-4	Design GIS programming capable of providing real-time data to emergency managers and historic data for future emergency response planning.	2	2	All	High	Raleigh City Manager and Information Technology	$100,000 - $1m	Local	3-5 year	In-Progress – Carry Forward	The IT Department led a citywide effort to develop a Situational Analysis Smart Dashboard for the Emergency Operations Center and refined it in real time as new types of data, such as current wind speed, were identified as critical to the safety of the public and city workers during an emergency. The Smart Dashboard was first deployed for Hurricane Florence. The dashboard is cross-departmental, with real-time progress tracking, covering a range of emergency management issues from debris in streets and closures, malfunctioning traffic signals, flood monitoring and 911 call data.

City of Raleigh											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
ES-5	Continue to conduct disaster tabletop exercise program.	2	1	All	Low	Raleigh Public Utilities, Fire, Police, City Manager, Emergency Management, and Engineering Services	$100,000 - $1m	Local	Ongoing – next 5 years	In-Progress – Carry Forward	Tabletop disaster exercises continue to occur with all EOC partners prior to the anticipated peak of hurricane season. These trainings take place each year to ensure staff are comfortable in their EOC roles and to handle staff turnover.
ES-6	Establish cross-functional team to develop Debris Management Plan. Team should work to identify and prepare additional debris management sites.	2	1	Flood, Tornado, Earthquake, Severe Winter Storm, Severe Weather, Hurricane	Moderate	City of Raleigh Transportation	$100,000	FEMA, City of Raleigh general fund support	1 year	New	N/A
Public Education and Awareness											
PEA-1	Utilize existing Everbridge advisory software to issue Heat Advisory Alerts targeted to vulnerable neighborhoods	1	2	Extreme Heat	High	Communications/ Sustainability	Less than $100,000	COR Operating Funds	2-3 years	New	N/A

Table 7.3 – Mitigation Action Plan, Town of Apex

Town of Apex											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Revise and update the regulatory floodplain boundary, including flood studies.	2	2	Flood	Moderate	Public Works & Transportation (Floodplain Administrator)	Staff Time	Town Funds	Ongoing - Next 5 years	In-Progress – Carry Forward	Action revised.
P-2	Develop an environmental committee that meets regularly to discuss issues and recommend projects.	2	2	All Hazards	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	Staff Time	Town Funds	Ongoing - Next 5 years	In-Progress – Carry Forward	The Town Council's Environmental committee has been established and meets approximately every 2 months
P-3	Encourage the use of Low Impact Development techniques.	4	2	Flood, Landslide, Drought, Hurricane, Extreme Heat	Low	Water Resources (Stormwater and Utility Engineering Manager)	Staff Time	Town Funds	Ongoing - Next 5 years	In-Progress – Carry Forward	Ongoing activity that has seen more results in last 5 years and will continue to be prioritized.
P-4	Use system development fees to help fund public projects	3	2	Flood, Wildfire, Tornado, Severe Winter Storm, Severe Weather, Drought, Hurricane	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	Unknown	Local Development Fees	3-5 years	In-Progress – Carry Forward	Action revised.
P-5	Update the UDO & Design and Development Manual to incorporate proper species selection and practices for planting and maintenance into the landscape ordinance.	4	1	Flood, Severe Winter Storm, Severe Weather, Drought, Hurricane	Moderate	Planning Dept.	Staff Time	Local	2-3 years	In-Progress – Carry Forward	Action revised.
P-6	Incorporate GIS data and risk analysis into the development review process.	4	2	All	Moderate	Fire Dept. & Planning Dept.	Staff Time	Local	Ongoing - Next 5 years	In-Progress – Carry Forward	Action revised.
P-7	Create a Stormwater Utility to fund the Town's Stormwater Program.	2	2	Flood	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	$100,000	Local	2-3 years	New	Implement: 2021
P-8	Continue to use "Neighbors Helping Neighbors" program to help low income Apex Utility customers pay their utility bills.	3	2	Extreme Heat, Severe Winter Storm	Moderate	Finance Dept/Western Wake Crisis Ministry	None	Local	Ongoing - Next 5 years	New	Has been in use for years but is just now being recognized as contributing towards mitigating impacts of high heat and cold weather.
P-9	Salt local roads before Severe Winter Storm & plow after snow and ice fall.	3	2	Severe Winter Storm	Moderate	Public Works & Transportation		Local	Ongoing - Next 5 years	New	On-going activity that is just now being added as mitigation for Severe Winter Storms.
Property Protection											
PP-1	Adopt and enforce the Fire Prevention Code.	4	1	Wildfire, Hazardous Materials Incident	Moderate	Fire Department	Staff Time	Local	Ongoing - Next 5 years	New	N/A
PP-2	Annually update the comprehensive occupancy pre-plan program with local data for use in risk analysis.	4	2	Flood, Wildfire, Hazardous Materials Incident, Radiological Emergency	Moderate	Fire Department	Staff Time	Local	Ongoing - Next 5 years	In-Progress – Carry Forward	Action revised.
PP-3	Restore streams to slow the speed of water and reduce erosion to prevent both private property loss and public infrastructure damage.	3	2	Flood	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	Over $500,000	Local & Federal	Ongoing - Next 5 years	New	N/A
Natural Resource Protection											
NRP-1	Middle Creek Greenway (Miramonte to Holly Springs).	3	2	All	Moderate	Apex Parks and Recreation	$2,870,000	Local	3-5 years	In-Progress – Carry Forward	under construction
NRP-2	White Oak Creek Greenway.	3	2	Flood	Moderate	Apex Parks and Recreation	$284,000	Local	3-5 years	In-Progress – Carry Forward	under construction
NRP-3	During development review, ensure new development complies with floodplain development restrictions listed in UDO Section 6.2 Flood Damage Prevention Overlay District.	4	2	Flood	Moderate	Public Works and Transportation (Floodplain Administrator)	Staff Time	Local	Ongoing - Next 5 years	New	N/A

Town of Apex											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
NRP-4	During development review, ensure new development complies with UDO stream buffer standards.	4	2	Flood	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	Staff Time	Local	Ongoing - Next 5 years	New	N/A
NRP-5	During development review, ensure SCMs are designed in accordance with State criteria to safely pass 100-year storm.	4	2	Flood	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	Staff Time	Local	Ongoing - Next 5 years	New	N/A
Structural Projects											
SP-1	Improve communications abilities for emergency response by building new fiber optic internet infrastructure and replacing current radio systems.	2	1	All	Moderate	Police Dept	$915,000	Local	3-5 years	New	N/A
SP-2	Build Jessie Drive to connect TenTen Rd and NC-55. This will provide greater connectivity and make evacuation faster & safer.	3	2	All	Moderate	Public Works and Transportation	$6,000,000	Local	3-5 years	New	N/A
SP-3	Relocate Beaver Creek Sewer Line out of the creek.	3	2	Flood, Wildfire, Severe Winter Storm, Hurricane	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	$1,500,000	Local	3-5 years	New	N/A
SP-4	Finish the Peakway loop road. Will provide greater connectivity, faster emergency response times, and make evacuation faster & safer.	3	2	All	High	Public Works and Transportation	$20,000,000	Local	More than 5 years	New	Design work is in progress
Emergency Services											
ES-1	Construct Fire Station #6	3	2	All Hazards	Moderate	Apex Fire	$4,175,000	Local	3-5 years	New	N/A
ES-2	Construct Fire Station #7	3	2	All Hazards	Moderate	Apex Fire	$4,000,000	Local	More than 5 years	New	N/A
ES-3	Relocate Fire Station #3 from its existing location because of the impacts of widening NC-55.	3	1	All Hazards	Moderate	Apex Fire	$4,000,000	Local	More than 5 years	New	N/A
ES-4	Keep Town website updated with information about Shearon Harris Siren Testing.	1	2	Radiological Incident	Moderate	Apex Public Information Officer	Staff Time	Local	Ongoing - Next 5 years	New	Ongoing activity that's just now being recognized for its mitigation potential
Public Education and Awareness											
PEA-1	Town website and utility billing announcing National Preparedness Month (September) reminding citizens to have a plan and be prepared.	1	1	All	Moderate	Administration (Communications Officer)	Less than $100,000	Local	Ongoing - Next 5 years	In-Progress – Carry Forward	On-going activity to be implemented annually
PEA-2	Include Environment Education Station and classroom at Nature Park.	1	1	All	Moderate	Apex Parks and Recreation	$1,000,000	Local	3-5 years	Not Started – Carry Forward	New target completion date is 2022
PEA-3	Post warning signage at local parks for lightning.	1	1	Severe Weather	Moderate	Apex Parks and Recreation	$100,000	Local	3-5 years	Not Started – Carry Forward	New implementation schedule is 3-5 years
PEA-4	Hand out hazard educational materials at Apex festivals.	1	1	All	Moderate	Planning Dept. & Water Resources	Less than $1,500	Local	Ongoing - Next 5 years	New	N/A
PEA-5	Use Social Media to inform residents about local hazards.	1	1	All	Moderate	Apex Public Information Officer & Planning Dept.	Staff Time	Local	Ongoing - Next 5 years	New	N/A

Table 7.4 – Mitigation Action Plan, Town of Cary

Town of Cary											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Town's Comprehensive Plan- The Town has an existing comprehensive plan which includes land use, parks and recreation, open space, transportation, utilities, and environment.	4	2	All	High	Cary Planning	$1M for plan development; implementation ongoing	General Fund	2-3 years	In-Progress – Carry Forward	Cary's comprehensive plan, called alternately the Cary Community Plan and the Imagine Cary Plan was finalized on January 24, 2017. Implementation in-process.
P-2	Adaptive Approach to Stormwater	4	1	Flood	High	Cary Stormwater	$900,000	General Fund and $300K Grant	Ongoing	New	Multi-pronged approach including 5 key components: 1) Working Group of residents and local experts to learn and advise 2) Maintenance, including Condition Assessment (a separately listed "action") 3) Open Space, examining how open space and tree canopy provide stormwater benefits 4) Model, hiring a firm to build a hynamic rainfall-runoff model to establish a baseline and test solutions and scenarios 5) Ordinance, looking at the stormwater ordinance as a way to achieve our risk mitigation goals
P-3	Stormwater Condition Assessment Program	4	2	Flood	High	Cary Stormwater	$750,000	General Fund	2-3 years	New	In phase 4, (1-GIS Assessment Tool, 2-GIS Mapping Data and assessment, 3-Modeling, 4-Maintenance) Assessment Tool completed. GIS Mapping 99% completed.
P-4	Develop flood model for upper Swift Creek watershed	2	2	Flood, Hurricane	High	Cary Stormwater	Unknown	Town Funds	1 year	New	N/A
P-5	Develop flood model for Symphony Lake	2	2	Flood, Hurricane	High	Cary Stormwater	Unknown	Town Funds	2-3 years	New	N/A
P-6	Engineering evaluation of Tryon Road dam	2	2	Dam Failure	Moderate	Cary Stormwater	Unknown	Town Funds	3-5 years	New	N/A
P-7	Conduct study and develop improvement plan for Twin Lakes dam	2	2	Dam Failure	High	Cary Stormwater	Unknown	Town Funds	3-5 years	New	N/A
P-8	Conduct flood study on Town-owned lake/dam, including breach analysis	2	2	River Flooding, Dam Failure	High	Cary Stormwater	Unknown	Town Funds	2-3 years	New	N/A
P-9	Triangle Regional Resiliency Partnership	4	1	River Flooding, Wildfire, Drought, Extreme Heat	Moderate	Town of Cary	Variable (depending on outside consultants)	General Funds	Ongoing	New	On-going partnership among Triangle area jurisdictions intended to do joint resilience planning and action. The group's first deliverable of a Triangle Regional Resilience Assessment was finalized late 2018. The group is continuing to meet and consider how it may implement recommendations of the assessment together.
Property Protection											
PP-1	Culvert Replacement - Arbor Brook	3	2	Flood	High	Cary Stormwater	$400,000	General Fund	1 year	New	Replace existing culverts with larger culverts
PP-2	Culvert Replacement - Two Creeks	3	2	Flood	High	Cary Stormwater	$800,000	General Fund	1 year	New	Replace existing culverts with larger culverts
Natural Resource Protection											
NRP-1	Downtown Park	3	2	Flood	High	Cary Stormwater and Facilities	$750,000	General Fund	2-3 years	New	In planning phase. Implementing SW management above and beyond state requirements. Detention of 2, 5 and 10-year storm reduces scour on receiving stream.
NRP-2	Buffer and UTB Protection	3	2	Flood	High	Cary Stormwater and Cary Planning	Over $10,000,000	Private (Developer) Funds	Ongoing - Next 5 Years	New	Extra 50-foot buffer (UTB) on USGS streams; no buffers platted in lots.
Structural Projects											
SP-1	Infrastructure improvements on Summer Lakes Dr.	3	2	Flood	High	Cary Stormwater	$900,000	General Fund	1 year	New	Replace existing undersized culverts
SP-2	Infrastructure improvements on Vincrest Ct	3	2	Flood	High	Cary Stormwater	$400,000	General Fund	2-3 years	New	Replace existing undersized culverts
SP-3	Update Water Shortage Response Plan	2	4	Drought	High	Town of Cary	Staff Time	N/A	1 year	New	N/A

Town of Cary											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
SP-4	Water System Risk Analysis	3	1	All	High	Town of Cary	$89,000	General Fund	Ongoing - 1 Year	New	The Water System Risk Analysis is a comprehensive look at the risks to our water system. It is being done to comply with the American Water Infrastructure Act of 2018. It will result in a new emergency response plan for our water system.
Emergency Services											
ES-1	Provide and enhance technical rescue capabilities throughout the Town.	2	1	All	High	Cary Fire	Unknown	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Cary's Fire Department has a technical rescue training program that we coordinate with Morrisville and Apex, NC. We train on all disciplines of technical rescue.
ES-2	Provide after-action report of emergency response to severe weather events in order to improve planning for future disasters.	2	2	All	High	Cary Fire, Water Resources, and Facilities Design & Transportation Services	Unknown	General Fund	Ongoing - Next 5 Years	In-Progress – Carry Forward	Cary's key emergency response departments have formal after-action meetings to learn from what went well and seek opportunities to improve. This occurs after each event, so is ongoing in nature.
ES-3	Establish a relationship/partnership with the Renaissance Computing Institute (RENCI) to create a web-based tool capable of providing real-time flood data to emergency managers and historic data for future emergency response planning.	2	2	All	Low	Cary Fire and Technology Services	Unknown	General Fund	Ongoing – Next 5 Years	In-Progress – Carry Forward	Still in the early stages of developing this partnership.
ES-4	Partnership with FBI Terrorism Task Force	2	2	Terrorism	Moderate	Town of Cary, Town of Cary Police	$100,000	General Fund	Ongoing	New	Since 2011 the Town of Cary Police have an officer assigned full time to the FBI Terrorism Task Force to maintain a relationship with the FBI. FBI Terrorism Task Force located in the FBI Raleigh Office located in the Town of Cary off Cary Parkway near US 1. Wake County Emergency Management has a plan for large scale events that impact Wake County. Those plans include guidance for law enforcement as part of a multi-agency response to all sorts of issues that could include the unlikely event of a terrorist attack.
ES-5	Inclement Weather Response Plan	2	1	Severe Winter Storm, Thunderstorm, Hurricane	Moderate	Town of Cary, Town of Cary Public Works	$100,000 - $1 Million (depending on number and type)	General Fund	Ongoing	New	The town commits significant Town-wide resource allocation and operational commitment to ensuring all aspects of winter weather events are planned, executed, and reviewed to maximize positive recovery outcomes for its citizens. The Town has similar structure and programs for thunderstorm or wind events.
Public Education and Awareness											
PEA-1	Environmental Education "green infrastructure" signage on Dry Avenue Properties that were bought out due to flooding. Signs to be installed early 2019	1	1	Flood	Low	Cary Stormwater and Sustainability	$11,000	Local	Ongoing - Next 5 Years	New	N/A
PEA-2	Citizen volunteers make up the Community Emergency Response Team (CERT). CERT training is a Citizens Corps program designed to enable citizens to care for themselves and their neighbors during the first three days following a disaster event. Participants are educated about disaster preparedness, CERT organization, light search and rescue, medical care, fire extinguisher use and disaster psychology.	1	2	All	Moderate	Cary Police Department and Fire Department	$1,000/year	Donations	Ongoing - Next 5 Years	New	N/A

Table 7.5 – Mitigation Action Plan, Town of Fuquay-Varina

Town of Fuquay-Varina											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Require pre and post construction certification for residential lot development within 10 feet of Wake County Flood Hazard Soils.	4	1	Flood	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of permit review process
P-2	Annually calculate acreage of flood prone property preserved as open space.	2	2	Flood, Hurricane	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of an annual report
P-3	Map storm water drainage system as part of Phase II Stormwater Management Plan.	2	2	Flood	High	Fuquay-Varina Engineering	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of infrastructure acceptance / ongoing project to work on historical data inclusion
P-4	Provide for public dissemination building inspections brochures regarding high winds, water damage prevention, and tie downs for accessory structures.	1	1	Flood, Tornado, Hurricane, Severe Weather	Moderate	Fuquay-Varina Inspections	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Brochures continuously made available to public at Town Hall
P-5	Review and update of drought policy for water conservation	2	2	Drought	High	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	3-5 years	New	N/A
P-6	Review and update requirements for mast arms to be installed over strain poles	3	2	Severe Weather, Severe Winter Storm, Hurricane, Tornado	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	3-5 years	New	N/A
P-7	Review and update the 2014 Comprehensive Systemwide Parks, Recreation & Cultural Resources Master Plan for inclusion of hazard safety information at facilities	4	2	Flood, Earthquake, Extreme Heat, Severe Weather, Tornado	High	Fuquay-Varina Planning and Parks, Recreation, & Cultural Resources	Budgeted Staff Time	Annual Budget	3-5 years	New	N/A
Property Protection											
PP-1	Continue to enforce the Flood Damage Prevention Ordinance for all new construction or substantial building rehabilitations.	4	1	Flood, Hurricane	High	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
PP-2	Require minimum finished floor elevation in known FEMA flood hazard zones be minimum 2’ above base flood elevation.	4	1	Flood, Hurricane	High	Fuquay-Varina Planning and Inspections	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
PP-3	Identify and inventory buildings that are located in FEMA flood zones to determine which structures may be prone to flooding (possible relocation and/or elevation).	3	1	Flood, Hurricane	High	Fuquay-Varina Planning and Engineering	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	We reference the Dept of Public Safety's report
Natural Resource Protection											
NRP-1	Work with the U.S. Army Corps of Engineers on wetland protection.	4	1	Flood, Hurricane	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
NRP-2	Use Open Space Ordinance to protect wildlife habitat.	4	1	All	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
NRP-3	Notify Wake County of any illegal stream dumping instances	3	1	Flood, Dam Failure, Hurricane	Moderate	Fuquay-Varina Planning and Public Utilities	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
NRP-4	Enforce standards for tree protection and control of clear cutting (Town has received legislative authority to enact tree protection and control of clearcutting standards.)	4	1	Flood, Wildfire, Landslide	High	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
NRP-5	Install low flow/high efficiency toilets at new town hall	3	1	Drought	Low	All Departments	To Be Determined	Annual Budget	1 year	New	N/A
Structural Projects											
S-1	Install a generator at the new town hall	3	1	All	High	All Departments	To Be Determined	Annual Budget	1 year	New	N/A
S-2	Install security cameras on new town hall	3	1	Terrorism	High	All Departments	To Be Determined	Annual Budget	1 year	New	N/A
Emergency Services											
ES-1	Maintain current warning system with local sirens on elevated platforms and use of the Emergency Broadcast System.	1	2	All	High	Fuquay-Varina Planning, Fire and Police	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
ES-2	Coordinate an incident command course for all Town employees, related to Emergency Operations Plan and Disaster Operations Plan for the Town.	2	1	All	Moderate	Fuquay-Varina Fire and Police	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Lack of staffing has prevented implementation

Town of Fuquay-Varina											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
ES-3	Conduct a scenario-based training exercise, related to Emergency Operations Plan and Disaster Operations Plan for the Town.	2	1	All	Moderate	Fuquay-Varina Fire and Police	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Lack of staffing has prevented implementation
ES-4	Assist Wake County Emergency Management with updating list of local hazardous materials sites.	2	1	Hazardous Materials Incident, Radiological Emergency	Moderate	Fuquay-Varina Fire and Wake County Emergency Management	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
ES-5	Continue Pre-Fire Incident Plan program for all commercial facilities within the Town limits.	3	2	All	High	Fuquay-Varina Fire	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
ES-6	Address securing and cleaning up affected hazardous areas when revising Disaster Operations Plan.	4	2	All	High	Fuquay-Varina Planning, Fire and Police	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
ES-7	Continue to evaluate and improve response and recovery methods following each hazard event.	2	2	All	High	Fuquay-Varina Fire and Police	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
ES-8	Finalize implementation of new/updated radio communication equipment.	2	1	All	Moderate	Fuquay-Varina Fire and Police	$55,000	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Police Department's portion completed. Fire Department anticipated completion, June 2019
Public Education and Awareness											
PEA-1	Maintain floodplain maps for public use and produce other maps as needed.	1	1	Flood, Hurricane	Moderate	Fuquay-Varina Planning and Engineering	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
PEA-2	Develop and maintain a hazard mitigation section on the Town website that is updated every 5 years as the plan is updated.	1	1	All	High	Fuquay-Varina Public Information and Information Technology	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
PEA-3	Collect educational materials on disaster preparedness and display at public library and local government offices.	1	1	All	High	Fuquay-Varina Planning, Inspections, Police, and Fire	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Lack of staffing has prevented implementation
PEA-4	Educate public on importance of channel maintenance as part of Phase II Stormwater Management Plan.	1	1	Flood, Dam Failure, Hurricane	Moderate	Fuquay-Varina Engineering	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
PEA-5	Work with local real estate agents to ensure that potential buyers are aware of properties that are exposed to potential flood damage.	1	1	Flood, Dam Failure, Hurricane	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
PEA-6	Require delineation of Wake County Flood Hazard Soils, FEMA flood zones, and wetlands on final plats.	3	2	Flood, Dam Failure, Hurricane	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
PEA-7	Annual participation in Severe Weather Preparedness Week (March 3-9) via Weather Channel (social media campaign, newsletter, published materials)	1	1	All	High	Fuquay Varina Planning and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A
PEA-8	Annual participation in National Preparedness Month (September) Ready.gov (social media campaign, newsletter, published materials)	1	1	All	High	Fuquay Varina Planning and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A
PEA-9	Annual participation in Hurricane Prep Week (May 13-19) ReadyNC.gov (social media campaign, newsletter, published materials)	1	1	Flood, Landslide, Hurricane	High	Fuquay Varina Planning and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A
PEA-10	Annual participation in Earthquake Awareness Month and National Earthquake Drill (February & October) Ready.gov (social media campaign, newsletter, published materials)	1	1	Earthquake	High	Fuquay Varina Planning and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A
PEA-11	Annual participation in National Dam Safety Awareness Day (May 31) Ready.gov (social media campaign, newsletter, published materials)	1	1	Dam Failure	High	Fuquay Varina Planning and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A
PEA-12	Structured public education through social media, brochures, and flyers in critical facilities	1	1	All	High	Fuquay Varina Planning, Fire & Police, and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A

Table 7.6 – Mitigation Action Plan, Town of Garner

Town of Garner											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Evaluate the need for regulations to encourage use of low impact development site planning principles to help control stormwater volume impacts.	4	1	Flood, Dam Failure, Hurricane	Moderate	Garner Engineering and Planning	Staff time	Local	2-3 years (2021)	Not Started – Carry Forward	Will be considered during our development code (UDO) update over the next 2 years
P-2	UDO: Continue to provide stream and creek buffers, and floodplain and wetland protection.	3	2	Flood, Dam Failure, Hurricane	High	Garner Planning	Staff time	Local	2-3 years (2021)	In-Progress – Carry Forward	Will be considered during our development code (UDO) update over the next 2 years
P-3	Provide adequate water supply through storage and interconnection with other public water systems.	3	2	Drought	Moderate	City of Raleigh and Garner Engineering	TBD	Local	2-3 years (2020)	In-Progress – Carry Forward	Support City of Raleigh's effort with the reservoir project at NC 50 and New Bethel Church Road
P-4	Garner Transportation Plan – Continue to address disaster preparedness (evacuation) through road interconnectivity, paved roads, and widening of roads.	4	2	Flood, Dam Failure, Earthquake, Hurricane, Severe Weather, Severe Winter Weather, Tornado, Hazardous Materials Incident, Radiological Emergency, Terrorism	Moderate	Garner Planning and Public Works	Improvement costs TBD on case-by-case basis	Local, State, Federal	Ongoing - Next 5 Years	In-Progress – Carry Forward	The Town's emergency preparedness plan follows the Wake County for routes. The Town's 2018 Transportation Plan does encourage and promote interconnectivity.
P-5	Develop for public dissemination building inspections brochures regarding high winds, water damage prevention, and tie downs for accessory structures.	1	1	Flood, Dam Failure, Earthquake, Hurricane, Severe Weather, Severe Winter Weather, Tornado	Moderate	Garner Inspections	Staff time and materials	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	We do this annually - seasonal brochures based on weather threats
P-6	The Town will inventory all its structures located within or immediately adjacent to known flood hazard areas.	2	2	Flood	Moderate	Garner Planning and Engineering	Staff time	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Town reviews when data is available (Flood Plain mapping, new LIDAR data)
P-7	In the upcoming zoning and development ordinance update / re-write (UDO), look for ways discourage and steer high density residential and other at-risk populations (daycares, schools, and retirement facilities as examples)	4	1	Hazardous Materials	Moderate	Garner Planning and Fire / Building Inspections	Staff time	Local	2-3 years	New	The Town will update the UDO (Zoning & Development code) soon
Property Protection											
PP-1	The Town has a service to respond to requests and questions from citizens regarding actions they may take to improve drainage, halt erosion, and to relocate, renovate or retrofit structures being flooded.	1	1	Flood	Moderate	Garner Engineering	Staff time	Local, Private	Ongoing - Next 5 Years	In-Progress – Carry Forward	Normal operations; ongoing activity.
Natural Resource Protection											
NRP-1	Develop and adopt a conservation subdivision ordinance to help preserve significant natural features.	4	1	Flood, Hurricane, Severe Weather, Tornado, Winter Storm	Moderate	Garner Planning	Staff time	Local	2-3 Years (2021)	Not Started – Carry Forward	Will be considered during our development code (UDO) update over the next 2 years
Structural Projects											
SP-1	Pursue stream restoration projects	3	2	Flood	High	Garner Engineering	TBD	Local, Regional, State, Federal	2-3 Years (2021)	Not Started – Carry Forward	Consideration as a capital project under the "stormwater" category as problem areas are identified.
Emergency Services											
ES-1	Develop a Business Continuity Plan that is the primary document housing all disaster related plans and procedures including Hazard Mitigation Plan, Debris Management Plan, Multi-Hazard Plan as well as disaster response plans for all Town departments.	2	2	All Hazards	High	Garner Police, Public Works, and Administration	$25,000-$50,000	Local	2-3 Years	In-Progress – Carry Forward	Target 2021
Public Education and Awareness											

Town of Garner											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
PEA-1	Town website will be updated with public access to information pertaining to evacuation routes, emergency contact numbers, and detailed weather reports in case of emergency.	1	2	Flood, Hurricane, Earthquake, Severe Weather, Tornado, Severe Winter Storm, Wildfire, Hazardous Materials Incident, Radiological Emergency	Moderate	Police & Fire Departments, Garner Communications	Staff time	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Target 2021
PEA-2	Develop and maintain a hazard mitigation section on the Town website.	1	1	All Hazards	Moderate	Garner Communications, and Garner IT	Staff time	Local	2-3 Years	Not Started – Carry Forward	Target 2021
PEA-3	Website - The Town maintains its own website which is able to provide up to date information for the public. Town continuously updates the site with additional resources.	1	1	All Hazards	High	Garner Police & Fire, Communications, and Garner IT	Staff time	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Completed the initial effort; it is in place and on-going

Table 7.7 – Mitigation Action Plan, Town of Holly Springs

Town of Holly Springs											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Vision Holly Springs Comprehensive Plan - The Town has an existing Comprehensive Plan which includes Land Use, Parks and Recreation, Public Safety, Economic Development, Transportation, Public Utilities and Environment. This plan includes past and current conditions and sets goals for future needs of the Town. The Hazard Mitigation Plan will be incorporated as an additional component of the CGP at plan update.	4	2	All	Moderate	Holly Springs Planning & Zoning	To be determined	Local	1 year	In-Progress – Carry Forward	To be updated in 2019
P-2	Update Floodplain Development Regulations - The Town has an ordinance developed to minimize public and private losses due to flood conditions. The latest update of the Flood Damage Prevention Ordinance was May 2, 2006. (00-23).	4	1	Flood	High	Holly Springs Engineering	No cost	Local	3-5 Years	In-Progress – Carry Forward	Ordinance will be updated once the preliminary maps under review by FEMA/NCDEM are adopted
P-3	Implement Floodplain Development Regulations related to participating in the National Flood Insurance Program	4	1	Flood	High	Holly Springs Engineering	Staff time	Local	2-3 years	Not Started – Carry Forward	The Town restricts or prohibits uses which are dangerous to health, safety and property due to water or erosion hazards or which result in damaging increases in erosion or in flood heights or velocities. (00-23)
P-4	Floodplain Development Regulations - The Town has been a participating member of the National Flood Insurance Program since 1992, The Town evaluated the Town's potential participation in the Community Rating System (CRS) and determined that the amount of insured properties in the Town did not warrant participation in the CRS. However, staff will reevaluate this determination in the future through the implementation of the Floodplain Management Program.	4	1	Flood	High	Holly Springs Engineering	To be determined	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Re-evaluate potential for CRS participation
P-5	Water Emergency Response Plan - Develop Water Emergency Response Plan in accordance with EPA mandate with wastewater emergency plan developed voluntarily.	3	2	All	High	Holly Springs Public Utilities, Engineering	To be determined	Local	3-5 years	In-Progress – Carry Forward	Plan review and update will ensure secondary water sources available during an emergency
Property Protection											
PP-1	Building Acquisition and Clearance - The Town is willing to develop a plan designed to utilize Federal grant resources to assist private property owners in purchasing properties located in flood hazard zones.	3	2	Flood	Low	Holly Springs Code Enforcement	Staff time; acquisition costs TBD on case by case basis	Local, State, Federal	2-3 years	Not Started – Carry Forward	Target for development of plan to enable this activity is now 2019-2021
PP-2	Building Relocation - The Town is willing to develop a plan designed to utilize Federal grant resources to assist private property owners in relocating existing structures out of flood hazard zones.	3	2	Flood	Low	Holly Springs Code Enforcement	Staff time; relocation costs TBD on case by case basis	Local, State, Federal	2-3 years	Not Started – Carry Forward	Target for development of plan to enable this activity is now 2019-2021
PP-3	Building Retrofit - The Town is willing to develop a plan to utilize Federal grant resources to assist private property owners in renovating and retrofitting existing structures in flood hazard zones to reduce vulnerability to flooding damage.	3	2	Flood	Low	Holly Springs Code Enforcement	Staff time; retrofitting costs TBD on case by case basis	Local, State, Federal	2-3 years	Not Started – Carry Forward	Target for development of plan to enable this activity is now 2020-2021
PP-4	Purchase of Open Space, Parks and Greenways - The Parks and Recreation Department is asking for $500,000 for Capital Improvement Projects to purchase open space. The Town also works with Wake County and other agencies to find other funding for open space acquisition. Once funds are obtained the Town will acquire land consistent with Land Use and Master Open Space Plans.	4	2	Flood	Moderate	Holly Springs Parks and Recreation	Land Cost	County & State Agencies	More than 5 years	In-Progress – Carry Forward	Continually seeks new investments
PP-5	Backup Power to Fire and Police Stations – The Town provides backup power to all fire and police stations. Fire Station 1 – backup power provided by a grant; backup power to Fire Station 2 and Fire Station 3 and Police Station provided by local funds.	3	1	All	High	Holly Springs Public Safety	Requires new facility. Cost unknown at this time.	Local, Federal	3-5 Years	In-Progress – Carry Forward	Plans to be developed to establish backup power for Fire Station #3.

Town of Holly Springs											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
PP-6	Emergency Generator for Public Works Building	3	1	All	Moderate	Holly Springs Public Works	To be determined	Local	3-5 Years	In-Progress – Carry Forward	The Town currently has an emergency generator to provide power to the Front Office of the Public Works Building during emergencies. Future goal is to provide 100% generator power to the building.
PP-7	Install additional Generators	3	1	All	High	Holly Springs Public Utilities	To be determined	Local	1 year	In-Progress – Carry Forward	The wastewater treatment plant and sewer lift stations built after 1994 have generators. In emergency situations, the Town also has mobile generators to be used at lift stations built between 1985 – 1994 that are without permanent generators on site. Over the next ten years, the Town would like to purchase generators for lift stations that do not currently have generators.
Natural Resource Protection											
NRP-1	As part of the next phases(s) of the Town's Watershed Masterplan, a map of impervious cover will be created. This information may be used overlain to show which structures are in hazardous locations.	2	2	Flood, Dam Failure, Earthquake, Hurricane, Severe Weather, Tornado, Wildfire	High	Holly Springs Engineering	Staff time	Local	3-5 years	New	N/A
Structural Projects											
S-1	The Town is in the process of pursuing options to improve the existing spillway or create a secondary spillway. Per an agreement with NC Dam Safety, this will be completed within the next 5 years.	3	2	Flood, Dam Failure	High	Holly Springs Engineering, Parks & Recreation	Over $100,000	Local	3-5 years	New	N/A
S-2	Reservoirs/Retention/Detention Basins - The Town does not currently maintain any retention or detention basins. The Town does maintain Bass Lake Dam. The Town regularly provides maintenance of vegetation and minor erosion while providing visual inspections of the dam. If larger repairs are required the Town will find appropriate means to resolve the problem. The Town also has a few small ponds located on existing parks. The Town maintains these ponds consistent with measures taken to maintain the Bass Lake Dam.	3	1	Flood	Moderate	Holly Springs Parks & Recreation	Staff time	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Consistently and correctly maintains all ponds and dams
Emergency Services											
ES-1	Technical Rescue Capabilities - Provide and enhance technical rescue capabilities more equitably throughout the Town.	2	2	All	High	Holly Springs Public Safety	No cost	Local, Federal	3-5 Years	In-Progress – Carry Forward	All crews have basic training. Currently looking into specialty training.
ES-2	GIS Programming - Design GIS programming capable of providing real-time data to emergency managers and historic data for future emergency response planning.	2	2	All	Low	Holly Springs Public Safety	No cost	Local	3-5 Years	In-Progress – Carry Forward	Currently in the implementation phase. The new Wake County CAD will be issued on May 2019. This is a no cost to the Town.
ES-3	ECC Notifications by NOAA for possible severe weather (tornados, ice, etc.). ECC is notified by both agencies when weather alerts are issued. Information is then broadcast over police radios. This information is generated by the State and Wake County and is obtained through the use of DC message, radio, fax and Nextel.	2	1	Severe Weather, Severe Winter Storm, Tornado, Hurricane	High	Holly Springs Public Safety	No cost	Local	3-5 years	In-Progress – Carry Forward	Partially implemented. Currently use WEB EOC and the dispatch center.
ES-4	Purchase ACU 1000 Communications Unit – System should allow all agencies on ACU 1000 to communicate using own radios and frequencies.	2	1	All	High	Holly Springs Public Safety	To be determined	Local	3-5 years	In-Progress – Carry Forward	In process of purchasing, but not yet completed.
ES-5	Tabletop Exercise Program - Continue to conduct disaster tabletop exercise program with Wake County	2	2	All	High	Holly Springs Public Safety	Staff time	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Tabletop exercises are held through public safety periodically and will continue to be done.

Town of Holly Springs											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
ES-6	Counseling – Police psychologist and Critical Incident Stress Debriefing Team training to provide debriefing sessions for personnel.	2	1	All	High	Holly Springs Police Department	Staff time	Local	5 years	In-Progress – Carry Forward	Partially implemented, under construction. Currently, we have incorporated the services of a chaplaincy program and conduct critical incident debriefs with our personnel for both internal and external incidents. In addition, we are looking at a proposal to expand our program to include peer teams, peer counselors, and incorporation of the NC Law Enforcement Assistance Program (http://www.nc-leap.org/page6.aspx) in partnership with Teia Pullen of the Cary Police Department. Our goal is to network with southern Wake County law enforcement and public safety agencies, clinicians, and other mental health professionals to provide a broad base of support services to our public safety professionals.
Public Education and Awareness											
PEA-1	Environmental Education	1	1	Flood, Drought	High	Holly Springs Engineering	Staff time and O&M costs	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	The Town currently has a program which includes environmental education for the public through Town festivals (Holly Fest), public meetings, brochures and preconstruction meetings. The Town operates the Bass Lake Retreat Center which will allow for space to hold additional environmental education activities. The Town will also expand its current education activities to meet NPDES Phase II requirements. The Town's Environmental Education focuses on flooding, drainage, the National Flood Insurance Program, NPDES Phase II, Erosion & Sedimentation Control, Habitat Preservation, etc.
PEA-2	Website - The Town maintains its own website, which is able to provide up to date information for the public. The Town is continuously updating the site with additional resources.	1	1	All	High	Holly Springs Governing Body	Staff time	Local	2017	In-Progress – Carry Forward	The Communications Department provides the community with news and information via the Town's website, the Town's government access television channel HSTV-11, news releases, The Source newsletter, email and text message subscriptions, and social media on a daily basis.

Table 7.8 – Mitigation Action Plan, Town of Knightdale

Town of Knightdale											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Pursue Grants to Acquire, Elevate and or Relocate Flood Prone Structures and Property.	3	1	Flood, Dam Failure, Hurricane & Tropical Storm	High	Knightdale Planning	Over $1m	Internal	Ongoing - Next 5 Years	Not Started – Carry Forward	This has not been necessary since there have been no affected structures and/or property. The Town will evaluate opportunities to purchase property for future events.
P-2	Establish post-disaster clean-up procedures.	2	1	All	High	Knightdale Public Works	$250,000	Internal	Ongoing - Next 5 Years	In-Progress – Carry Forward	The Town will continuously evaluate post-disaster clean-up procedures.
P-3	Prepare debris removal and disposal plan.	2	1	Dam Failure, Earthquake, Hurricane & Tropical Storm, Landslide, Severe Weather, Severe Winter Storm, Tornado	Moderate	Knightdale Public Works	Over $1m	Internal, FEMA, NCEM	Ongoing - Next 5 Years	In-Progress – Carry Forward	The Town will continuously evaluate debris removal and disposal plan
P-4	Protect and Obtain Land for the Little River Reservoir.	3	1	Drought	Moderate	City of Raleigh Public Utilities	Over $1m	Internal, City of Raleigh	Ongoing - Next 5 Years	In-Progress – Carry Forward	City of Raleigh is responsible for implementation
Structural Projects											
SP-1	Dredging, new riser and plunge pool for pond restoration at Environmental Park	3	2	Flood, Hurricane	Moderate	Knightdale Administration, Knightdale Public Works	$500,000	Grants, bonds, Knightdale Administration, Knightdale Fire	3-5 years	New	N/A
Public Education and Awareness											
PEA-1	Develop a policy for the installation of warning signs concerning lightning, hail and thunderstorms at outdoor public facilities and begin retro-fitting existing spaces.	1	2	Severe Weather, Tornado	Moderate	Knightdale Parks & Recreation	Over $1m	Internal	2-3 years	Not Started – Carry Forward	Due to staff turnover and lack of funding this project has not been completed. This project is still a valuable tool that will be studied for future implementation
PEA-2	Expand the Town's existing fire/smoke alarm program for retro-fitting older structures to include CO alarms.	1	2	Earthquake, Severe Weather, Tornado, Hazardous Materials Incident	Low	Knightdale Fire	about $200,000	Internal, Grants	2-3 years	In-Progress – Carry Forward	The Knightdale Fire Department routinely visits residents to ensure smoke detectors are working property.
PEA-3	Have a Town staff member that is a Certified Floodplain Manager.	2	1	Flood, Dam Failure, Hurricane & Tropical Storm	Moderate	Knightdale Engineering/Public Works	$40,000	Internal	2-3 years	In-Progress – Carry Forward	Due to recent turnover the Town lost its only Certified Floodplain Manager
PEA-4	Issue an annual local proclamation for Severe Weather Awareness Week and conduct associated promotional activities.	1	1	All	Moderate	Knightdale Fire	$200,000	Internal	Ongoing - Next 5 years	Not Started – Carry Forward	Due to staff turnover this item has not been started.
PEA-5	Incentivize the use of cool roofing products through the Town's Water Allocation Policy point system.	4	1	Extreme Heat	Low	Knightdale Planning	less than $100,000	Internal	3-5 years	Not Started – Carry Forward	Due to changes in development patterns other updates to the Town's Water Allocation Policy were deemed more timely. This will be evaluated for future inclusion.

Table 7.9 – Mitigation Action Plan, Town of Morrisville

Town of Morrisville											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Reduce vulnerability of cyber attack by transitioning Town staff to encrypted laptops.	3	1	Terrorism	Moderate	Town of Morrisville	$9,000 annually	Town of Morrisville	Ongoing - Next 5 years	New	N/A
P-2	Establish a Municipal Service District (MSD) in order to convert private roads in Carpenter Park neighborhood to public roads with a higher design, safety, and maintenance standard.	3	2	All	Moderate	Town of Morrisville	$460,000	Town of Morrisville	1 year	New	N/A
P-3	Coordinate with Duke Power to draft Electric Utility Master Plan, which seeks to identify areas feasible for utility line burial.	4	1	Tornado, Severe Winter Storm, Severe Weather, Hurricane	High	Town of Morrisville	$20,000	Town of Morrisville	2-3 years	New	N/A
P-4	Update Land Use Plan to ensure protection of natural resources, strengthen existing development to resist hazards, and guide future development away from hazard prone areas.	4	2	Flood, Wildfire, Landslide, Dam Failure, Hurricane, Hazardous Materials Incident, Radiological Emergency	Moderate	Town of Morrisville	$275,000	Town of Morrisville	2-3 years	New	N/A
P-5	Obtain frequently updated, high-resolution aerial photography to assist with land use decisions, emergency response planning, and code enforcement.	2	2	Flood, Landslide, Severe Winter Storm, Severe Weather, Dam Failure, Hurricane, Hazards Materials Incident, Radiological Emergency, Terrorism	Moderate	Town of Morrisville	$7,000 annually	Town of Morrisville	Ongoing - Next 5 years	New	N/A
P-6	Working through the Triangle Water Supply Partnership, update the Water Resources Plan to ensure water supply is sufficient for Town's future needs.	4	2	Drought, Dam Failure, Extreme Heat	High	Triangle Water Supply Partnership	$250,000	Triangle Water Supply Partnership, Town of Morrisville	3-5 years	New	N/A
P-7	Working through the Triangle Water Supply Partnership, draft a Drought Management Plan to ensure water resources are properly managed during drought conditions.	4	1	Drought, Extreme Heat	High	Triangle Water Supply Partnership	$150,000	Triangle Water Supply Partnership, Town of Morrisville	3-5 years	New	N/A
P-8	Working through the Triangle Water Supply Partnership, draft an Emergency Spill Response and Mitigation Plan to protect watersheds and other water resources from hazardous spills.	3	2	Flood, Drought, Dam Failure, Extreme Heat, Hazardous Materials Incident, Radiological Emergency	High	Triangle Water Supply Partnership	$150,000	Triangle Water Supply Partnership, Town of Morrisville	3-5 years	New	N/A
P-9	Transition Wake County's sedimentation and erosion control permitting and monitoring to Town of Morrisville for better increased processing efficiency and faster incident response.	2	2	Flood, Landslide, Dam Failure, Hurricane, Hazardous Materials Incident	Moderate	Town of Morrisville	Unknown	Town of Morrisville	2-3 years	New	N/A
P-10	Conduct a complete review and update to the Town's stormwater management program, which helps mitigate effects of stormwater runoff and flooding.	4	1	Flood, Landslide, Dam Failure, Hurricane, Hazardous Materials Incident	High	Town of Morrisville	$100,000	Town of Morrisville	2-3 years	New	N/A
Property Protection											
PP-1	Reduce vulnerability of important data by transitioning IT Department's routine data backup to cloud storage.	3	1	Tornado, Earthquake, Severe Winter Storm, Severe Weather, Hurricane, Terrorism	High	Town of Morrisville	$42,000 annually	Town of Morrisville	Ongoing - Next 5 years	New	N/A
PP-2	Seek Federal, State, and County funding opportunities to purchase property located completely or partially in FEMA designated floodplains in order to mitigate potential property damage and protect natural resources.	3	2	Flood, Hurricane, Dam Failure	Low	Morrisville Director of Community Services, Director of Development Services	$5,000,000	Flood Mitigation Assistance Grant Program	More than 5 years	Not Started – Carry Forward	Town has purchased flood-prone properties using Town funds. Town has not sought any outside funding for floodplain property purchase.
Structural Projects											
SP-1	Construct Green Drive and Fairview Road Flood Reduction Drainage Project to mitigate potential flood hazards.	3	2	Flood, Dam Failure, Hurricane	High	Town of Morrisville	$450,000	Town of Morrisville	2-3 years	New	N/A
SP-2	Construct new public works facility, which will increase Town's capacity to respond to hazards and other safety concerns.	2	1	All	Moderate	Town of Morrisville	$8,500,000	Town of Morrisville	3-5 years	New	N/A

Town of Morrisville											
Action #	Description	Goal	Objective	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
Emergency Services											
ES-1	Monitor the status of backup generators, communications and vehicles for all Morrisville owned critical public facilities.	2	1	All	Low	Town of Morrisville	$5,500 annually	Town of Morrisville	Ongoing - Next 5 years	In-Progress – Carry Forward	The Town has a contract with a private vendor to monitor the status and condition of critical emergency response equipment such as backup generators, communications, and vehicles.
ES-2	Install new generators for Town Hall and Police Station to ensure continuity of critical operations during a power outage.	3	1	All	High	Town of Morrisville	$150,000	Town of Morrisville	1 year	New	N/A
ES-3	Construct new fire station in Morrisville in order to improve fire protection coverage and emergency response times.	2	1	All	Moderate	Town of Morrisville	$4,500,000	Town of Morrisville	3-5 years	New	N/A
ES-4	Update Town's Emergency Operations Plan to ensure best processes and procedures for the most likely and applicable emergency scenarios.	2	2	All	Moderate	Town of Morrisville	$150,000	Town of Morrisville	3-5 years	New	N/A
Public Education and Awareness											
PEA-1	Implement Wake County's Everbridge text alert system to notify citizens and Town staff of potential safety hazards or concerns.	1	1	All	High	Wake County	$0	Wake County	1 year	New	N/A
PEA-2	Purchase and implement new online civic engagement platform to be used in part to inform citizens on disaster preparation, emergency response training opportunities, and evacuation information.	1	1	All	Moderate	Town of Morrisville	$10,000	Town of Morrisville	1 year	New	N/A
PEA-3	Utilize volunteer citizen committees, such as CERT or Public Safety Committee, to educate residents in preparing for natural hazards.	1	1	All	Low	Town of Morrisville	$2,000/year	Town of Morrisville	Ongoing - Next 5 Years	In-Progress – Carry Forward	The Community Emergency Response Team is a group of dedicated volunteers that meet monthly for emergency response training.

Table 7.10 – Mitigation Action Plan, Town of Rolesville

Town of Rolesville											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Provide backup power for all critical public facilities (wastewater treatment plant, sewer pump stations, Public Works and Utilities building, etc.) to ensure continued utility service during power loss.	3	1	All	Moderate	City of Raleigh	Cost varies by facility	Local	1 year	In-Progress – Carry Forward	City of Raleigh has updated sewer pump stations with backup power, no upgrade of Town buildings but intended for future budgets.
P-2	Transportation Plan – Continue to address disaster preparedness (evacuation) through road interconnectivity, paved roads, and widening of roads.	3	2	All	Moderate	Rolesville Planning	Staff Time	Local	1 year	In-Progress – Carry Forward	Town has policy for new development connectivity and is implemented with each new development. New Transportation Plan targeted in mid-year 2019.
P-3	Update Rolesville Stormwater Management Plan for operation/implementation and program effectiveness and study the possible changes	4	1	Flood	Moderate	Rolesville Administration	Staff Time	Local	2-3 years	New	N/A
Structural Projects											
SP-1	Install emergency power backup generator for Town Hall and Police Station to ensure continued operation of government during power loss.	3	2	All	High	Rolesville Administration	Over $100,000	Local	2 years	New	N/A
Emergency Services											
ES-1	Implement Wake County Everbridge text alert system to notify citizens in real time of an event of local interest with instructions.	1	2	All	High	Rolesville Administration	Staff Time	Local	1 year	New	N/A
Public Education and Awareness											
PEA-1	Town website - develop hazard mitigation section covering such items as public access, evacuation routes, emergency contact numbers, and detailed weather reports in case of emergency,	1	1	All	Moderate	Rolesville Administration	Staff Time	Local	1 year	In-Progress – Carry Forward	Town is in the process of new Town's Website development and development of a hazard mitigation section will be included by Spring of 2019.

Table 7.11 – Mitigation Action Plan, Town of Wake Forest

Town of Wake Forest											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Prepare a Storm Drainage Master Plan to include all storm drainage, infrastructure, and capacity analysis.	2	2	Flood	High	Wake Forest Engineering	$400,000	General Fund	2019	In-Progress – Carry Forward	75% complete, completion scheduled June 2019
P-2	Put electric distribution lines underground.	3	1	Hurricane, Severe Weather, Severe Winter Storm, Tornado, Wildfire	Low	Wake Forest Power	$10,000,000	Electric Fund, General Fund, and Bonds	2024	In-Progress – Carry Forward	Where feasible, electric lines have been put underground. However, there are still some lines that could be buried and the town will look into carrying that out going forward.
P-3	Become a CRS community	2	2	Flood	Low	Wake Forest Public Works	$100,000	General Fund	2022	New	Work towards becoming a CRS community
P-4	Explore the use of Stormwater Utility Fees	3	1	Flood	Moderate	Wake Forest Administration	$100,000	General Fund that would become a User Fee if implemented	2020	New	As subdivisions age, their covenants could expire after 20 years leaving the town with maintaining additional stormwater control measures. These fees could help offset necessary maintenance.
P-5	Maintain a GIS database of building footprints and use it to regularly update a map of critical facilities and vulnerable buildings.	2	2	All	Moderate	Wake Forest GIS	Staff time	General Fund	Ongoing Annually	New	Updated data will be used to identify properties that should be prioritized for mitigation.
Property Protection											
PP-1	Document each historic structure in Wake Forest town limits and ETJ	3	1	Hurricane, Severe Weather, Severe Winter Storm, Tornado, Wildfire, Flood	Moderate	Wake Forest Planning	$75,000	General Fund	2020	New	Photographs and taken every other year in the local historic district. A baseline photographic inventory of all historic structures in the town limits and ETJ will be taken and repeated every 5 years. If damage occurred due to a natural disaster, it would be easier to secure funding to replace/repair back to its historical integrity.
PP-2	Provide for primary or mobile generators to shelter sites.	3	1	All	Moderate	Wake County Emergency Management	$500,000	General Fund	2024	In-Progress – Carry Forward	Heritage High School has generators. Town is constructing Joyner Park with intention to be used as a shelter site. Generator is being included with the building.
PP-3	Assess facilities for the need for emergency generation, giving consideration to alternate facility sites.	3	1	All	High	Wake Forest Power	$250,000	General Fund	2023	In-Progress – Carry Forward	The town has assessed facilities for the need for emergency generation and many facilities have been fitted with generators. However, additional facilities with emergency generation would be useful.
Natural Resource Protection											
NRP-1	Manage the Wake Forest Reservoir for hazard mitigation	2	1	Drought, Flood, Dam Failure	Moderate	Wake Forest Public Works	$300,000	General Fund	2021	New	The City of Raleigh is in the process of transferring the Wake Forest Reservoir to the town. Staff is investigating all details associated with the reservoir ownership from a hazard mitigation standpoint, such as flooding/breaching potential.
NRP-2	Expansion of our greenway trail network	3	2	Flood, Hurricane, Extreme Heat	Moderate	Wake Forest Planning	$16,100,000	General Fund and Bonds	2024	New	The Town has multiple greenway extensions and new routes planned. By installing greenways along our waterways, it gives the Town a better opportunity to remove fallen debris and trash that helps alleviate possible flooding.
Structural Projects											
SP-1	Conduct stream mitigation projects on Old Mill Stream, Richland Creek, and others subject to flooding or erosion.	3	2	Flood	Moderate	Wake Forest Engineering	$2,350,000	General Fund, Clean Water Management Trust Fund, Ecosystem Enhancement Program	2024	In-Progress – Carry Forward	Some mitigation projects have been conducted on these water bodies, but there is significant effort that is still needed to reduce potential erosion. Current projects include: Old Mill Stream and Richland Creek - construction plans @ 90%. Ailey Young Dam - completion June 2019; Smith Creek - quote has been requested for work to be done. Stream erosion throughout town continues to be an ongoing process as needed

Town of Wake Forest											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Emergency Services											
ES-1	Investigate methods of encouraging gas stations to acquire backup generators.	1	1	All	High	Wake Forest Public Works and Inspections	$50,000	General Fund	2022	In-Progress – Carry Forward	Grocery stores and gas stations are encouraged to have back up generators. Wal-Mart added a generator with the help of the town. Wegmans which will be constructed in the next two years will have a generator on site. These sites will help provide necessary food and supplies to residents.
ES-2	See that all nursing homes and assisted living facilities have backup generators.	1	1	All	High	Property owners	$150,000	Property owners	2023	In-Progress – Carry Forward	New facilities are being encouraged to include generators. Existing facilities without generators are financially constrained and have little ability to add generators.
ES-3	Require, in the contract, that fuel suppliers have backup generators.	3	1	All	High	Wake Forest Administration, Finance, and Public Works	$25,000	General Fund	2024	In-Progress – Carry Forward	This is the Town's current policy and we continue to monitor new contracts for compliance.
ES-4	Adopt and Implement an Emergency Operations Plan	3	2	All	High	Wake Forest Administration	$100,000	General Fund	2021	New	A draft EOP has been created; adoption expected in 2019
ES-5	Adopt a SARA Title III Plan	4	2	All	Moderate	Wake Forest Fire Department	$150,000	General Fund	2023	New	Investigate the ability to create a SARA Title III Plan to have clearer knowledge and how to better handle chemical releases from facilities that could impact the town.
Public Education and Awareness											
PEA-1	Develop a policy and advise the public that all outside above ground LP or propane gas tanks be cut off during a major event.	1	1	All	Moderate	Wake Forest Communications	$10,000	General Fund	2020	In-Progress – Carry Forward	Past communications have included information advising the public of turning off propane tanks during a storm, but better outreach is needed to ensure this occurs. A policy should be put in place to ensure it is regularly communicated. Perhaps it can be included as part of the EOP.

Table 7.12 – Mitigation Action Plan, Town of Wendell

Town of Wendell											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Install generators as needed at lift stations.	3	2	All	High	City of Raleigh Public Utilities	To be determined	Internal	3-5 years	Not Started – Carry Forward	No funds were budgeted by CORPUD for this since 2014, but a new pump station is planned south of Hollybrook Rd, which would require a generator.
P-2	Amend the Town's Water Allocation Policy to add a new point category for voluntarily increasing undisturbed riparian buffer protections from 50 to 100 feet around Neuse perennial streams	4	1	Flood, Dam Failure, Hurricane	High	Wendell Planning	$0	N/A	1 year	New	N/A
P-3	Add environmentally sensitive and hazard areas to the Future Land Use Map and adopt updated Comprehensive Plan, which will allow environmental conditions and hazard areas to guide zoning and density decisions.	4	2	Flood, Dam Failure, Hazardous Materials Incident, Radiological Incident, Terrorism	High	Wendell Planning	$120,000	Town of Wendell	2-3 years	New	N/A
P-4	Consider amendments to the UDO to establish minimum ingress/egress standards for new residential development based on density/# of lots	4	1	Earthquake, Flood, Dam Failure, Hurricane, Wildfire, Tornado, Severe Winter Storm, Hazardous Materials Incident, Radiological Incident, Terrorism	High	Wendell Planning	$0	N/A	1 year	New	N/A
P-5	Encourage the use of low-impact development techniques through amendments to the Town's Water Allocation Policy	4	1	Flood, Dam Failure, Hurricane	High	Wendell Planning	$0	N/A	1 year	New	N/A
P-6	Consider regulations to regulate clear-cutting to help control erosion from construction sites	4	1	Flood, Drought	Moderate	Wendell Planning	$0	Town of Wendell	2-3 years	New	N/A
P-7	Evaluate potential changes to the Town's Arterial and Collector Street Plan to minimize adverse impacts to environmentally sensitive areas due to new roadway construction or widening	4	2	Flood	Moderate	Wendell Planning	$500	Town of Wendell	2-3 years	New	N/A
Natural Resource Protection											
NRP-1	Perform environmental asset mapping in order to identify areas most key for preservation and potential acquisition due to an array of environmental factors	2	2	Flood, Drought	Moderate	Wendell Planning	$10,000	Town of Wendell	2-3 years	New	N/A
NRP-2	Evaluate policy regarding greenway dedication requirements in order to expand greenway network and further protect riparian corridors	4	2	Flood	High	Wendell Planning	$0	Town of Wendell	2-3 years	New	N/A
Structural Projects											
SP-1	Perform improvements to existing open drainage device near intersection of 1st St & Pine St. to increase total water volume & flow	3	1	Flood	Moderate	Wendell Public Works	$5,000	Town of Wendell	3-5 years	New	N/A
Emergency Services											
ES-1	Make electrical improvements in the downtown in order to help ensure continuity of service during extreme weather	3	1	Severe Weather, Severe Winter Storm, Hurricane	High	Wendell Public Works	$5,000	Town of Wendell	2-3 years	New	N/A
ES-2	Develop Adverse Weather Plan Map for Public Works crew	2	1	Severe Weather, Severe Winter Storm, Hurricane	High	Wendell Planning	$0	N/A	1 year	New	N/A
ES-3	Evaluate potential locations for a future Public Works debris site, to accommodate debris associated with natural hazards	2	2	All	Moderate	Wendell Public Works	$0	Town of Wendell	3-5 years	New	N/A
ES-4	Provide written after-action report of response to severe weather and hazard events to include recommendations for process improvements and improve planning for future disasters	2	2	All	Moderate	Wendell Police Dept.	$0	Town of Wendell	2-3 years	New	N/A
ES-5	Secure and utilize visual warning barricades for vehicular and pedestrian traffic to block properties, roadways, etc. for public safety during or following hazard events	2	1	All	Moderate	Wendell Public Works	$2,000	Town of Wendell	3-5 years	New	N/A

Town of Wendell											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
ES-6	Conduct periodic training exercises, related to higher-risk hazard threats identified by the Hazard Mitigation Plan	2	2	All	Moderate	Wendell Police Dept.	$500	Town of Wendell	2-3 years	New	N/A
ES-7	Work with Wake County and the City of Raleigh to operate and update the County's Master Address Repository program, which will support emergency response following hazards.	2	2	All	High	Wendell Planning	$0	Town of Wendell	2-3 years	New	N/A
Public Education and Awareness											
PEA-1	Modify the Town's "Tell Wendell" webpage application to allow citizens to report flood issues and create a tracking mechanism for the Town	1	2	Flood	High	Wendell Planning	$0	Town of Wendell	2-3 years	New	N/A
PEA-2	Incorporate Hazard Awareness class into the Track-Out Camp run by the Wendell Parks & Recreation Dept.	1	1	Flood, Earthquake, Extreme Heat, Drought, Hurricane, Severe Weather, Severe Winter Storm, Tornado	Moderate	Wendell Parks and Recreation	$0	Town of Wendell	2-3 years	New	N/A
PEA-3	Post warning signage at local parks for lightning	1	2	Severe Weather	High	Wendell Parks and Recreation	$500	Town of Wendell	2-3 years	New	N/A
PEA-4	Facilitate community outreach and distribution of educational materials regarding hazard awareness to the community, to include participation at community events such as Public Safety Day.	1	1	All	Moderate	Wendell Public Works	$500	Town of Wendell	2-3 years	New	N/A
PEA-5	Perform Continuing Education Training for select Public Works personnel as it relates to state storm water regulations	2	2	Flood	High	Wendell Public Works	$1,200	Town of Wendell	2-3 years	New	N/A

Table 7.13 – Mitigation Action Plan, Town of Zebulon

Town of Zebulon											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Prepare Plan maintenance report.	2	2	All	High	Zebulon Planning Department	Staff time	Town of Zebulon	2019, Annually	Not Started – Carry Forward	Plan maintenance meetings have been held annually and will continue to be held going forward.
P-2	Enforce subdivision standards for development in flood hazard areas.	3	2	Flood	High	Zebulon Planning & Inspections	Staff time	Town of Zebulon, Wake County	2019	In-Progress – Carry Forward	UDO Revision is in final stages.
P-3	Further restrict development in floodplain by prohibiting development or requiring 2 feet of freeboard.	3	2	Flood	High	Zebulon Planning	Staff time	Town of Zebulon	2019	In-Progress – Carry Forward	UDO Revision is in final stages.
P-4	Revise floodplain ordinance.	4	1	Flood	High	Zebulon Planning	Staff time	Town of Zebulon	2019	In-Progress – Carry Forward	UDO Revision is in final stages.
P-5	Require burial of power lines for new developments.	3	1	Hurricane, Tornadoes, Winter Storms/ Freezes	Moderate	Zebulon Planning	Unknown	Town of Zebulon	2019	In-Progress – Carry Forward	UDO Revision is in final stages.
Structural Projects											
SP-1	Resolve localized flooding issue that occurs in/around West Sycamore Streets, Gannon Avenue, and North Arendell Avenue during heavy rainfall events.	3	2	Flood	Moderate	Zebulon Administration, Zebulon Public Works	$900,000	Town of Zebulon	2020	New	The town has completed design and permitting of project improvements and is currently acquiring easements.
Emergency Services											
ES-1	Develop an Emergency Operations Plan	2	2	All	Moderate	Zebulon Fire Department	TBD	Town of Zebulon	2019	New	The Town has been in the process of developing an Emergency Operations Plan and hopes to adopt the plan within the year.
Public Education and Awareness											
PEA-1	Require disclosure of flood hazard in real estate transactions.	1	1	Flood	Moderate	Zebulon Planning Department	Little to no cost	Town of Zebulon	2019	In-Progress – Carry Forward	N/A
PEA-2	Develop a public education program to provide hazard risk and preparedness education via social media	1	1	All	High	Zebulon Fire Department	Staff time	Town of Zebulon	2019	New	The Town is currently using social media for some public education but will formalize a program for hazards awareness.

8 Plan Maintenance

Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This section discusses how the Mitigation Action Plans will be implemented by participating jurisdictions and outlines the method and schedule for monitoring, updating, and evaluating the plan. This section also discusses incorporating the plan into existing planning mechanisms and how the public will continue to be involved in the planning process. It consists of the following three subsections:

8.1 Implementation
8.2 Monitoring, Evaluation, and Enhancement
8.3 Continued Public Involvement

8.1 IMPLEMENTATION

Each jurisdiction participating in this plan update is responsible for implementing specific mitigation actions as prescribed in their Mitigation Action Plan (found in Section 7). In each Mitigation Action Plan, every proposed action is assigned to a specific local department or agency to ensure responsibility and accountability and increase the likelihood of subsequent implementation. This approach enables individual jurisdictions to update their own unique mitigation action list as needed without altering the broader focus of the regional plan.

In addition to the assignment of a local lead department or agency, an implementation timeline or a specific implementation date or window has been assigned to each mitigation action to help assess whether reasonable progress is being made toward implementation. The participating jurisdictions will seek outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified for proposed actions listed in the Mitigation Action Plan.

An important implementation mechanism that is highly effective and low-cost is incorporation of the Hazard Mitigation Plan recommendations and their underlying principles into other plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement the Mitigation Action Plan. It will be the responsibility of the HMPC representatives from each participating jurisdiction to determine and pursue opportunities for integrating the requirements of this plan with other local planning documents and ensure that the goals and strategies of new and updated local planning documents for their jurisdictions or agencies are consistent with the goals and actions of the Hazard Mitigation Plan and will not contribute to increased hazard vulnerability in the Plan Area. Methods for integration may include:

- Monitoring other planning/program agendas;
- Attending other planning/program meetings;
- Participating in other planning processes; and
- Monitoring community budget meetings for other community program opportunities.

Table 8.1 details each jurisdiction's integration of the 2015 Wake County Multi-Jurisdictional Hazard Mitigation Plan into other local planning efforts as well as any identified opportunities for integration of this plan update.

Table 8.1 – Integration Efforts

Jurisdiction	Integration of 2015 plan	Intended integration of this plan update
Wake County	No integration occurred	Integration will be pursued as opportunities arise.
City of Raleigh	Raleigh has used the 2015 plan to identify frequent flood prone areas during disasters, including Hurricane Florence most recently. The plan aids as a notification strategy for vulnerable populations living in these locations	Plan update will continue to be used prominently during disasters.
Town of Apex	No integration occurred	Apex will have the opportunity to integrate the plan update with updates to the Transportation Plan and Bike & Pedestrian Plan
Town of Cary	Plan was generally integrated with the Comprehensive Plan	Integration will be pursued as opportunities arise.
Town of Fuquay-Varina	No integration occurred	Integration will be pursued as opportunities arise.
Town of Garner	Plan was integrated with the Unified Development Ordinance, Long-Range Land Use and Transportation Plans, and the Wake County Emergency Operations Plan.	Garner will continue to pursue implementation with these plans and ordinances.
Town of Holly Springs	No integration occurred	Integration will be pursued as opportunities arise.
Town of Knightdale	Plan was integrated with the Comprehensive Plan	Knightdale will have the opportunity to integrate this plan with the update of the Unified Development Ordinance and development of a Comprehensive Transportation Plan in future years.
Town of Morrisville	No integration occurred	Integration will be pursued as opportunities arise.
Town of Rolesville	No integration occurred	Integration will be pursued as opportunities arise.
Town of Wake Forest	No integration occurred	Integration will be pursued as opportunities arise.
Town of Wendell	No integration occurred	Wendell will seek to integrate this plan update with updates to the Comprehensive Plan, Greenway Plan, and Transportation Plan.
Town of Zebulon	No integration occurred	Zebulon will seek to integrate this plan update with upcoming updates to the Transportation Plan, Parks and Recreation Master Plan, Comprehensive Plan, and Emergency Operations Plan.

Opportunities to integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the HMPC and through the five-year review process described herein. Although it is recognized that there are many possible benefits to integrating components of this plan into other local planning mechanisms, the development and maintenance of this stand-alone Hazard Mitigation Plan is deemed by the HMPC to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

8.2 MONITORING, EVALUATION, AND ENHANCEMENT

8.2.1 Role of HMPC in Implementation, Monitoring and Maintenance

With adoption of this plan, each jurisdiction will be responsible for the implementation and maintenance of their mitigation actions. Wake County will take the lead in all plan monitoring and update procedures. As such, the County, led by the Director of Emergency Management, agrees to continue its relationship with the HMPC and:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Ensure hazard mitigation remains a consideration for community decision makers;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended revisions to the County Board of Commissioners; and
- Inform and solicit input from the public.

The HMPC's primary duty moving forward is to see the plan successfully carried out and report to the County Board of Commissioners, Town and City Councils, NCEM, FEMA, and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about flood mitigation, passing concerns on to appropriate entities, and provide relevant information for posting on the County and local community websites (and others as appropriate).

Simultaneous to these efforts, it will be important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the costlier recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the County and participating jurisdictions will be positioned to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

8.2.2 Maintenance Schedule

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as progress, roadblocks, or changing circumstances are recognized. The Wake County Emergency Manager will be responsible for convening the HMPC and initiating regular reviews. Regular maintenance will take place through quarterly conference calls and an annual meeting of the HMPC. The HMPC will also convene to review the plan after significant hazard events. If determined appropriate or as requested, an annual report on the plan will be developed and presented to local governing bodies of participating jurisdictions to report on implementation progress and recommended changes.

The five-year written update to this plan will be submitted to the NCEM and FEMA Region IV, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With this plan update anticipated to be adopted and fully approved by 2020, the next plan update for Wake County will be completed by 2025.

8.2.3 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will:

- Consider changes in vulnerability due to project implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to County inventories; and
- Incorporate new project recommendations or changes in project prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the HMPC will follow the following process:

- The HMPC representatives from each jurisdiction will be responsible for tracking and reporting on their mitigation actions. Jurisdictional representatives should provide input on whether the action as implemented met the defined objectives and/or is likely to be successful in reducing vulnerabilities.
- If the action does not meet identified objectives, the jurisdictional representatives will determine what additional measures may be implemented and will make any required modifications to the plan.
- All monitoring and implementation information will be reported to the full HMPC, led by the Wake County Emergency Manager, during quarterly meetings. An annual plan maintenance report may be drafted as deemed necessary.

Changes will be made to the plan as needed to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the mitigation action plans will be by written changes and submissions, as is appropriate and necessary, and as approved by the appropriate jurisdiction's local governing body.

Following a disaster declaration, the plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of Wake County Emergency Management to reconvene the HMPC and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

Criteria for Quarterly Reviews in Preparation for 5-Year Update

The criteria recommended in 44 CFR 201 and 206 will be utilized in reviewing and updating the plan. More specifically, quarterly reviews will monitor changes to the following information:

- Community growth or change in the past quarter.
- The number of substantially damaged or substantially improved structures by flood zone.
- The renovations to public infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of the Emergency Operations Center (EOC) and whether the event resulted in a presidential disaster declaration.

- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the community or closure of businesses, schools, or public services.
- The dates of hazard events descriptions.
- Documented damages due to the event.
- Closures of places of employment or schools and the number of days closed.
- Road or bridge closures due to the hazard and the length of time closed.
- Assessment of the number of private and public buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed. The assessment will include residences, mobile homes, commercial structures, industrial structures, and public buildings, such as schools and public safety buildings.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the community and how and if the policy changes can or should be incorporated into the Hazard Mitigation Plan. Review of the status of implementation of projects (mitigation strategies) including projects completed will be noted. Projects behind schedule will include a reason for delay of implementation.

8.3 CONTINUED PUBLIC INVOLVEMENT

Continued public involvement is imperative to the overall success of the plan's implementation. The quarterly review process will provide an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the plan implementation and seek additional public comment. Efforts to involve the public in the maintenance, evaluation and revision process may include:

- Advertising HMPC meetings in the local newspaper, public bulletin boards and/or City and County office buildings;
- Designating willing citizens and private sector representatives as official members of the HMPC;
- Utilizing local media to update the public of any maintenance and/or review activities;
- Utilizing City and County websites to advertise any maintenance and/or review activities;
- Maintaining copies of the plan in public libraries or other appropriate venues;
- Posting annual progress reports on the Plan to City, County and Town websites;
- Heavy publicity of the plan and potential ways for the public to be involved after significant hazard events, tailored to the event that has just happened;
- Keeping websites, social media outlets, etc. updated;
- Drafting articles for the local community newspapers/newsletters;
- Utilizing social media accounts (e.g. Twitter, Facebook).

Public Involvement for Five-year Update

When the HMPC reconvenes for the five-year update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. In reconvening, the HMPC will be responsible for coordinating the activities necessary to involve the greater public, including disseminating information through a variety of media channels detailing the plan update process. As part of this effort, public meetings will be held and public comments will be solicited on the plan update draft.

9 Plan Adoption

Requirement §201.6(c)(5): [The plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).

The purpose of formally adopting this plan is to secure buy-in, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 (Adopt the Plan) of the 10-step planning process, in accordance with the requirements of DMA 2000. FEMA Approval Letters and community adoption resolutions are provided below.

Annex A Wake County Unincorporated Areas

A.1 PLANNING PROCESS

The table below lists the HMPC members who represented Wake County unincorporated areas.

Table A.1 – HMPC Members

Agency	Representative	Position or Title
Wake County Planning	Sharon Peterson	Long Range Planner
Wake County Planning	Bryan Coates	Long Range Planner
Wake Soil and Water Conservation District	Teresa Furr	Natural Resource Conservationist
N/A	Emma D'Allaird	Citizen Stakeholder
RDU	Jason Alvero	Director of Emergency Operations

A.2 COMMUNITY PROFILE

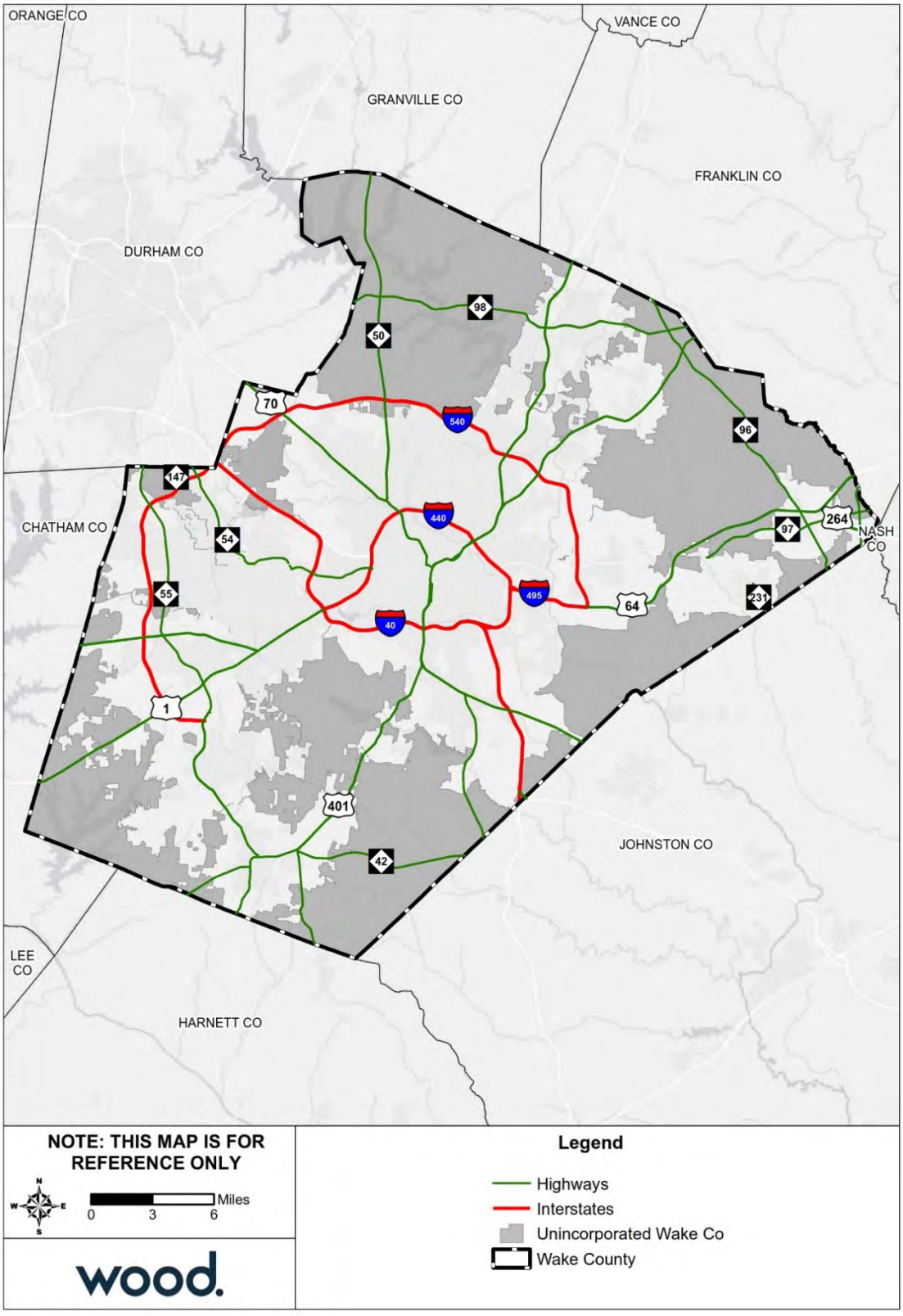
Geography

Wake County is located in the eastern portion of the Piedmont of North Carolina. It is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. The County comprises a total land area of 834 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 18,332 acres of wetlands in the unincorporated areas of the County.

Figure A.1 shows a base map of major transportation routes in the unincorporated areas of the County.

Figure A.1 – Major Transportation Routes, Wake County



Source: Wake County GIS Open Data

Population and Demographics

Table A.2 provides population counts and growth estimates for the County's unincorporated areas as compared to the County overall. Table A.3 provides demographic information for the unincorporated areas as compared to the whole County.

Table A.2 – Population Counts, Unincorporated Wake County, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Unincorporated areas	169,386	181,890	189,996	8,106	4.5%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates
Note: Unincorporated areas statistics calculated by subtracting jurisdiction counts from the county total. The total population of Cary, Raleigh, and Wake Forest includes population residing in adjacent counties.

Table A.3 – Racial Demographics, Unincorporated Wake County, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Unincorporated areas	77.1%	14.2%	1.8%	4.3%	2.1%	12.0%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates
*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Wake County unincorporated areas in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure A.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table A.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Unincorporated Wake County	1,902	0	0	574	0	621	0	198	27	0	0	0	0	186	28	14	43	0	**3,593**

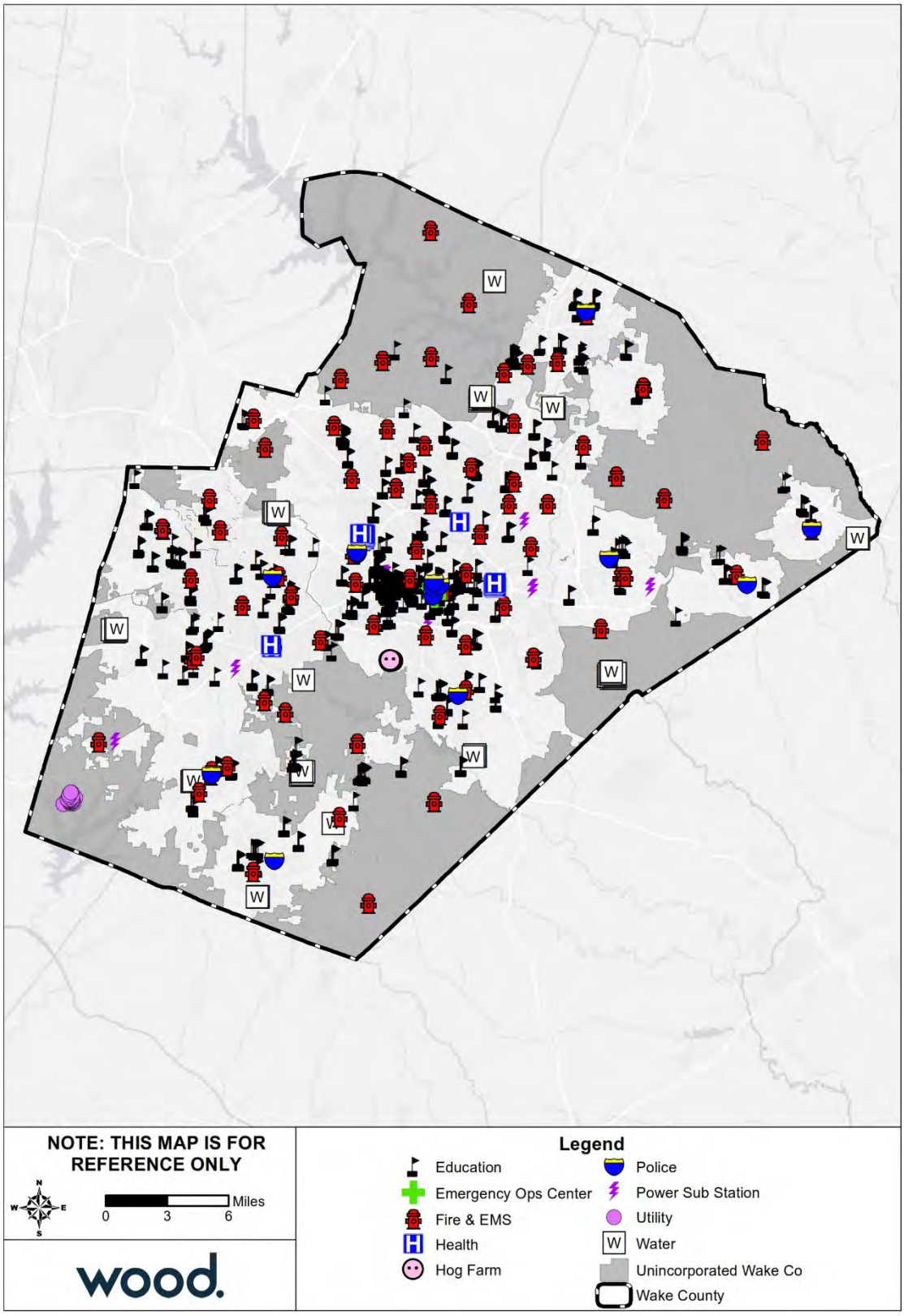
Source: NCEM Risk Management Tool

Table A.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Wake County unincorporated areas	432	84	26	44	1	36	66	0	**689**

Source: NCEM Risk Management Tool

Figure A.2 – Critical Facilities, Unincorporated Wake County



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in Unincorporated Wake County, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table A.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table A.6 – Parcels Developed 2011 or Later, Unincorporated Wake County

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	56	$25,563,035
Agriculture	21	$8,023,782
Commercial	7	$14,603,090
EXEMPT	4	$4,843,752
Forestry	6	$3,289,430
HOA	3	-
Horticulture	2	$757,361
Industrial	3	$56,884,017
Part Exempt	30	$10,452,989
Residential Less Than 10 Acres	4,381	$1,566,297,546
Grand Total	**4,513**	**$1,690,715,002**

Source: Wake County Open Data; retrieved April 8, 2019

There are 13 listings on the National Register of Historic Places for Wake County unincorporated areas, including two historic districts. These sites are listed in the table below.

Table A.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
01000424	Cannady--Brogden Farm	4/25/2001	Building	Creedmoor
74001379	Mangum, James, House	11/18/1974	Building	Creedmoor
99000509	Hood--Anderson Farm	4/29/1999	District	Eagle Rock
83001921	Falls of the Neuse Manufacturing Company	9/19/1983	Building	Falls
84000118	Forestville Baptist Church	10/25/1984	Building	Forestville
01000426	New Hill Historic District	4/25/2001	District	New Hill
07001503	Holleman, Samuel Bartley, House	1/30/2008	Building	New Hill
94001025	Perry Farm	8/26/1994	Building	Riley Hill
93001021	Oaky Grove	9/30/1993	Building	Shotwell
85002418	Rogers--Whitaker--Haywood House	9/19/1985	Building	Wake Crossroads
06000788	Davis--Adcock Store	9/6/2006	Building	Wilbon
03000931	Smith, Frank and Mary, House	9/11/2003	Building	Willow Spring
05000549	Smith, Turner and Amelia, House	6/10/2005	Building	Willow Spring

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The table below details key housing statistics for Wake County unincorporated areas as compared to the County overall. Growth in housing units was much more limited in the unincorporated areas as compared to the County overall.

Table A.8 – Housing Statistics, Unincorporated Wake County, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Unincorporated areas	69,428	70,641	1.7%	80.0%	6.6%	n/a

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Wake County unincorporated areas as compared to the County overall.

Table A.9 – Employment Statistics, Unincorporated Wake County, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Unincorporated areas	100,211	63.8	3.9	32.2	5.7

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table A.10 – Percent of Employed Population by Occupation, Unincorporated Wake County, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Unincorporated areas	46.3	13.2	23.7	9.3	7.4

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

A.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the unincorporated areas than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Dam Failure, Flood and Wildfire.

A.3.1 Dam Failure

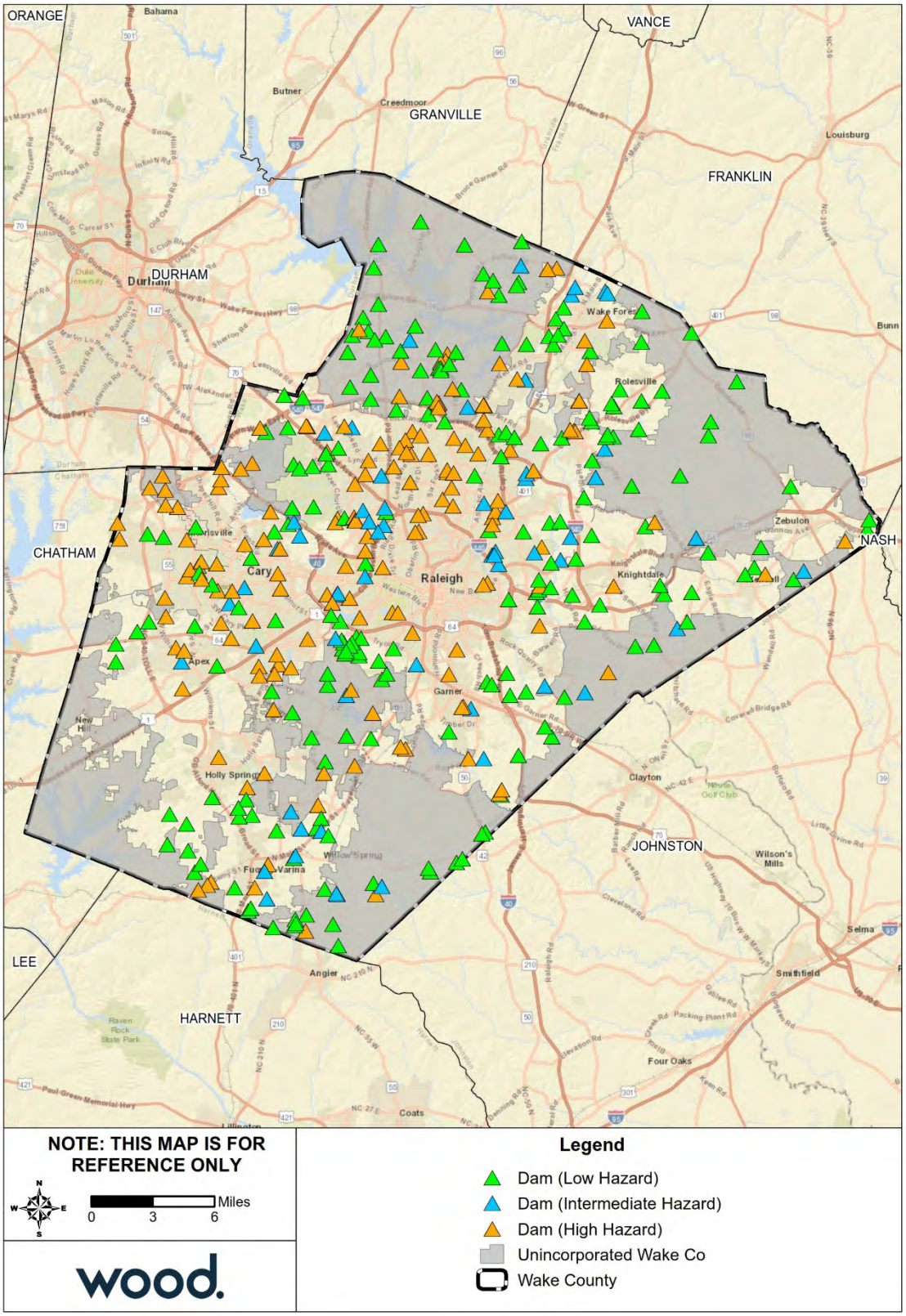
Table A.11 lists all high hazard dams identified by the North Carolina Dam Inventory as of July 2018. Dam locations in relation to unincorporated Wake County are shown in Figure A.3.

Table A.11 – High Hazard Dams in Unincorporated Wake County

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Downstream Location
Wake County				
Johnson Pond Dam	NC00163	Satisfactory	95	Lillington
Crossgate Lake Dam #1	NC00850	Fair	207	Raleigh
Crossgate Dam #2	NC04437	Fair	40	Raleigh
Lake Benson Dam	NC00861	Satisfactory	7200	Smithfield (Benson Rd near Dam
Lake Wheeler Dam	NC00864	Satisfactory	10800	Smithfield (See Comments)
Mason Lake Dam	NC00865	Fair	52	Milburnie
Panther Lake Dam	NC00876	Fair	253	Smithfield
Rdu Wastewater Dam	NC04443		22.5	N/A
Rtp South Dam	NC04444	Satisfactory	708	Apex
Pendleton Lake	NC04450	Satisfactory	10	Swan Mill Crossing Rd
Crabtree Dam 20-A	NC04456	Satisfactory	2500	John Brantley Blvd
Johnson Pond Dam	NC00845	Poor	5	NC-39
Coachman Trail Lake Dam Lower	NC01461	Fair	93	Falls (CoachmanWay@Dam)
Falls Of The Neuse Dam	NC01713		1128100	Falls (OldFallOfNeuseRd-Dam)
Stonebridge Lake Dam	NC01664	Fair	45	Falls
Coachman Trail Lake Dam Upper	NC04531	Fair	180	Coachman's Way Rd
Byrd Dam	NC04532	Fair	10	Baird Drive
Crabtree Creek Dam 5-A	NC04536	Fair	3010	Raleigh (I-40 @ Dam)
Bailey Dam	NC04563	Fair	76	Six Forks Road
Marshall Pond #2	NC04576	Unsatisfactory	59	Forestville Road
Howell Dam	NC04621	Fair	36	
Manchester Dam	NC04964	Fair	88	Enderbury Drive
Rtp W-1	NC05193	Satisfactory	327	
Crossgate Dam #3	NC05068	Fair	12	White Chapel Way
Chateau Lapointe Dam H	NC05069	Satisfactory	90	White Chapel Way
Cozart Pond Dam	NC05065	Not Rated		
Underwood Pond Dam	NC05218	Fair	27	
Betts Pond Dam	NC05036	Fair	40	
Hasentree Golf Communtiy Dam	NC05685	Satisfactory	139	Hasentree Club Drive
Neuse River Waste Water Treatment Plant Equalization Basin	NC05686	Satisfactory	114	Mai Plantation Road
RTP W-5 Dam	NC05795	Satisfactory	700	Jordan Reservoir
Burnside Drive Dam	NC05802	Fair	12	Burnside Drive
Rosewood Subdivision Dam	NC05877	Satisfactory	6	MacTavish Way
McCullers Pond Dam	NC06160	Not Rated		

Source: NC Dam Inventory, July 2018

Figure A.3 – Dam Locations, Unincorporated Wake County



Source: NC Dam Inventory, July 2018

A.3.2 Flood

Table A.12 details the acreage of unincorporated Wake County's total area by flood zone on the effective DFIRM. Per this assessment, over 10 percent of the unincorporated area in the County falls within the mapped 1%-annual-chance floodplains.

Table A.12 – Flood Zone Acreage in Unincorporated Wake County

Flood Zone	Acreage	Percent of Total (%)
Zone A	244.34	0.07
Zone AE	34,276.21	10.13
Zone X (500-year)	1,923.22	0.57
Zone X Unshaded	302,007.04	89.23
Total	**338,450.81**	--

Source: FEMA Effective DFIRM; Wake County GIS

Figure A.4 reflects the effective mapped flood hazard zones for Wake County, and Figure A.5 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in Unincorporated Wake County, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain. This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions. Table A.13 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table A.13 – Parcels Developed 2011 or Later and Located in 1% Annual Chance Floodplain

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	20	$9,213,446
Forestry	1	$777,207
Industrial	1	$48,366,843
Residential Less Than 10 Acres	118	$46,029,733
Grand Total	**140**	**$104,387,229**

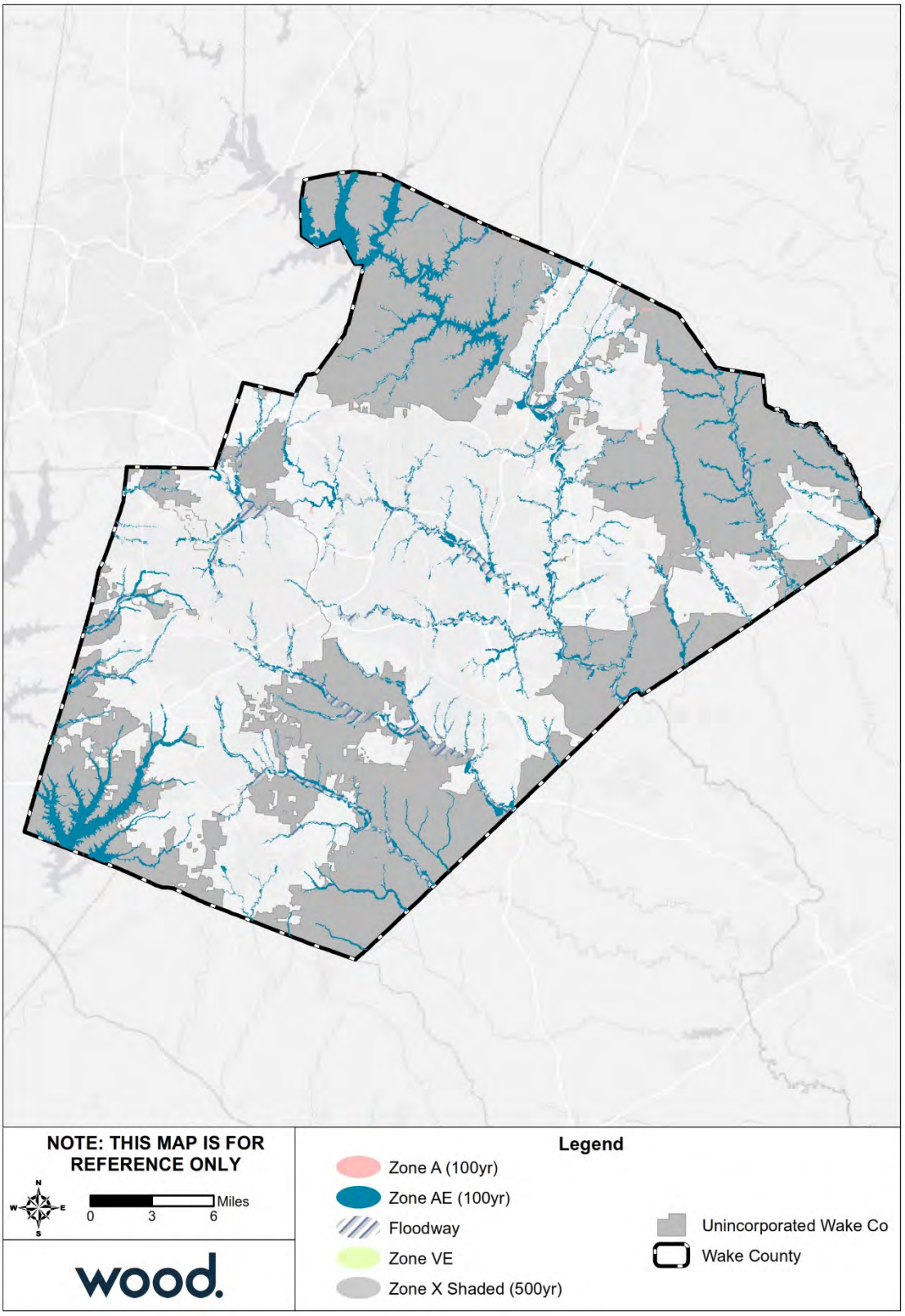
Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Table A.14 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector and flood event in the City of Raleigh.

Table A.14 – Critical Facilities Exposed to Flooding, Unincorporated Wake County

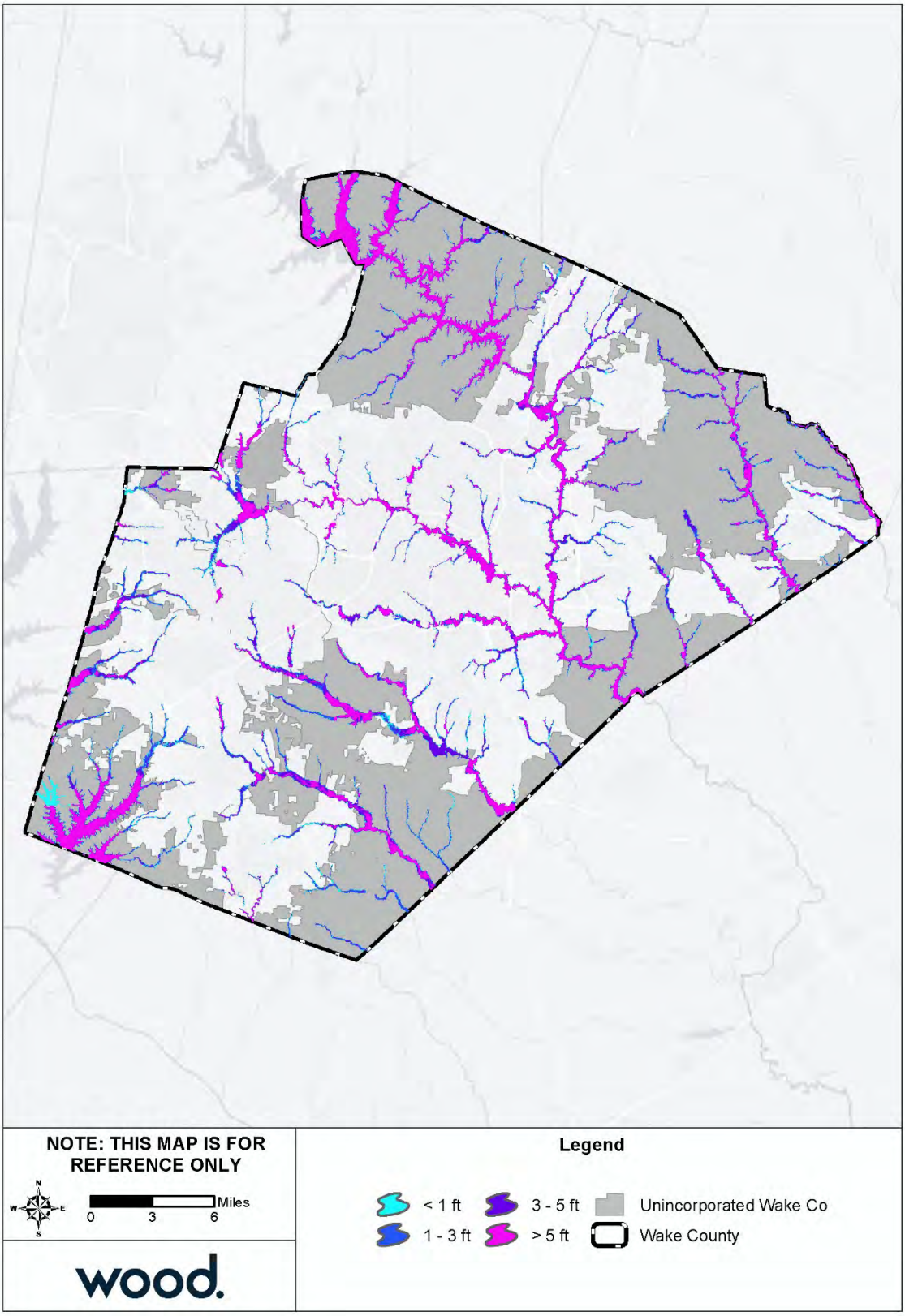
Sector	Event	Number of Buildings at Risk	Estimated Damages
Commercial Facilities	100 Year	20	$439,223
	Floodway	1	$23,765
Government Facilities	100 Year	2	$86,000
Transportation Systems	100 Year	1	$60,845
	Floodway	1	$60,845
All Categories	**100 Year**	**23**	**$586,068**
	Floodway	**2**	**$84,610**

Figure A.4 – FEMA Flood Hazard Areas, Unincorporated Wake County



Source: FEMA Effective DFIRM

Figure A.5 – Flood Depth, 1%-Annual-Chance Floodplain, Unincorporated Wake County



Source: FEMA Effective DFIRM

A.3.3 Wildfire

Table A.15 summarizes the acreage in unincorporated Wake County that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 25 percent of unincorporated Wake County is not included in the WUI.

Table A.15 – Wildland Urban Interface Acreage, Unincorporated Wake County

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*61,268.0*	*25.5%*
	LT 1hs/40ac	21,805.8	9.1%
	1hs/40ac to 1hs/20ac	18,817.7	7.8%
	1hs/20ac to 1hs/10ac	25,599.6	10.7%
	1hs/10ac to 1hs/5ac	30,158.9	12.6%
	1hs/5ac to 1hs/2ac	42,523.2	17.7%
	1hs/2ac to 3hs/1ac	39,565.4	16.5%
	GT 3hs/1ac	180.7	0.1%
	Total	239,919.4	

Source: Southern Wildfire Risk Assessment

Figure A.6 depicts the WUI for unincorporated Wake County. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure A.7 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure A.8 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

Potential fire intensity is highest in northwest and southwest Wake County; however, these areas have lower burn probability and/or are largely outside of the WUI, meaning little to no development is at risk. The area of greatest risk in the County is in the southeast where WUI overlays with moderate burn probability and moderate fire intensity levels.

Table A.16 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector at risk to wildfire hazard. Table A.17provides counts and estimated damages for High Potential Loss Properties in the Town of Fuquay-Varina.

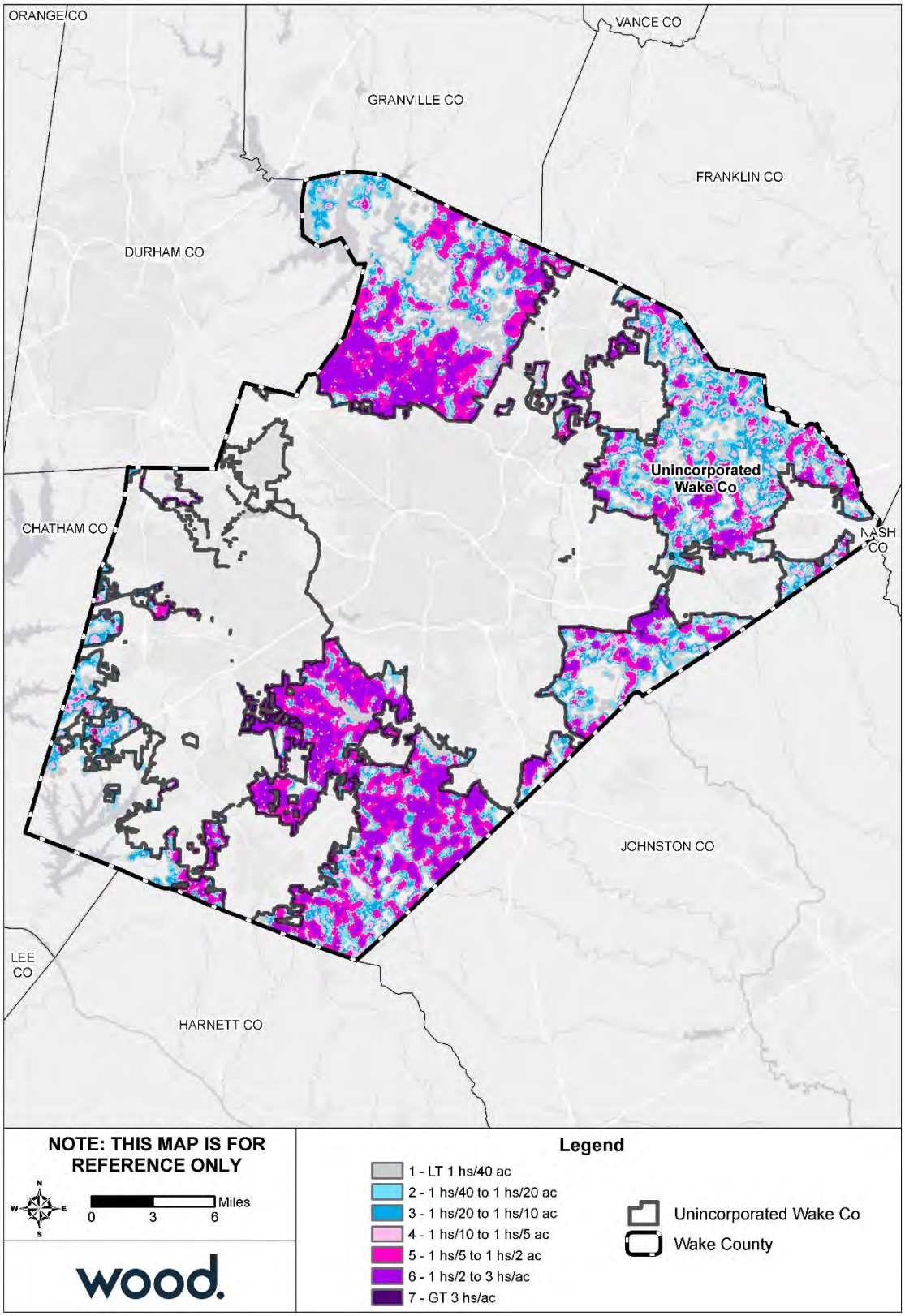
Table A.16 – Critical Facilities Exposed to Wildfire, Unincorporated Wake County

Sector	Event	Number of Buildings at Risk	Estimated Damages
Commercial Facilities	Wildfire Hazard	5	$7,400,764
Critical Manufacturing	Wildfire Hazard	4	$1,485,862
Food and Agriculture	Wildfire Hazard	54	$2,326,874
All Categories	**Wildfire Hazard**	**63**	**$11,213,500**

Table A.17 – High Potential Loss Properties Exposed to Wildfire, Unincorporated Wake County

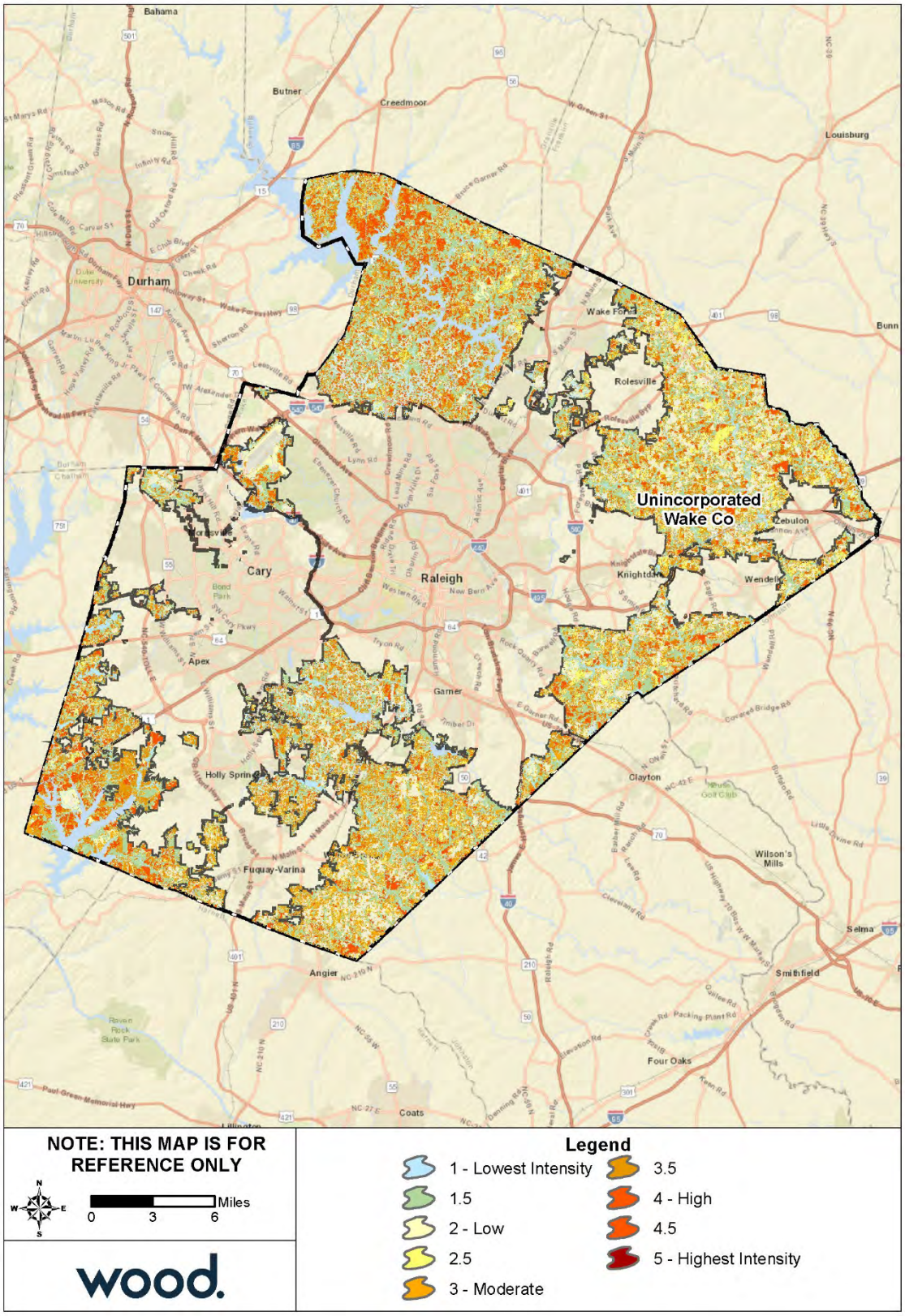
Category	Event	Number of Buildings at Risk	Estimated Damages
Commercial	Wildfire Hazard	1	$2,740,704
Religious	Wildfire Hazard	1	$1,658,293
All Categories	**Wildfire Hazard**	**2**	**$4,398,997**

Figure A.6 – Wildland Urban Interface, Unincorporated Wake County



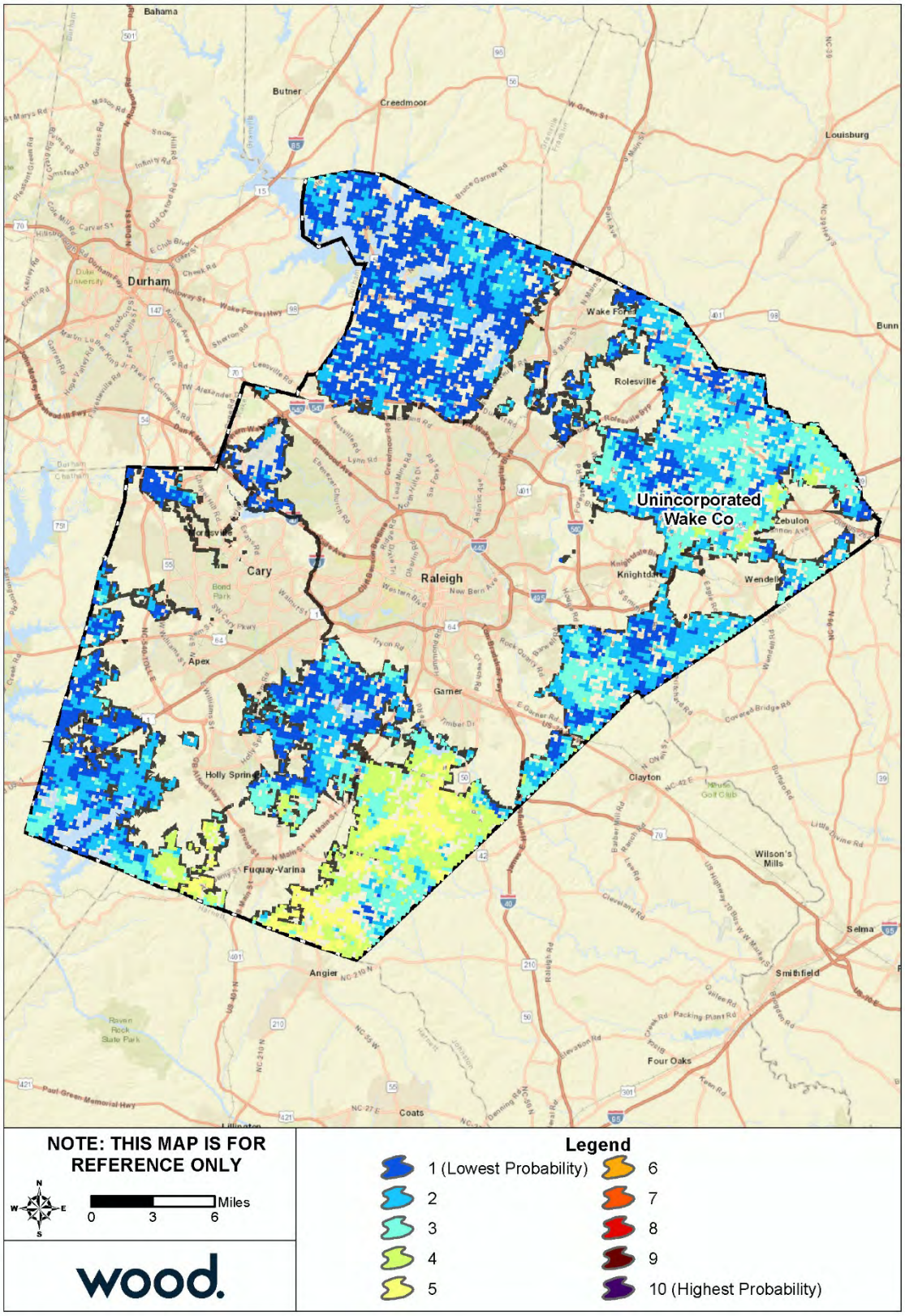
Source: Southern Wildfire Risk Assessment

Figure A.7 – Fire Intensity Scale, Unincorporated Wake County



Source: Southern Wildfire Risk Assessment

Figure A.8 – Burn Probability, Unincorporated Wake County



Source: Southern Wildfire Risk Assessment

A.4 CAPABILITY ASSESSMENT

A.4.1 Overall Capability

Details on the tools and resources in place and available to Wake County were provided by the County's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Wake County has an overall capability rating of Moderate. The County's Self-Assessment of key capability areas is summarized in Table A.18 below.

Table A.18 – Capability Self-Assessment, Unincorporated Wake County

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	Moderate
Fiscal Capability	Moderate
Education and Outreach Capability	Limited
Mitigation Capability	Unrated
Political Capability	Unrated
Overall Capability	Moderate

A.4.2 Floodplain Management

Wake County joined the NFIP emergency program in 1975 and has been a regular participant in the NFIP since November 1978. The following tables reflect NFIP policy and claims data for the County categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table A.19 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	382	$158,156	$111,781,800	51	$628,493.34
2-4 Family	1	$373	$350,000	1	$10,458.76
All Other Residential	51	$7,938	$7,640,800	0	$0.00
Non-Residential	4	$2,190	$180,500	18	$357,122.41
Total	438	$168,657	$119,953,100	70	$996,074.51

Source: FEMA Community Information System, accessed November 2018

Table A.20 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	68	$26,968	$12,851,700	36	$646,919.29
A Zones	1	$677	$350,000	2	$3,575.95
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
B, C & X Zone					
Standard	27	$16,200	$4,452,400	3	$103,973.20
Preferred	342	$124,812	$102,299,000	25	$220,469.76
Total	438	$168,657	$119,953,100	66	$974,938.20

Source: FEMA Community Information System, accessed November 2018

Table A.21 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	40	$10,332	$6,059,100	22	$306,182.74
A Zones	0	$0	$0	1	$2,692.23
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	30	$12,465	$8,073,300	7	$56,998.08
Standard	2	$2,878	$379,300	0	$0.00
Preferred	28	$9,587	$7,694,000	7	$56,998.08
Total	70	$22,797	$14,132,400	30	$365,873.05

Source: FEMA Community Information System, accessed November 2018

Table A.22 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	28	$16,636	$6,792,600	14	$340,736.55
A Zones	1	$677	$350,000	1	$883.72
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	339	$128,547	$98,678,100	21	$267,444.88
Standard	25	$13,322	$4,073,100	3	$103,973.20
Preferred	314	$115,225	$94,605,000	18	$163,471.68
Total	368	$145,860	$105,820,700	36	$609,065.15

Source: FEMA Community Information System, accessed November 2018

A.5 MITIGATION STRATEGY

Wake County											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Conduct a groundwater assessment using a network of wells and leading to a groundwater model that can enhance the understanding of groundwater capacity, threats and vulnerabilities in response to growth and weather.	1	1	Drought	High	Wake Environmental Services, Wake Water Partnership, USGS	$1,565,000	Non-departmental operating expense and USGS	3-5 years	In-Progress – Carry Forward	Program scope established and project is underway. Wake County is partnering with USGS to conduct this study.
P-2	Oversee completion of planned reclaimed water projects per the County's approved Community Improvement Program (CIP).	4	2	Drought	Moderate	Raleigh, Wake County	$16,000,000	Annual budget process	2-3 years	In-Progress – Carry Forward	Completed several reclaimed water projects in RTP and others directly related to County facilities. Project has three phases; phases 1 and 2 are complete.
Property Protection											
PP-1	Identify road network segments no longer maintained by NCDOT and provide funding and planning resources for mitigation and recovery efforts to communities to ensure infrastructure and transportation resiliency. Assist in reinstating water and sewer services post disaster.	3	1	All	Moderate	Wake County Community Services	$100,000,000	Annual budget ordinance	Ongoing - Next 5 years	New	N/A
Natural Resource Protection											
NRP-1	Partner with other governmental units and other interested parties to jointly identify and acquire 30,000 acres of open space lands.	3	2	Flood, Drought, Landslide, Extreme Heat	High	Wake County Community Services	$335,000,000	Open Space Bonds	3-5 years	In-Progress – Carry Forward	The County has purchased approximately 7,634 acres since the program's inception. It will take several decades as indicated to complete. In 2018 voters approved $120m Parks, Greenways, Recreation and Open Space Bond. $26m available for 2019.
Structural Projects											
SP-1	Replace emergency generators located at facilities that serve as emergency shelter locations based on their scheduled end of life cycle.	3	1	All	Moderate	Wake County Facilities Design & Construction	$1,400,000	Local and Federal Grant	More than 5 years	New	N/A
SP-2	Construction of a new Emergency Operations Center adequate for the size and complexity of the jurisdiction	2	1	All	Moderate	Wake County Emergency Management	$6,500,000	Local	3-5 years	New	N/A
Emergency Services											
ES-1	Recovery Plan. Develop a comprehensive disaster recovery plan for Wake County consistent with the vision and goals described in PPD-8 and the National Disaster Recovery Framework.	4	2	All	Moderate	Wake County Emergency Management	$150,000	Local	3-5 years	New	N/A
ES-2	Upload dam failure inundation maps to Everbridge system for notification and evacuation.	1	2	Dam Failure	High	Wake County Emergency Management	Staff time	Local	1 year	New	N/A
Public Education and Awareness											
PEA-1	Emergency Planning and Community Right-to-Know Act (EPCRA) High Hazard Chemicals Awareness. Identify chem facilities, potential impact zones, and potentially affected communities. Inform public and provide resources and education.	1	1	Hazardous Material	Moderate	Wake County Local Emergency Planning Committee	$15,000	Local funding, donations	2-3 years	New	N/A
PEA-2	Increase public awareness and participation in the Ready Wake program and resources.	1	1	All	Moderate	Wake County Fire Services, Emergency Management	$10,000	Federal Grants and Local	2-3 years	New	N/A

Annex B City of Raleigh

B.1 PLANNING PROCESS

The table below lists the HMPC members who represented the City of Raleigh.

Table B.1 – HMPC Members

Agency	Representative	Position or Title
Emergency Management and Special Events	Kelly Lindsey*	Emergency Management Coordinator
Emergency Management and Special Events	Whitney Schoenfeld	Special Events Planner
Engineering Services – Stormwater Management	Ben Brown	Stormwater Administrator
Office of Sustainability	Megan Anderson	Sustainability Manager
Office of Sustainability	Nicole Goddard	Sustainability Analyst

*Note: Vacated position midway through the planning process.

B.2 COMMUNITY PROFILE

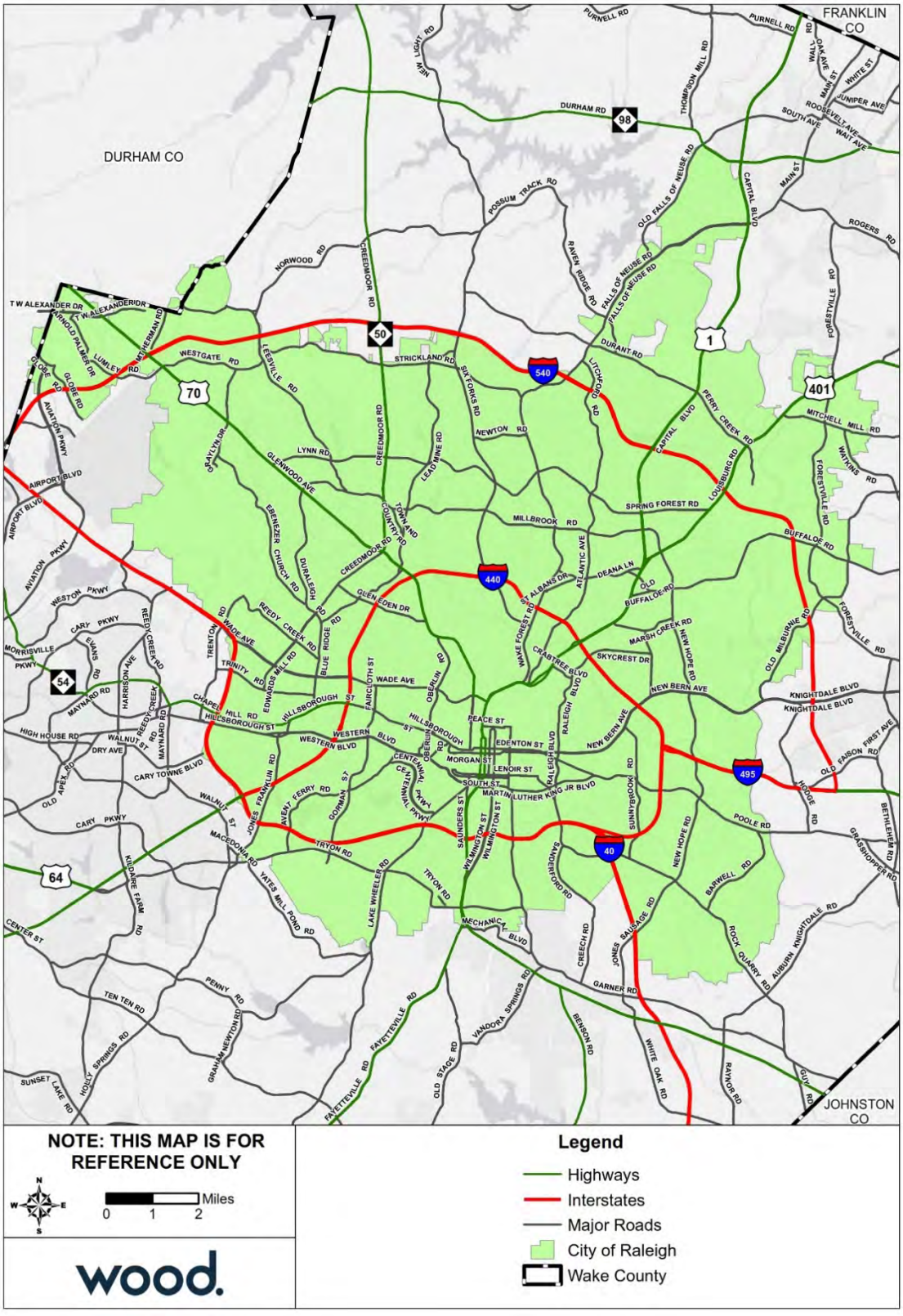
Geography

The City of Raleigh is located in central Wake County. A very small portion of the city extends west into Durham County, however all data presented here is representative of the entire city. The City is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Raleigh comprises a total land area of 142.9 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 10,298 acres of wetlands in Raleigh.

Figure B.1 shows a base map of major transportation routes in the City of Raleigh.

Figure B.1 – Major Transportation Routes, City of Raleigh



Source: Wake County GIS Open Data

Population and Demographics

Table B.2 provides population counts and growth estimates for the City of Raleigh as compared to the County overall. Table B.3 provides demographic information for Raleigh as compared to the whole County.

Table B.2 – Population Counts, Raleigh, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
City of Raleigh	276,093	403,892	449,477	45,585	11.3%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010 American Community Survey 2013-2017 5-Year Estimates
Note: The total population of Raleigh includes population residing in adjacent county.

Table B.3 – Racial Demographics, Raleigh, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
City of Raleigh	59.0%	28.9%	4.6%	4.6%	2.6%	11.0%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates
*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Raleigh in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure B.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table B.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
City of Raleigh	166	164	1	3,653	8	1,678	2	1,643	457	0	0	2	0	739	13	40	12	0	**8,578**

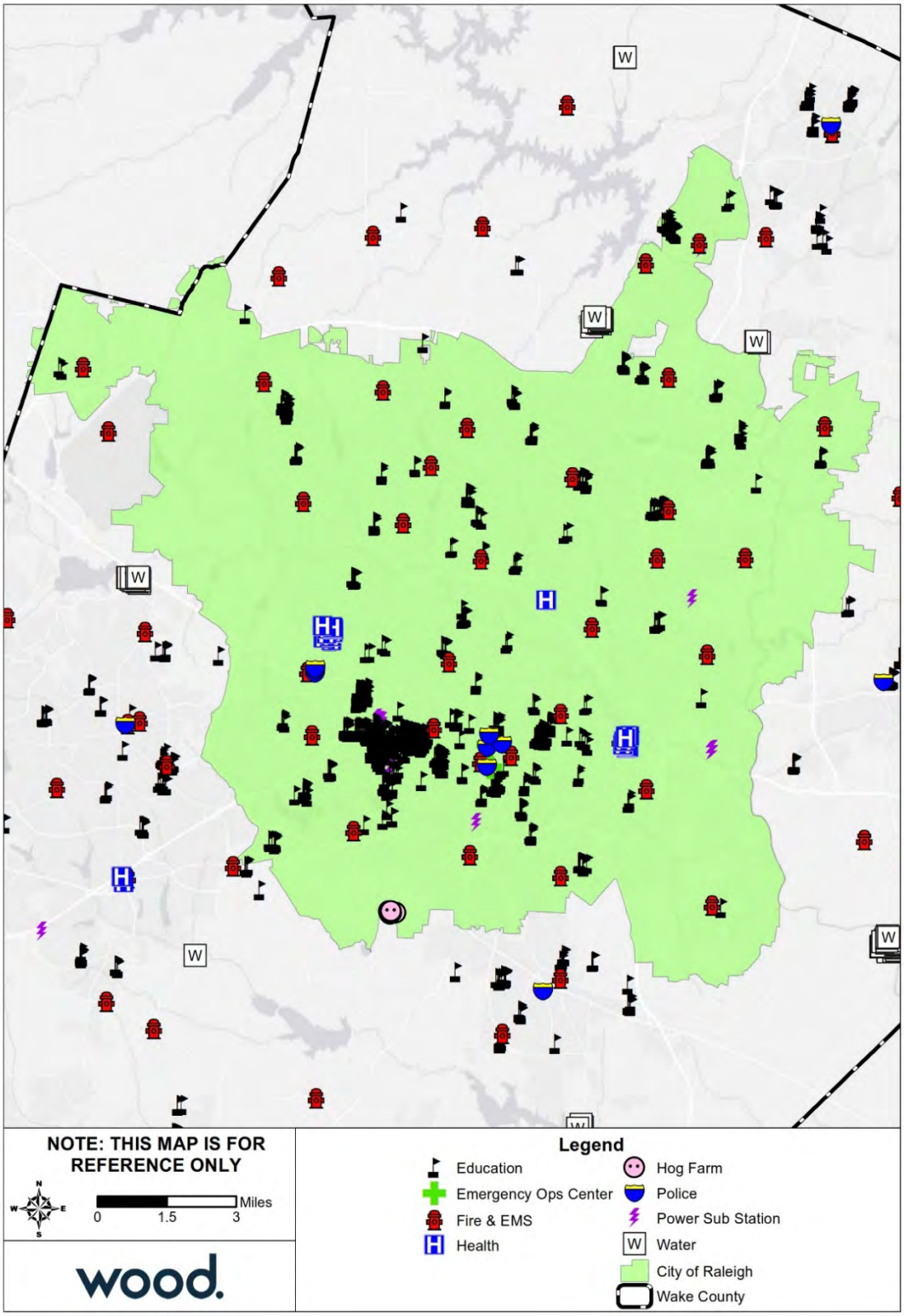
Source: NCEM Risk Management Tool

Table B.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
City of Raleigh	1,284	1,359	338	505	1	170	13	0	**3,670**

Source: NCEM Risk Management Tool

Figure B.2 – Critical Facilities, City of Raleigh



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the City of Raleigh, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

TABLE provides a summary by land class of parcel development from January 2011 to April 2019.

Table B.6 – Parcels Developed 2011 or Later, City of Raleigh

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	2	$407,892
Agriculture	3	$639,681
Apartment	113	$1,607,194,130
Commercial	189	$956,181,909
Condo Complex	7	-
EXEMPT	148	$256,148,638
HOA	12	$1,635,560
Industrial	30	$43,151,006
Part Exempt	117	$405,564,987
Residential Less Than 10 Acres	9,226	$2,507,781,302
Retirement Home	3	$15,067,239
State Assessed	1	$4,890,225
Grand Total	**9,851**	**$5,798,662,569**

Source: Wake County Open Data; retrieved April 8, 2019

There are 141 listings on the National Register of Historic Places for the City of Raleigh, including 39 historic districts. These sites are listed in the table below. Four of these sites are also designated as National Historic Landmarks.

Table B.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
70000475	North Carolina Executive Mansion	2/26/1970	Building	Raleigh
70000476	North Carolina State Capitol	2/26/1970	Building	Raleigh
70000479	Yates Mill	2/26/1970	Building	Raleigh
70000474	Mordecai House	7/1/1970	Building	Raleigh
70000478	State Bank of North Carolina	7/1/1970	Building	Raleigh
70000469	Christ Church	7/28/1970	Building	Raleigh
70000470	Haywood Hall	7/28/1970	Building	Raleigh
70000471	Haywood, Richard B., House	7/28/1970	Building	Raleigh
70000472	Lane, Joel, House	7/28/1970	Building	Raleigh
70000477	St. Mary's Chapel	11/20/1970	Building	Raleigh
71000627	White-Holman House	4/16/1971	Building	Raleigh
71000624	Federal Building	5/6/1971	Building	Raleigh
71000626	Seaboard Coast Line Railroad Company Office Building	5/6/1971	Building	Raleigh
71000623	Dodd-Hinsdale House	11/12/1971	Building	Raleigh
71000625	Raleigh Water Tower	12/16/1971	Building	Raleigh

Ref#	Property Name	Status Date	Category	City
72000998	Andrews-Duncan House	1/20/1972	Building	Raleigh
72001000	Heck-Andrews House	1/20/1972	Building	Raleigh
72000999	Hawkins-Hartness House	2/1/1972	Building	Raleigh
72001001	Lewis-Smith House	12/11/1972	Building	Raleigh
73001375	J. S. Dorton Arena	4/11/1973	Building	Raleigh
73001374	Heck-Lee, Heck-Wynne, and Heck-Pool Houses	4/13/1973	Building	Raleigh
73001373	Estey Hall	5/25/1973	Building	Raleigh
73001376	Jones Jr., Nathaniel, House	6/4/1973	Building	Raleigh
73001377	Peace College Main Building	6/19/1973	Building	Raleigh
73001372	Briggs Hardware Building	10/25/1973	Building	Raleigh
74001380	Oakwood Historic District	6/25/1974	District	Raleigh
75001293	Capehart House	1/17/1975	Building	Raleigh
75001297	Tucker Carriage House	2/13/1975	Building	Raleigh
75001295	Jones, Alpheus, House	7/7/1975	Building	Raleigh
75001294	Elmwood	10/29/1975	Building	Raleigh
76001341	Agriculture Building	6/16/1976	Building	Raleigh
76001343	North Carolina School for the Blind and Deaf Dormitory	8/11/1976	Building	Raleigh
76001344	Pullen Park Carousel	9/8/1976	Structure	Raleigh
76001342	Daniels, Josephus, House	12/8/1976	Building	Raleigh
77001012	Polk, Leonidas L., House	4/13/1977	Building	Raleigh
78001979	Montford Hall	3/8/1978	Building	Raleigh
78001978	Capitol Area Historic District	4/15/1978	District	Raleigh
78001980	Raleigh, Sir Walter, Hotel	8/11/1978	Building	Raleigh
78001981	St. Mary's College	12/19/1978	District	Raleigh
79001759	Rogers-Bagley-Daniels-Pegues House	3/21/1979	Building	Raleigh
79003341	Masonic Temple Building	9/17/1979	Building	Raleigh
80002902	Norburn Terrace	2/1/1980	Building	Raleigh
80002903	St. Augustine's College Campus	3/28/1980	District	Raleigh
77001011	Lane-Bennett House	6/30/1983	Building	Raleigh
83001924	Moore Square Historic District	8/3/1983	District	Raleigh
83001923	Lumsden-Boone Building	9/8/1983	Building	Raleigh
83001925	Professional Building	9/8/1983	Building	Raleigh
83004003	Spring Hill	12/29/1983	Building	Raleigh
84002533	Masonic Temple Building	5/3/1984	Building	Raleigh
85001671	Boylan Heights	7/29/1985	District	Raleigh
85001672	Glenwood	7/29/1985	District	Raleigh
85001673	Cameron Park	7/29/1985	District	Raleigh
85003076	Capital Club Building	12/5/1985	Building	Raleigh
86000403	Marshall--Harris--Richardson House	3/5/1986	Building	Raleigh
87000855	North Carolina State Fair Commercial & Education Buildings	6/5/1987	Building	Raleigh
87001787	Oakwood Historic District (Boundary Increase)	10/21/1987	District	Raleigh
80004607	St. Paul A.M.E. Church	11/5/1987	Building	Raleigh
87002597	Christ Episcopal Church	12/23/1987	Building	Raleigh
87002235	Oakwood Historic District (Boundary Increase II)	1/6/1988	District	Raleigh
88003044	Oakwood Historic District (Boundary Increase III)	1/9/1989	District	Raleigh

Ref#	Property Name	Status Date	Category	City
89000441	Pilot Mill	6/5/1989	District	Raleigh
89001049	Henderson, Isabelle Bowen, House and Gardens	8/7/1989	District	Raleigh
90001030	Wyatt, Leonidas R., House	7/5/1990	Building	Raleigh
90001527	East Raleigh--South Park Historic District	10/11/1990	District	Raleigh
90001638	Dix Hill	11/7/1990	District	Raleigh
91000359	Oak View	4/3/1991	District	Raleigh
92001602	Grosvenor Gardens Apartments	11/12/1992	Building	Raleigh
93000440	Fadum House	6/10/1993	Building	Raleigh
93000543	Raleigh Banking and Trust Company Building	6/17/1993	Building	Raleigh
94001085	Small, G. Milton, and Associates, Office Building	9/21/1994	Building	Raleigh
94001086	Small House	9/21/1994	Building	Raleigh
94001087	Ritcher House	9/21/1994	Building	Raleigh
94001088	Paschal House	9/21/1994	Building	Raleigh
94001089	Matsumoto House	9/21/1994	Building	Raleigh
95000783	Crabtree Creek Recreational Demonstration Area	6/30/1995	District	Raleigh
95001440	Haywood, Dr. Hubert Benbury, House	12/13/1995	Building	Raleigh
96000197	Kamphoefner, Henry L., House	3/12/1996	Building	Raleigh
97000022	Raleigh National Cemetery	1/31/1997	Site	Raleigh
97001304	Carolina Power and Light Company Car Barn and Automobile Garage	10/30/1997	Building	Raleigh
97001305	Raleigh Electric Company Power House	10/30/1997	Building	Raleigh
97001498	Odd Fellows Building	12/1/1997	Building	Raleigh
97001499	Pine Street Creamery, (Former)	12/1/1997	Building	Raleigh
97001593	Royal Baking Company	12/30/1997	Building	Raleigh
97001668	Mordecai Place Historic District	2/4/1998	District	Raleigh
99001392	Pope, Dr. M.T., House	11/22/1999	Building	Raleigh
99001452	Raleigh Water Works and E.B. Bain Water Treatment Plant	11/22/1999	Building	Raleigh
00000457	Mahler and Carolina Trust Buildings	11/29/2000	Building	Raleigh
00001570	Mordecai Place Historic District (Boundary Increase)	12/28/2000	Building	Raleigh
01000416	St. Matthews School	4/25/2001	Building	Raleigh
01000421	Panther Branch School	5/8/2001	Building	Raleigh
01000557	Caraleigh Mills	5/25/2001	Building	Raleigh
01001112	North Carolina Agricultural Experiment Station Cottage	10/15/2001	Building	Raleigh
02000058	Glenwood--Brooklyn Historic District (Boundary Increase and Decrease)	2/20/2002	District	Raleigh
02000165	Penny, Jesse, House and Outbuildings	3/13/2002	Building	Raleigh
02000499	Turner, John T. and Mary, House	5/16/2002	Building	Raleigh
02000500	Graves, Willis M., House	5/16/2002	Building	Raleigh
02000501	Hall, Rev. Plummer T., House	5/16/2002	Building	Raleigh
02000502	Latta, Rev. M.L., House	5/16/2002	Building	Raleigh
02000496	Hayes Barton Historic District	5/16/2002	District	Raleigh
02000497	Bloomsbury Historic District	5/16/2002	District	Raleigh
02000946	Depot Historic District	9/6/2002	District	Raleigh
03000389	Roanoke Park Historic District	5/9/2003	District	Raleigh
03000391	Vanguard Park Historic District	5/9/2003	District	Raleigh

Ref#	Property Name	Status Date	Category	City
03000929	Occidental Life Insurance Company Building	9/11/2003	Building	Raleigh
03000930	Green, Herman, House	9/11/2003	Building	Raleigh
03001300	West Raleigh Historic District	12/18/2003	District	Raleigh
04001584	Washington Graded and High School	2/2/2005	Building	Raleigh
05000321	Rothstein, Mae and Philip, House	4/15/2005	Building	Raleigh
05000320	Lawrence, Dr. Elmo N., House	4/20/2005	Building	Raleigh
05001449	Blalock, Dr. Nathan M., House	12/23/2005	Building	Raleigh
06000223	Ivey, Rufus J., House	4/5/2006	Building	Raleigh
06000338	Maiden Lane Historic District	5/3/2006	District	Raleigh
06000790	Raleigh Bonded Warehouse	8/24/2006	Building	Raleigh
06000789	Pine Hall	9/6/2006	Building	Raleigh
06001109	Adams--Edwards House	12/6/2006	Building	Raleigh
07000902	Boylan Apartments	9/5/2007	Building	Raleigh
07001412	Fayetteville Street Historic District	2/27/2008	District	Raleigh
08000888	Free Church of the Good Shepherd	9/10/2008	Building	Raleigh
08000889	City Cemetery	9/12/2008	District	Raleigh
08000939	Curtis, William A., House	9/24/2008	Building	Raleigh
08001292	Mount Hope Cemetery	1/8/2009	District	Raleigh
08001388	Welles, Paul and Ellen, House	1/29/2009	Building	Raleigh
08001415	Mary Elizabeth Hospital	2/5/2009	Building	Raleigh
09000661	Carolina Coach Garage and Shop	8/27/2009	Building	Raleigh
10000632	Madonna Acres Historic District	9/1/2010	District	Raleigh
10001098	Harris, Harwell Hamilton and Jean Bangs, House and Office	12/28/2010	Building	Raleigh
10001111	Battery Heights Historic District	1/3/2011	District	Raleigh
10001112	Capitol Heights Historic District	1/3/2011	District	Raleigh
10001113	Longview Gardens Historic District	1/3/2011	District	Raleigh
11000484	Hi-Mount Historic District	7/29/2011	District	Raleigh
11000892	Arndt, G. Dewey and Elma, House	12/7/2011	Building	Raleigh
11000893	Rochester Heights Historic District	12/7/2011	District	Raleigh
11000956	Cameron Village Historic District	12/22/2011	District	Raleigh
14000523	Merrimon--Wynne House	8/25/2014	Building	Raleigh
14001024	Tucker, Garland Scott and Toler Moore, House	12/10/2014	Building	Raleigh
14001025	Wachovia Building Company Contemporary Ranch House	12/10/2014	Building	Raleigh
16000188	Chavis, John, Memorial Park	4/19/2016	District	Raleigh
100000941	O'Kelly, Berry, Historic District	5/11/2017	District	Raleigh
100001634	Depot Historic District (Boundary Increase)	9/21/2017	District	Raleigh
100002930	Oak Grove Cemetery	9/14/2018	Site	Raleigh
100002931	Oberlin Cemetery	9/14/2018	Site	Raleigh

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The table below details key housing statistics for Raleigh as compared to the County overall.

Table B.8 – Housing Statistics, Raleigh, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
City of Raleigh	176,124	194,768	10.6%	47.2%	9.2%	$225,000

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Raleigh as compared to the County overall.

Table B.9 – Employment Statistics, Raleigh, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
City of Raleigh	257,228	67.5	3.6	28.8	5.0

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table B.10 – Percent of Employed Population by Occupation, Raleigh, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
City of Raleigh	46.2	15.7	24.6	6.0	7.4

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

B.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the City of Raleigh than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in in this section are: Flood and Wildfire.

B.3.1 Flood

Table B.11 details the acreage of the City of Raleigh's total area by flood zone on the effective DFIRM. Per this assessment, about 8 percent of the unincorporated area in the County falls within the mapped 1%-annual-chance floodplains.

Table B.11 – Flood Zone Acreage in the City of Raleigh

Flood Zone	Acreage	Percent of Total (%)
Zone A	101.08	0.09
Zone AE	9265.33	8.03
Zone X (500-year)	1085.68	0.94
Zone X Unshaded	104886.22	90.94
Total	**115338.32**	--

Source: FEMA Effective DFIRM; Wake County GIS

Figure B.3 reflects the effective mapped flood hazard zones for the City of Raleigh, and Figure B.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in the City of Raleigh, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. For parcels where updated building footprints were available, the parcel was considered exposed only if the building intersected the floodplain boundary, otherwise, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table B.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table B.12 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain, City of Raleigh

Land Class	Number of Parcels	Sum of Building Value
Apartment	9	$197,174,867
Commercial	12	$97,896,588
EXEMPT	12	$58,671,973
Industrial	5	$5,461,158
Part Exempt	1	$541,282
Residential Less Than 10 Acres	86	$31,032,549
Grand Total	**125**	**$390,778,417**

Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Table B.13 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector and flood event in the City of Raleigh. Table B.14 provides counts and estimated damages for High Potential Loss Properties in the City of Raleigh.

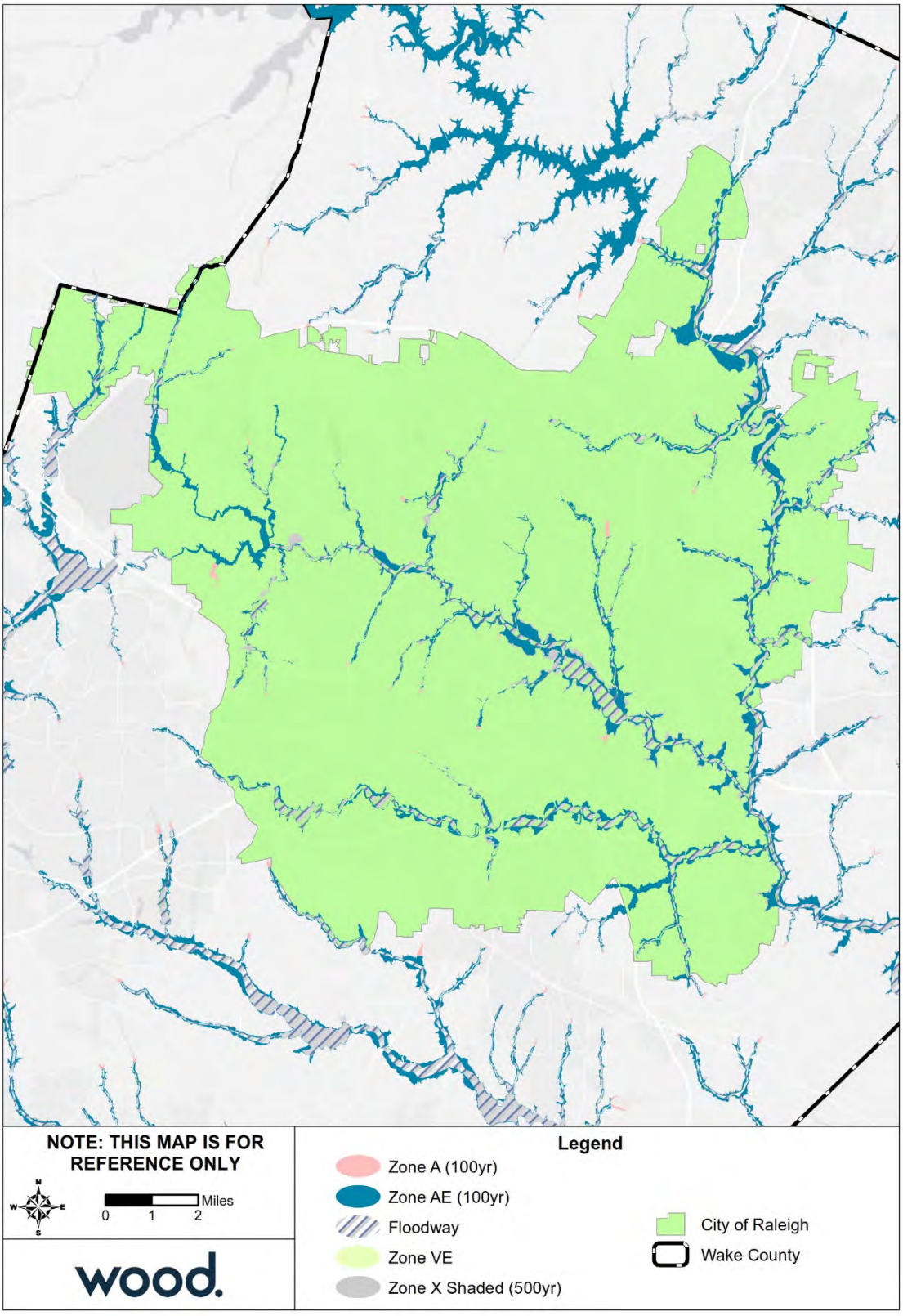
Table B.13 – Critical Facilities Exposed to Flooding, City of Raleigh

Sector	Event	Number of Buildings at Risk	Estimated Damages
Banking and Finance	100 Year	4	$1,433,067
	Floodway	1	$48,447
Commercial Facilities	100 Year	156	$156,539,970
	Floodway	45	$7,918,573
Critical Manufacturing	100 Year	8	$960,696
	Floodway	3	$255,246
Government Facilities	100 Year	5	$259,852
	Floodway	1	$64,062
Transportation Systems	100 Year	3	$2,003,605
All Categories	**100 Year**	**176**	**$161,197,190**
	Floodway	**50**	**$8,286,328**

Table B.14 – High Potential Loss Properties Exposed to Flooding, City of Raleigh

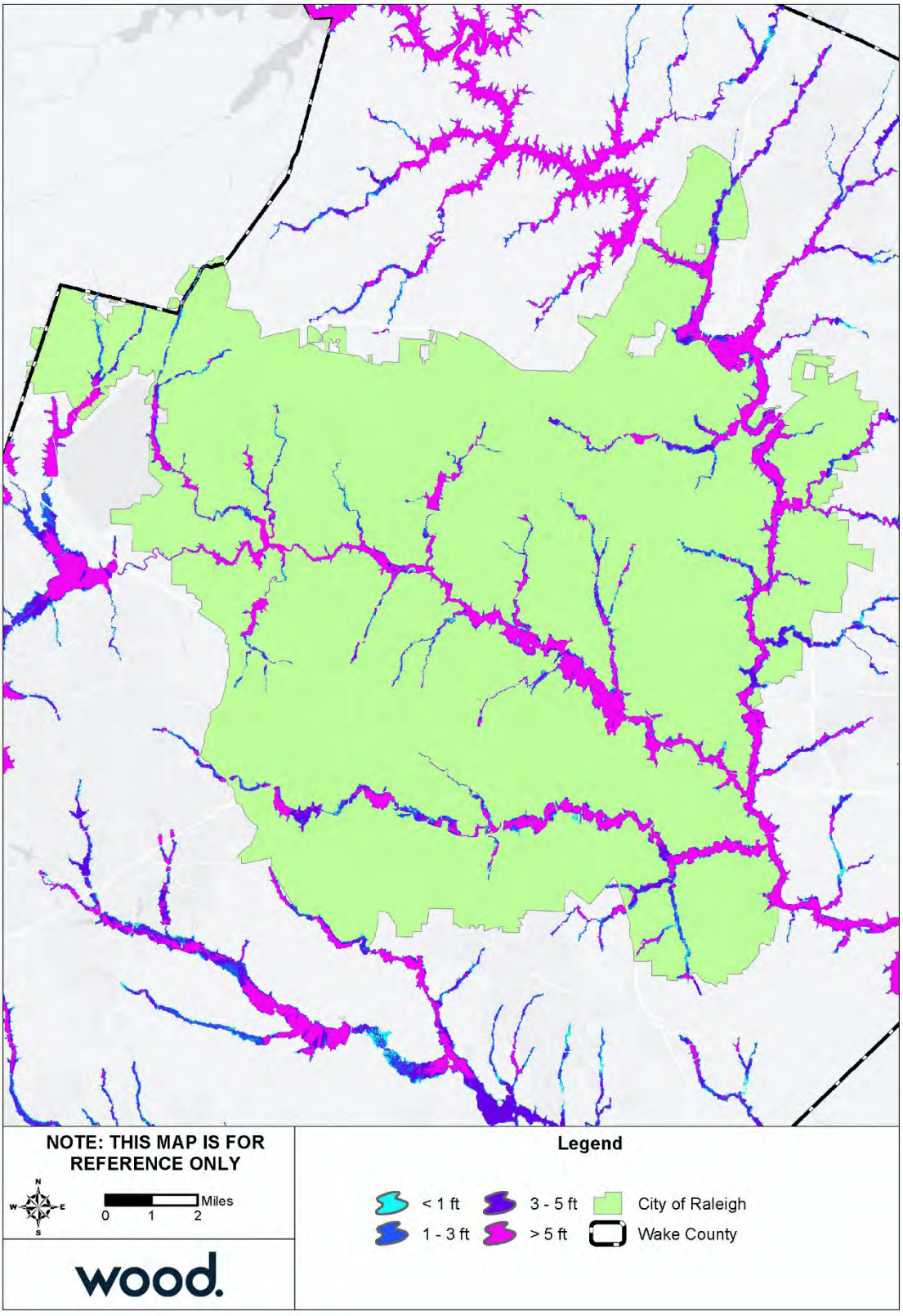
Category	Event	Number of Buildings at Risk	Estimated Damages
Commercial	100 Year	25	$148,719,520
	Floodway	5	$2,652,525
Residential	100 Year	11	$3,331,354
	Floodway	2	$1,349,353
All Categories	**100 Year**	**36**	**$152,050,874**
	Floodway	**7**	**$4,001,878**

Figure B.3 – FEMA Flood Hazard Areas, City of Raleigh



Source: FEMA Effective DFIRM

Figure B.4 – Flood Depth, 1%-Annual Chance Floodplain, City of Raleigh



Source: FEMA Effective DFIRM

B.3.2 Wildfire

Table B.15 summarizes the acreage in the City of Raleigh that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. 18 percent of the City of Raleigh is not included in the WUI.

Table B.15 – Wildland Urban Interface Acreage, City of Raleigh

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*20,688.0*	*18.0%*
	LT 1hs/40ac	4,359.1	3.8%
	1hs/40ac to 1hs/20ac	2,579.8	2.2%
	1hs/20ac to 1hs/10ac	3,549.9	3.1%
	1hs/10ac to 1hs/5ac	4,720.0	4.1%
	1hs/5ac to 1hs/2ac	8,663.3	7.5%
	1hs/2ac to 3hs/1ac	54,281.6	47.2%
	GT 3hs/1ac	16,195.1	14.1%
	Total	115,066.8	

Source: Southern Wildfire Risk Assessment

Figure B.5 depicts the WUI for the City of Raleigh. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure B.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure B.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

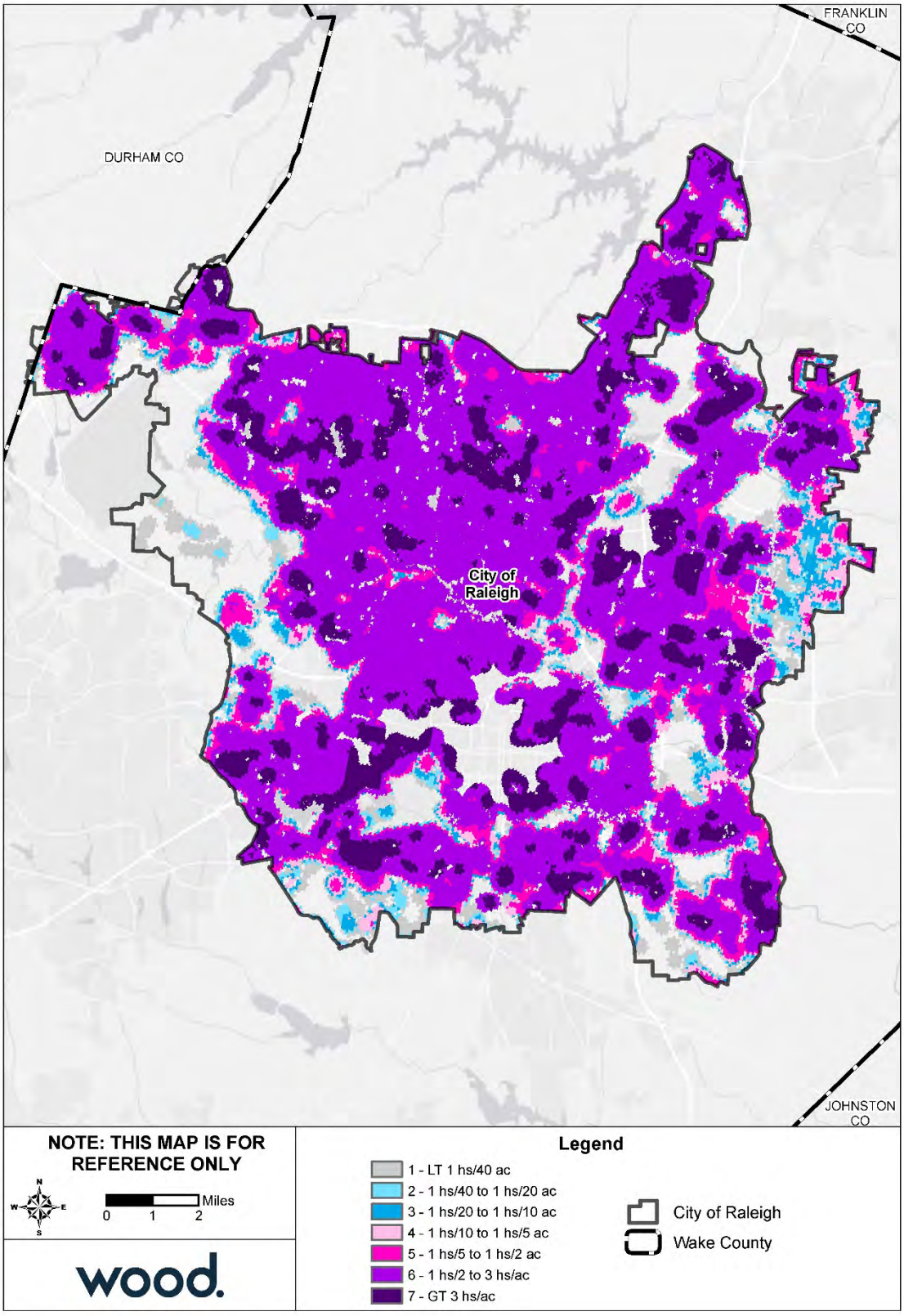
Potential fire intensity is highest on the western border of the City of Raleigh; however, this area has lower burn probability and is largely outside of the WUI, meaning little to no development is at risk. The City of Raleigh overall has relatively low burn probability – the highest being in the southwest, although much of this area is outside of the WUI.

Table B.16 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector at risk to wildfire hazard.

Table B.16 – Critical Facilities Exposed to Wildfire, City of Raleigh

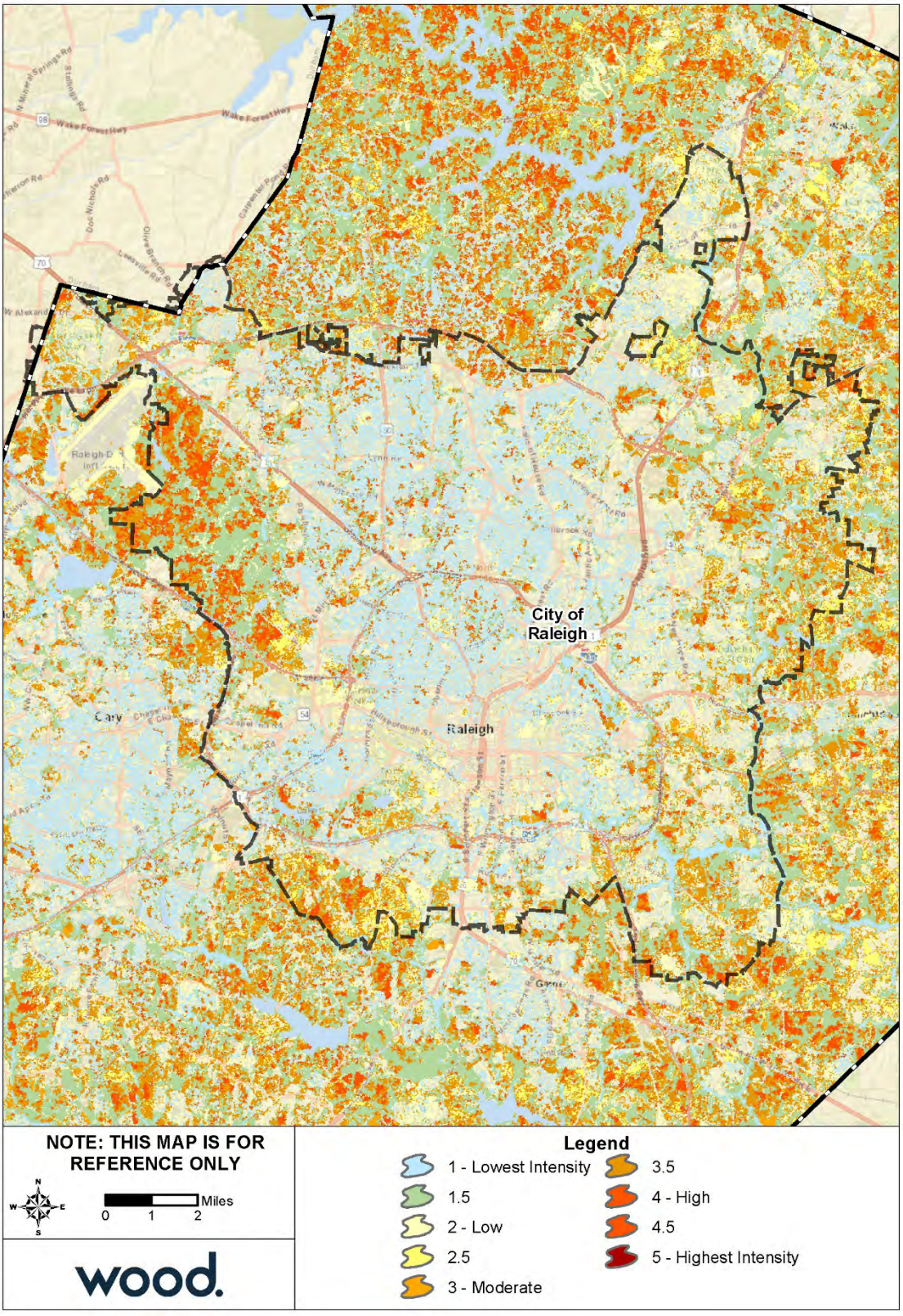
Sector	Event	Number of Buildings at Risk	Estimated Damages
Transportation Systems	Wildfire Hazard	2	$381,965
All Categories	**Wildfire Hazard**	**2**	**$381,965**

Figure B.5 – Wildland Urban Interface, City of Raleigh



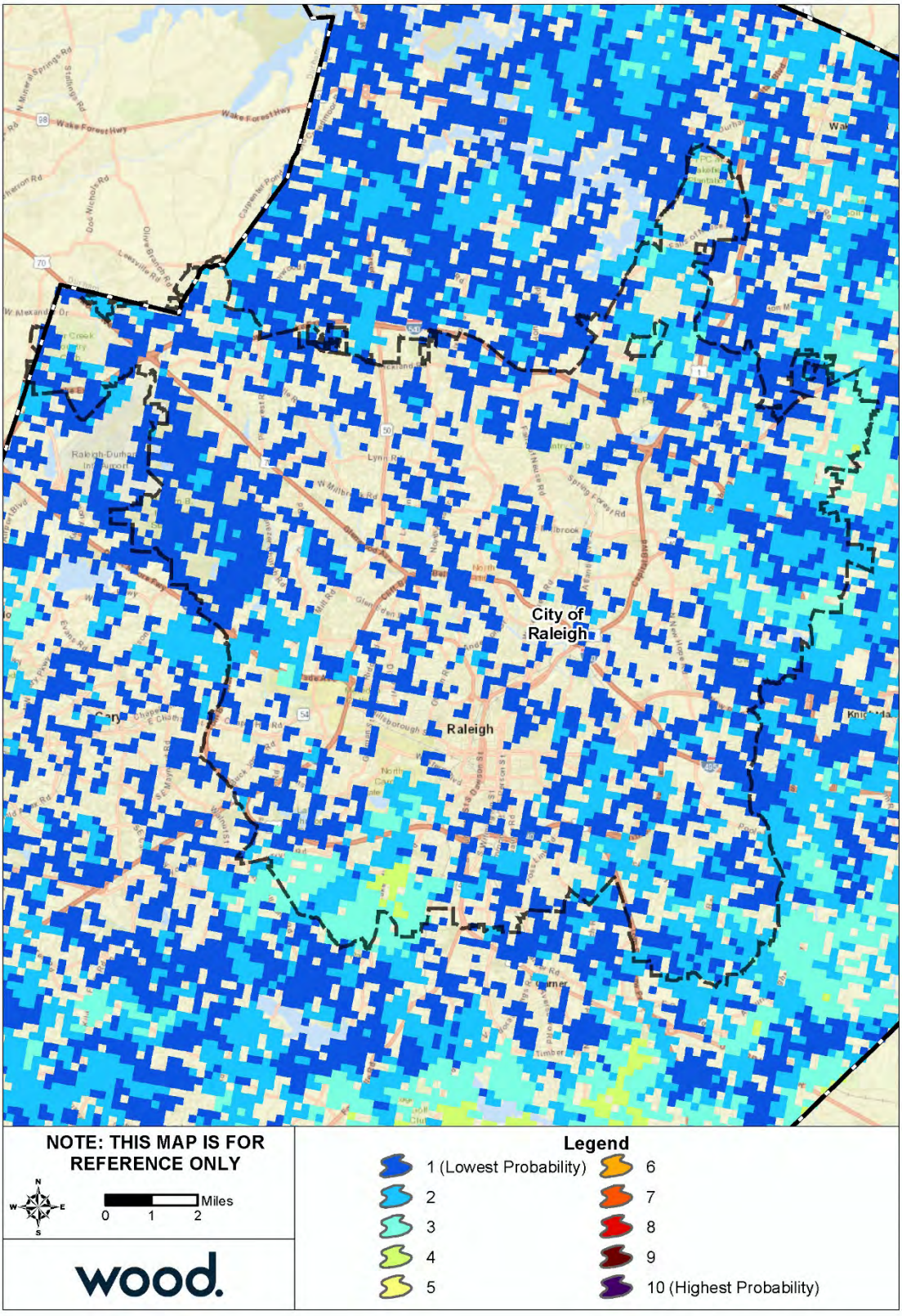
Source: Southern Wildfire Risk Assessment

Figure B.6 – Fire Intensity Scale, City of Raleigh



Source: Southern Wildfire Risk Assessment

Figure B.7 – Burn Probability, City of Raleigh



Source: Southern Wildfire Risk Assessment

B.4 CAPABILITY ASSESSMENT

B.4.1 Overall Capability

Details on the tools and resources in place and available to the City of Raleigh were provided by the City's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Raleigh has an overall capability rating of High. The City's Self-Assessment of key capability areas is summarized in Table B.17 below.

Table B.17 – Capability Self-Assessment, Raleigh

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	High
Fiscal Capability	High
Education and Outreach Capability	High
Mitigation Capability	High
Political Capability	High
Overall Capability	High

B.4.2 Floodplain Management

The City of Raleigh joined the NFIP emergency program in 1973 and has been a regular participant in the NFIP since August 1978. The following tables reflect NFIP policy and claims data for the City categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table B.18 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	1,452	$778,623	$398,477,500	443	$5,223,294.75
2-4 Family	78	$54,834	$12,871,300	69	$2,068,949.87
All Other Residential	246	$336,722	$68,078,200	97	$3,804,074.58
Non-Residential	169	$665,212	$72,437,400	245	$12,440,828.93
Total	1,945	$1,835,391	$551,864,400	854	$23,537,148.13

Source: FEMA Community Information System, accessed November 2018

Table B.19 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	762	$1,317,146	$215,609,800	552	$17,138,041.13
A Zones	14	$13,926	$2,421,900	19	$902,450.88
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
B, C & X Zone					
Standard	79	$97,728	$17,072,700	110	$3,994,871.47
Preferred	1,090	$406,591	$316,760,000	130	$1,347,167.04
Total	1,945	$1,835,391	$551,864,400	811	$23,382,530.52

Source: FEMA Community Information System, accessed November 2018

Table B.20 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	259	$911,803	$70,492,500	452	$15,857,154.78
A Zones	1	$1,497	$250,000	14	$655,980.79
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	342	$157,915	$96,763,900	150	$2,964,790.14
Standard	24	$34,624	$4,763,900	62	$1,964,515.02
Preferred	318	$123,291	$92,000,000	88	$1,000,275.12
Total	602	$1,071,215	$167,506,400	616	$19,477,925.71

Source: FEMA Community Information System, accessed November 2018

Table B.21 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	503	$405,343	$145,117,300	98	$1,270,586.35
A Zones	13	$12,429	$2,171,900	5	$246,470.09
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	827	$346,404	$237,068,800	90	$2,377,248.37
Standard	55	$63,104	$12,308,800	48	$2,030,356.45
Preferred	772	$283,300	$224,760,000	42	$346,891.92
Total	1,343	$764,176	$384,358,000	193	$3,894,304.81

Source: FEMA Community Information System, accessed November 2018

B.5 MITIGATION STRATEGY

City of Raleigh											
Action #	Description	Goal	Objective	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
Prevention											
P-1	Establish a Lake Preservation Policy that encourages private property owners to preserve existing lakes and ponds, and in certain circumstances provides for public assistance.	4	1	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local	1 year	In-Progress – Carry Forward	City Stormwater has also worked with the Stormwater Management Advisory Commission to develop recommendations to further enhance the lake preservation program. It is anticipated that the revised program will be considered by City Council during calendar year 2019. Enhancements would include the continued ability to restore and upgrade dams and spillways associated with safety improvements as well as removal of dams to protect safety and restore natural conditions
P-2	Develop ongoing multi-year program of detailed basin studies for each watershed in City's jurisdiction. Fifteen basin studies are complete with 10 additional studies budgeted in the capital program. (CRS 410).	2	2	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local	1 year	In-Progress – Carry Forward	City Stormwater is currently working on an Integrated Stormwater Management Master Plan. Basin studies will be reviewed and updated as needed with further improvement needs and opportunities identified and prioritized. Reduction of flooding hazards remains a key priority for improvement projects.
P-3	Planning Commission to consider program to develop future conditions floodplain mapping for all FEMA mapped areas (this is already done for non-FEMA mapped areas). The program would consist of a multi-year capital program for mapping for all FEMA streams in the ETJ and consideration of changes to development regulations in these areas. Future conditions would be based on expected development per the Comprehensive Plan and zoning maps.	4	2	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local	3-5 years	In-Progress – Carry Forward	The preliminary maps that have all FEMA floodplain in the city studied for future conditions. Our ordinance is already set up to enforce these areas. Once the maps are effective this effort will be complete.
P-4	Reallocation of Falls Lake water conservation pool; increased available storage for water supply by 4.1B gallons	2	1	Drought	High	Public Utilities Department	No cost	N/A	Ongoing - Next 5 years	New	N/A
P-5	Implementation of a regional mutual aid contract between local water utilities which would describe how the utilities would provide assistance if a partner utility experienced a water shortage	2	2	Drought	High	Public Utilities Department	Variable - depends on volume of water transferred between systems	Public Utilities Dept	Ongoing - Next 5 years	New	N/A
P-6	Develop a written Resiliency Plan for City of Raleigh operations and services, including infrastructure resilience, community resilience, ecosystem resilience and governance resilience.	4	1	All	High	Office of Sustainability	Less than $100,000	Unknown	2-3 years	New	N/A
P-7	Water Shortage Response Plan which uses a hydrologic model (OASIS) to establish risk based drought triggers that are designed to reduce water demand before severe drought conditions and also when to exit drought triggers when conditions improve.	2	2	Drought	Moderate	Public Utilities Department	No cost	N/A	Ongoing - Next 5 years	New	N/A
P-8	Update and maintain GIS data of building footprints, parcels, and critical facilities, and use it to regularly identify buildings in need of mitigation.	2	2	All	Moderate	Raleigh Information Technology, GIS staff	Staff time	Local	Ongoing - Next 5 years	New	Updated data will be used in future plan updates and risk assessments and to identify properties that should be prioritized for mitigation.
Property Protection											
PP-1	Develop ongoing program designed to utilize Federal grant resources to assist private property owners in relocating existing structures out of flood hazard zones. (CRS 500/510/520)	3	2	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local, Federal	3-5 years	In-Progress – Carry Forward	The city is cataloging potential candidates for relocation based on our current repetitive loss list. Staff has developed a scoring system based on cost benefit for relocation.

City of Raleigh											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
PP-2	Develop an ongoing program designed to utilize Federal grant resources to assist private property owners in elevating existing structures located within flood hazard zones. (CRS 510/530)	3	2	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local, Federal	3-5 years	In-Progress – Carry Forward	To further this initiative, the city is cataloging potential candidates for relocation based on our current repetitive loss list. Staff has developed a scoring system based on cost benefit for relocation that would compare the projects to relocation and retrofits.
PP-3	Develop an ongoing program designed to utilize Federal grant resources to assist private property owners in renovating and retrofitting existing structures in flood hazard zones to reduce vulnerability to flooding damage.	3	2	Flood	Moderate	Raleigh Engineering Services	$100,000 - $1m	Local, Federal	Ongoing – next 5 years	In-Progress – Carry Forward	City staff evaluates potential candidates and approaches property owners for mitigation help.
PP-4	Program to install emergency electrical generators at all public utility facilities. Current focus on redundant generators at critical facilities, second fuel truck and completion of 100% generator coverage in Garner area.	3	1	All	High	Raleigh Public Utilities	$100,000 - $1m	Local	2-3 years	In-Progress – Carry Forward	We now have emergency backup power generators at all our critical facilities except for our South Raleigh Operations Facility. However, we can relocate supplies, material and teams to any of our other facilities per our emergency operational planning. Also, per our Hurricane Florence AAR we are conducting emergency fuel capacity studies for our generators at our largest wastewater treatment plant and both our water treatment plants. A fuel truck is not in the works but we have emergency fuel contracts with Red Star and also exploring dual use of natural gas to power some of our energy resiliency to give us an added layer.
Structural Projects											
SP-1	Install cameras in flood prone areas throughout the City of Raleigh to allow us to view these locations and make informed decisions as it relates to flooding	2	2	Flood, Hurricane	Moderate	City of Raleigh Transportation	$100,000 to $1m	Unknown	3-5 years	New	N/A
Emergency Services											
ES-1	Provide and enhance technical rescue capabilities more equitably throughout the City.	2	1	Dam Failure, Flood, Hurricane, Severe Weather, Severe Winter Storm, Tornado, Wildfire	High	Raleigh Fire	$100,000 - $1m	Local	2-3 years	In-Progress – Carry Forward	We continually look at our technical rescue capabilities and adjust as needed. The initiative to add 1 Heavy Rescue and 2 Squads has been completed. Additionally, we've added 1 company (12 personnel) to the team, upgraded water rescue equipment, increased water rescue certified personnel from 20 to 60, required 100% of members be Technical Rescuer and Vehicle Extrication certified and are working toward 100% certification for all members in all the other technical rescue disciplines.
ES-2	Provide after-action report of emergency response to severe weather events in order to improve planning for future disasters.	2	2	Hurricane, Severe Weather, Severe Winter Storm, Tornado	High	Raleigh Fire and Emergency Management	$100,000 - $1m	Local	Ongoing- Post Event	In-Progress – Carry Forward	After-action report made for Hurricane Florence and will continue to be made for all subsequent weather events.
ES-3	Maintain a standard operating guideline to direct operational planning prior to anticipated weather emergencies.	2	1	All	High	Raleigh Fire and Emergency Management	$100,000 - $1m	Local	Ongoing – next 5 years	In-Progress – Carry Forward	The City's Emergency Operation Plan outlines our standard operating guidelines and has been adopted as an official document used prior to and during weather emergencies.
ES-4	Design GIS programming capable of providing real-time data to emergency managers and historic data for future emergency response planning.	2	2	All	High	Raleigh City Manager and Information Technology	$100,000 - $1m	Local	3-5 year	In-Progress – Carry Forward	The IT Department led a citywide effort to develop a Situational Analysis Smart Dashboard for the Emergency Operations Center and refined it in real time as new types of data, such as current wind speed, were identified as critical to the safety of the public and city workers during an emergency. The Smart Dashboard was first deployed for Hurricane Florence. The dashboard is cross-departmental, with real-time progress tracking, covering a range of emergency management issues from debris in streets and closures, malfunctioning traffic signals, flood monitoring and 911 call data.

City of Raleigh											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
ES-5	Continue to conduct disaster tabletop exercise program.	2	1	All	Low	Raleigh Public Utilities, Fire, Police, City Manager, Emergency Management, and Engineering Services	$100,000 - $1m	Local	Ongoing – next 5 years	In-Progress – Carry Forward	Tabletop disaster exercises continue to occur with all EOC partners prior to the anticipated peak of hurricane season. These trainings take place each year to ensure staff are comfortable in their EOC roles and to handle staff turnover.
ES-6	Establish cross-functional team to develop Debris Management Plan. Team should work to identify and prepare additional debris management sites.	2	1	Flood, Tornado, Earthquake, Severe Winter Storm, Severe Weather, Hurricane	Moderate	City of Raleigh Transportation	$100,000	FEMA, City of Raleigh general fund support	1 year	New	N/A
Public Education and Awareness											
PEA-1	Utilize existing Everbridge advisory software to issue Heat Advisory Alerts targeted to vulnerable neighborhoods	1	2	Extreme Heat	High	Communications/ Sustainability	Less than $100,000	COR Operating Funds	2-3 years	New	N/A

Annex C Town of Apex

C.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Apex.

Table C.1 – HMPC Members

Agency	Representative	Position or Title
Planning Department	Shelly Mayo	Planner
Planning Department	Dianne Khin	Planning Director
N/A	Jim Scarborough	Citizen Stakeholder

C.2 COMMUNITY PROFILE

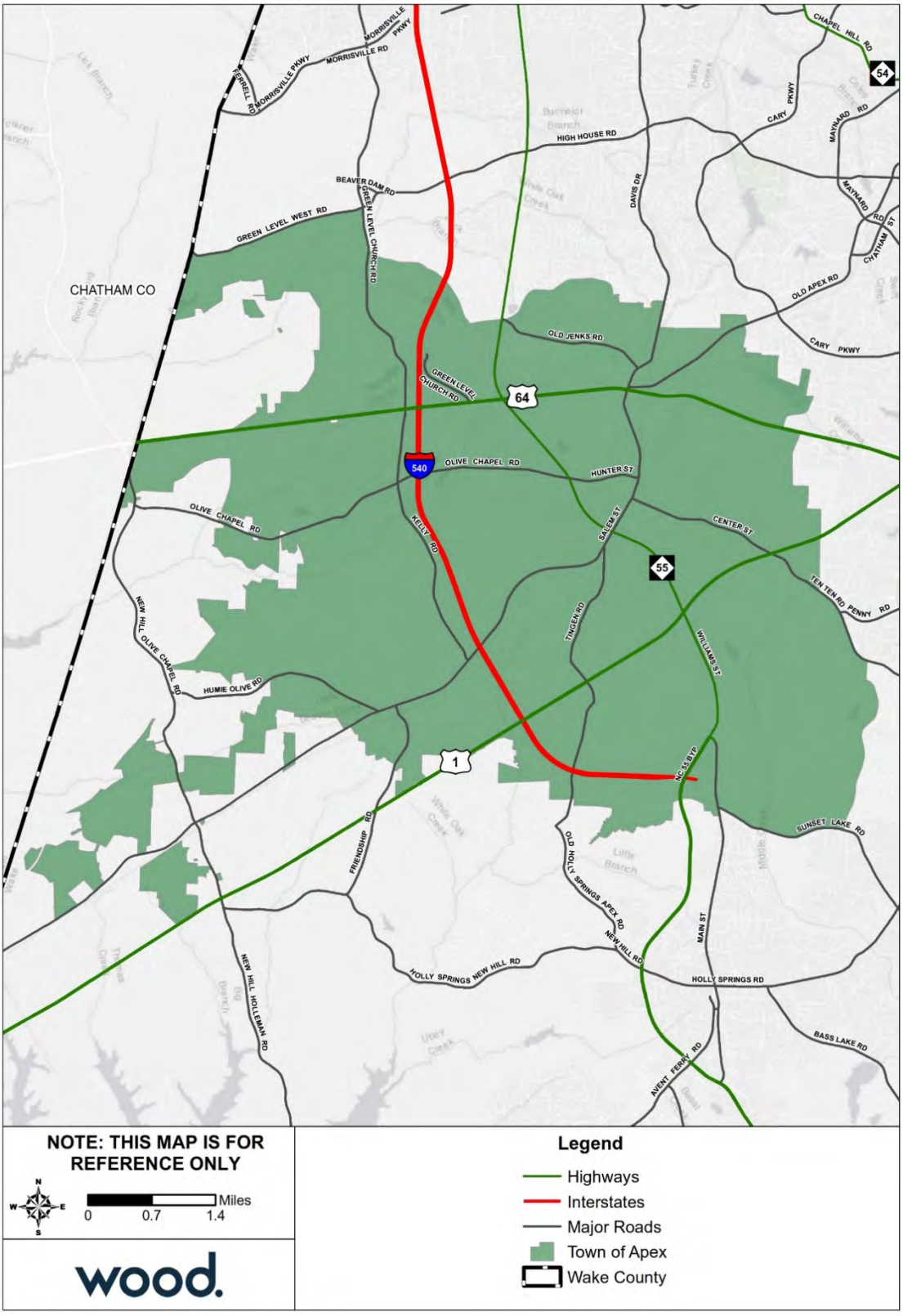
Geography

The Town of Apex is located in southwestern Wake County. It is neighbored by Cary to the north and northeast and Holly springs to the south. The Town is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Apex comprises a total land area of 23.4 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 2,695 acres of wetlands in Apex.

Figure C.1 shows a base map of the major transportation routes in the Town of Apex.

Figure C.1 – Major Transportation Routes, Town of Apex



Source: Wake County GIS Open Data

Population and Demographics

Table C.2 provides population counts and growth estimates for the Town of Apex as compared to the County overall. Table C.3 provides demographic information for Raleigh as compared to the whole County.

Table C.2 – Population Counts, Apex, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Apex	20,212	37,476	45,899	8,423	22.5%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates

Table C.3 – Racial Demographics, Apex, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Apex	79.3%	8.6%	7.4%	1.5%	2.9%	7.3%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates
*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Apex in order to estimate the total physical exposure to hazards in the jurisdiction. The locations of critical facilities are shown in Figure C.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted.

Table C.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Apex	75	14	0	302	0	225	1	91	27	0	0	0	0	59	0	2	0	0	**796**

Source: NCEM Risk Management Tool

Table C.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Apex	71	76	50	19	0	16	0	0	**232**

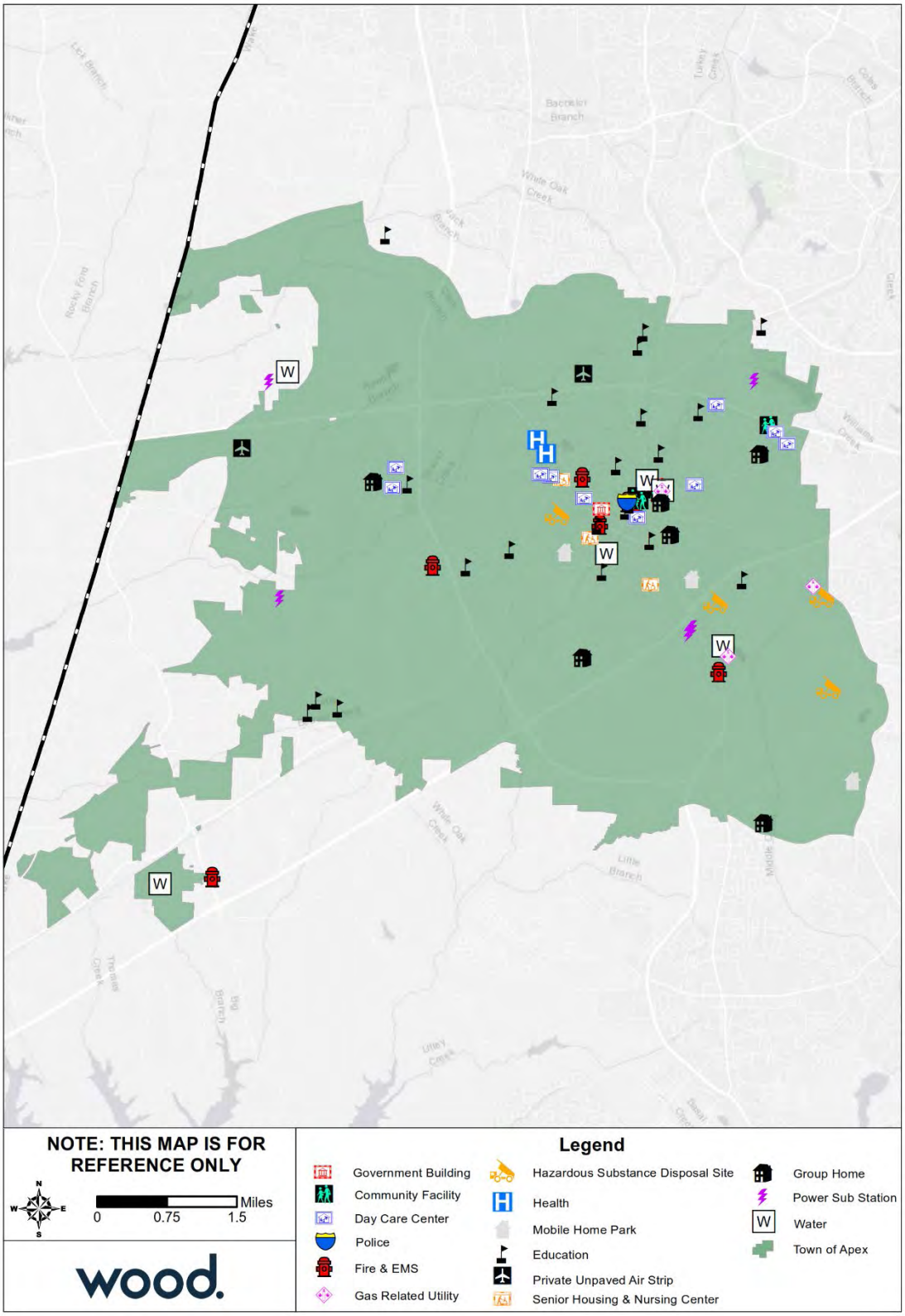
Source: NCEM Risk Management Tool

To supplement the NCEM IRISK database information on critical facilities and account for significant new development, the Town of Apex provided GIS datasets on critical facilities, schools, and other key assets. The additional facilities not already accounted for in Table C.4 are listed below. These facilities are displayed in Figure C.2 along with those identified in IRISK.

Table C.6 – Supplemental Critical Facilities List

Facility Type	Count
Community Facility	4
Day Care Center	10
Electrical Substation	5
Fire/Police/EMS	6
Gas Pressure Station	1
Gas Terminal	2
Government Building	1
Group Home	6
Hazardous Substance Disposal Site	4
Health Facility	1
Hospital	1
Mobile Home Park	3
Preschool	3
Private Unpaved Air Strip	2
School	10
Senior Housing/Nursing Center	3
Water Facility	6
Grand Total	**68**

Figure C.2 – Critical Facilities, Town of Apex



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Apex, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table C.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table C.7 – Parcels Developed 2011 or Later, Town of Apex

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	5	$2,500,898
Agriculture	1	$196,703
Apartment	7	$93,911,496
Commercial	34	$76,087,487
Condo Complex	7	-
EXEMPT	14	$112,104,783
HOA	10	-
Industrial	16	$19,628,010
Part Exempt	36	$9,941,184
Residential Less Than 10 Acres	4,885	$1,391,100,016
Vacant	2	-
Grand Total	**5,011**	**$1,705,470,577**

Source: Wake County Open Data; retrieved April 8, 2019

There are seven listings on the National Register of Historic Places for the Town of Apex, including three historic districts. These sites are listed in the table below.

Table C.8 – Historic Properties

Ref#	Property Name	Status Date	Category	City
85003077	The Halle Building (f.k.a Historic Apex Town Hall)	12/5/1985	Building	Apex
88002697	Apex Union Depot	12/1/1988	Building	Apex
94000185	Apex Historic District	3/17/1994	District	Apex
95000210	Apex Historic District (Boundary Increase)	3/10/1995	District	Apex
02000016	Apex Historic District (Boundary Increase)	2/14/2002	District	Apex
07001502	Apex Historic District (Boundary Increase II)	1/31/2008	District	Apex
08000937	Lawrence, Calvin Wray, House	9/23/2008	Building	Apex

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The table below details key housing statistics for Apex as compared to the County overall.

Table C.9 – Housing Statistics, Apex, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Apex	13,922	16,883	21.3%	68.9%	4.2%	$289,300

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Apex as compared to the County overall.

Table C.10 – Employment Statistics, Apex, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Apex	25,403	72.5	3.0	24.5	3.9

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table C.11 – Percent of Employed Population by Occupation, Apex, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Apex	57.2	11.4	22.6	4.8	4.0

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

C.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Apex than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

C.3.1 Flood

Table C.11 details the acreage of the Town of Apex total area by flood zone on the effective DFIRM. Per this assessment, over 4 percent of the Town of Apex falls within the mapped 1%-annual-chance floodplains.

Table C.12– Flood Zone Acreage in the Town of Apex

Flood Zone	Acreage	Percent of Total (%)
Zone A	15.59	0.07
Zone AE	995.67	4.22
Zone X (500-year)	27.7	0.12
Zone X Unshaded	22,556.33	95.60
Total	**23,595.29**	**--**

Source: FEMA Effective DFIRM; Wake County GIS

Figure C.3 reflects the effective mapped flood hazard zones for the Town of Apex, and Figure C.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in the Town of Apex, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly

developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

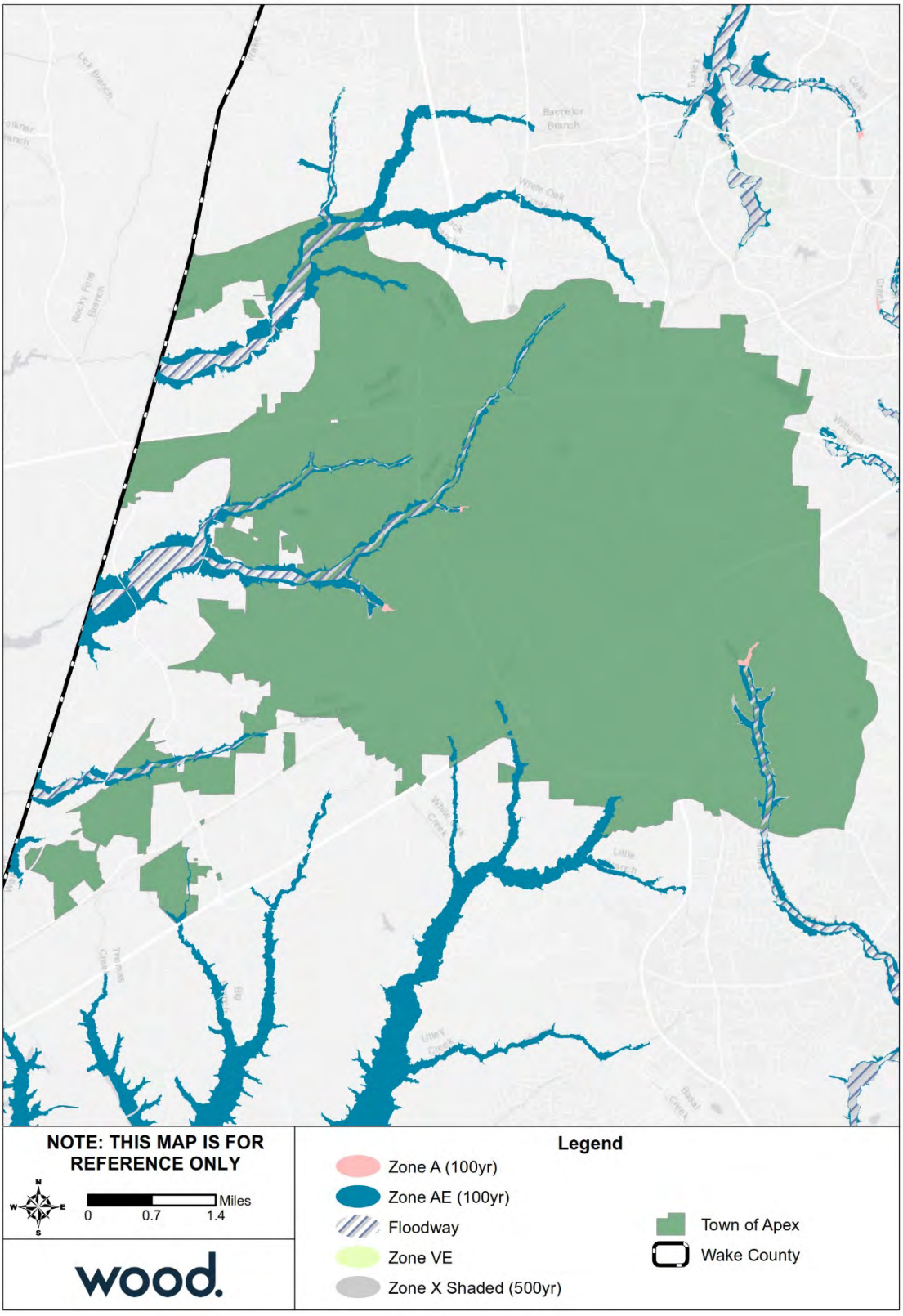
Table C.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table C.13 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain, Town of Apex

Land Class	Number of Parcels	Sum of Building Value
Commercial	1	$10,465,559
EXEMPT	3	$3,428,276
Residential Less Than 10 Acres	12	$4,645,437
Grand Total	**16**	**$18,539,272**

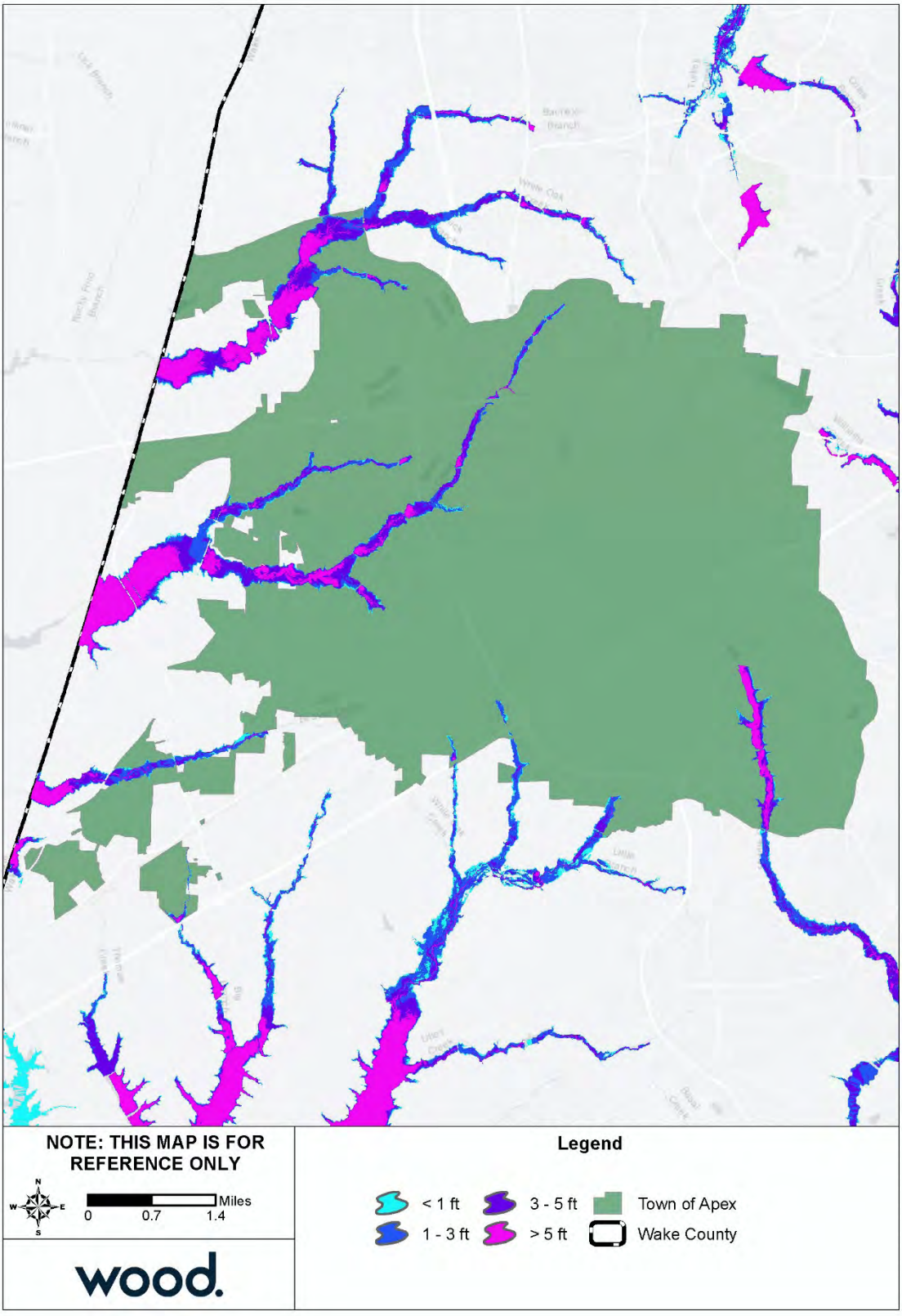
Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Figure C.3 – FEMA Flood Hazard Areas, Town of Apex



Source: FEMA Effective DFIRM

Figure C.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Apex



Source: FEMA Effective DFIRM

C.3.2 Wildfire

Table C.13 summarizes the acreage in the Town of Apex that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 17 percent of the Town of Apex is not included in the WUI.

Table C.14 – Wildland Urban Interface Acreage, Town of Apex

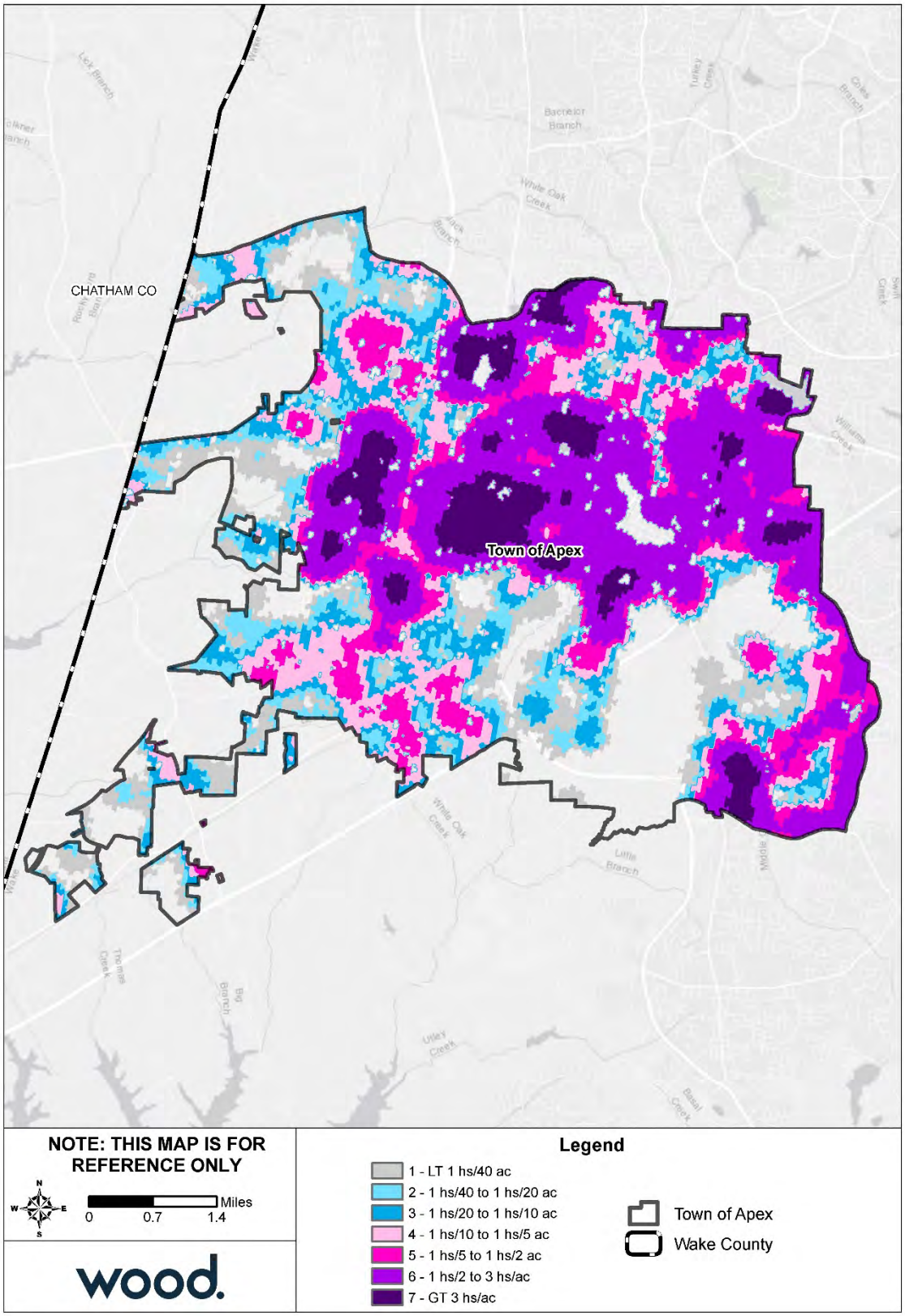
	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*4,230.0*	*17.9%*
	LT 1hs/40ac	2,393.3	10.1%
	1hs/40ac to 1hs/20ac	1,859.2	7.9%
	1hs/20ac to 1hs/10ac	2,299.7	9.7%
	1hs/10ac to 1hs/5ac	2,589.9	11%
	1hs/5ac to 1hs/2ac	2,664.6	11.3%
	1hs/2ac to 3hs/1ac	5,829.0	24.7%
	GT 3hs/1ac	1,721.8	7.3%
	Total	23,587.5	

Source: Southern Wildfire Risk Assessment

Table C.5 depicts the WUI for unincorporated Wake County. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure A.7 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure C.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

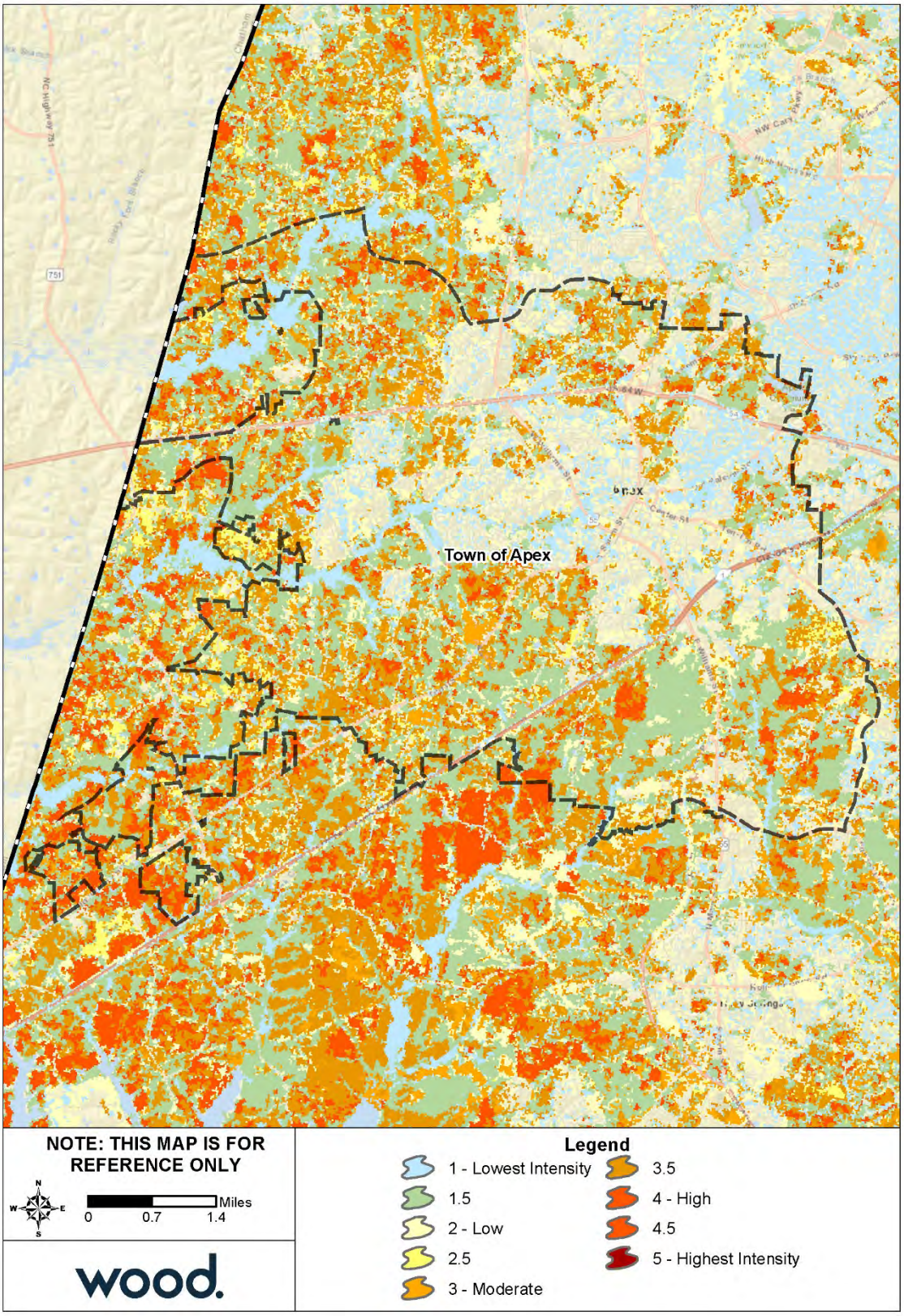
Potential fire intensity is highest in southeast part of the Town of Apex; however, these areas, as with much of the town, have lower burn. Much of the most densely developed area in the WUI have low to moderate fire intensity.

Figure C.5 – Wildland Urban Interface, Town of Apex



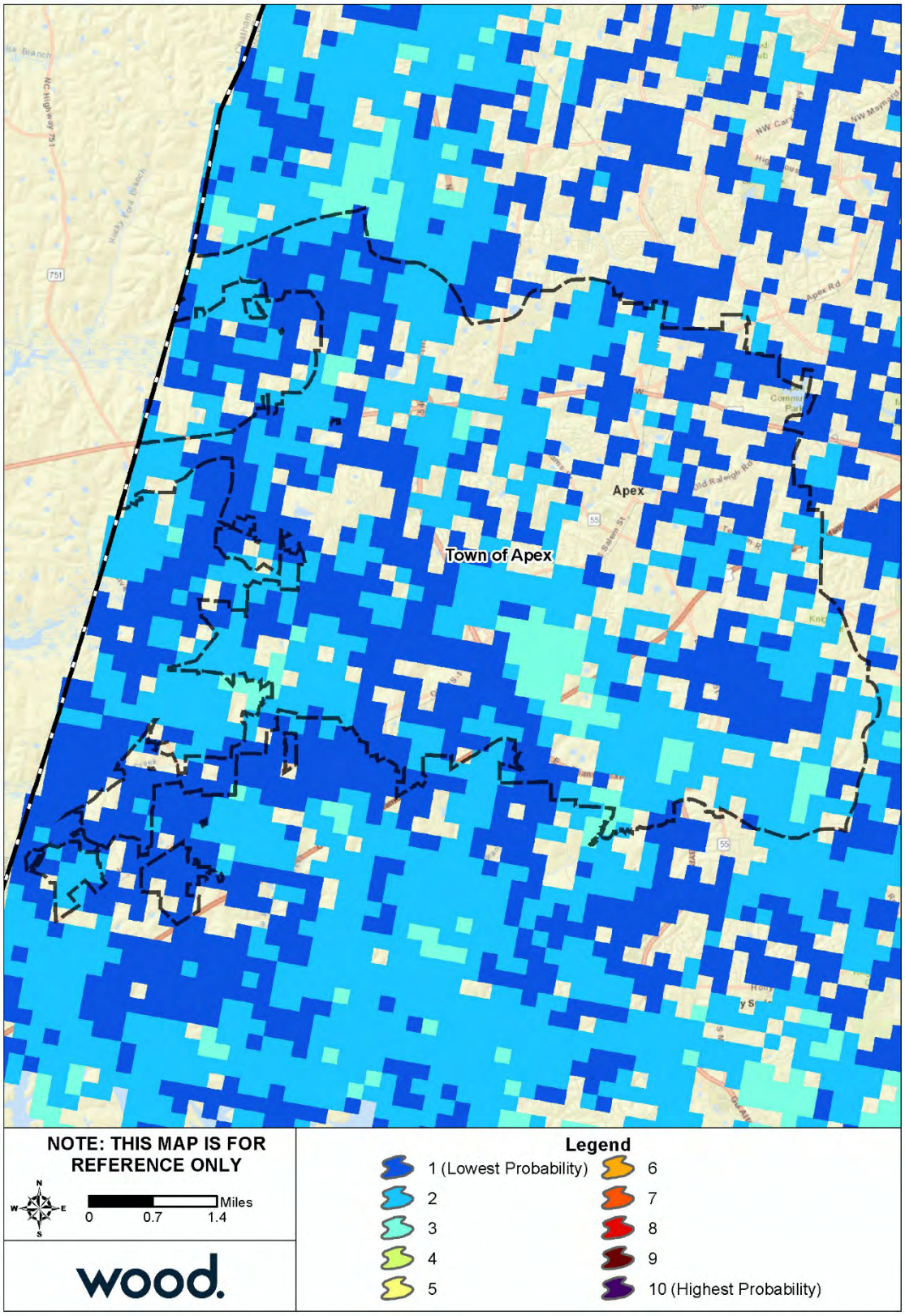
Source: Southern Wildfire Risk Assessment

Figure C.6 – Fire Intensity Scale, Town of Apex



Source: Southern Wildfire Risk Assessment

Figure C.7 – Burn Probability, Town of Apex



Source: Southern Wildfire Risk Assessment

C.4 CAPABILITY ASSESSMENT

C.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Apex were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Apex has an overall capability rating of High. The Town's Self-Assessment of key capability areas is summarized in Table C.14 below.

Table C.15 – Capability Self-Assessment, Apex

Capability Area	Rating
Plans, Ordinances, Codes and Programs	Moderate
Administrative and Technical Capability	High
Fiscal Capability	High
Education and Outreach Capability	Limited
Mitigation Capability	High
Political Capability	High
Overall Capability	High

C.4.2 Floodplain Management

The Town of Apex joined the NFIP as a regular participant in March 1992. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table C.16 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	106	$42,257	$30,943,000	1	$1,299.97
2-4 Family	2	$555	$400,000	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	3	$5,991	$1,600,000	0	$0.00
Total	111	$48,803	$32,943,000	1	$1,299.97

Source: FEMA Community Information System, accessed November 2018

Table C.17 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	15	$8,790	$4,269,000	0	$0.00
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone					

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Standard	2	$4,031	$750,000	0	$0.00
Preferred	94	$35,982	$27,924,000	1	$1,299.97
Total	111	$48,803	$32,943,000	1	$1,299.97

Source: FEMA Community Information System, accessed November 2018

Table C.18 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	0	$0	$0	0	$0.00
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	9	$2,607	$1,665,000	0	$0.00
Standard	0	$0	$0	0	$0.00
Preferred	9	$2,607	$1,665,000	0	$0.00
Total	9	$2,607	$1,665,000	0	$0.00

Source: FEMA Community Information System, accessed November 2018

Table C.19 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	15	$8,790	$4,269,000	0	$0.00
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	87	$37,406	$27,009,000	1	$1,299.97
Standard	2	$4,031	$750,000	0	$0.00
Preferred	85	$33,375	$26,259,000	1	$1,299.97
Total	102	$46,196	$31,278,000	1	$1,299.97

Source: FEMA Community Information System, accessed November 2018

C.5 MITIGATION STRATEGY

Town of Apex											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Revise and update the regulatory floodplain boundary, including flood studies.	2	2	Flood	Moderate	Public Works & Transportation (Floodplain Administrator)	Staff Time	Town Funds	Ongoing - Next 5 years	In-Progress – Carry Forward	Action revised.
P-2	Develop an environmental committee that meets regularly to discuss issues and recommend projects.	2	2	All Hazards	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	Staff Time	Town Funds	Ongoing - Next 5 years	In-Progress – Carry Forward	The Town Council's Environmental committee has been established and meets approximately every 2 months
P-3	Encourage the use of Low Impact Development techniques.	4	2	Flood, Landslide, Drought, Hurricane, Extreme Heat	Low	Water Resources (Stormwater and Utility Engineering Manager)	Staff Time	Town Funds	Ongoing - Next 5 years	In-Progress – Carry Forward	Ongoing activity that has seen more results in last 5 years and will continue to be prioritized.
P-4	Use system development fees to help fund public projects	3	2	Flood, Wildfire, Tornado, Severe Winter Storm, Severe Weather, Drought, Hurricane	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	Unknown	Local Development Fees	3-5 years	In-Progress – Carry Forward	Action revised.
P-5	Update the UDO & Design and Development Manual to incorporate proper species selection and practices for planting and maintenance into the landscape ordinance.	4	1	Flood, Severe Winter Storm, Severe Weather, Drought, Hurricane	Moderate	Planning Dept.	Staff Time	Local	2-3 years	In-Progress – Carry Forward	Action revised.
P-6	Incorporate GIS data and risk analysis into the development review process.	4	2	All	Moderate	Fire Dept. & Planning Dept.	Staff Time	Local	Ongoing - Next 5 years	In-Progress – Carry Forward	Action revised.
P-7	Create a Stormwater Utility to fund the Town's Stormwater Program.	2	2	Flood	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	$100,000	Local	2-3 years	New	Implement: 2021
P-8	Continue to use "Neighbors Helping Neighbors" program to help low income Apex Utility customers pay their utility bills.	3	2	Extreme Heat, Severe Winter Storm	Moderate	Finance Dept/Western Wake Crisis Ministry	None	Local	Ongoing - Next 5 years	New	Has been in use for years but is just now being recognized as contributing towards mitigating impacts of high heat and cold weather.
P-9	Salt local roads before Severe Winter Storm & plow after snow and ice fall.	3	2	Severe Winter Storm	Moderate	Public Works & Transportation		Local	Ongoing - Next 5 years	New	On-going activity that is just now being added as mitigation for Severe Winter Storms.
Property Protection											
PP-1	Adopt and enforce the Fire Prevention Code.	4	1	Wildfire, Hazardous Materials Incident	Moderate	Fire Department	Staff Time	Local	Ongoing - Next 5 years	New	N/A
PP-2	Annually update the comprehensive occupancy pre-plan program with local data for use in risk analysis.	4	2	Flood, Wildfire, Hazardous Materials Incident, Radiological Emergency	Moderate	Fire Department	Staff Time	Local	Ongoing - Next 5 years	In-Progress – Carry Forward	Action revised.
PP-3	Restore streams to slow the speed of water and reduce erosion to prevent both private property loss and public infrastructure damage.	3	2	Flood	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	Over $500,000	Local & Federal	Ongoing - Next 5 years	New	N/A
Natural Resource Protection											
NRP-1	Middle Creek Greenway (Miramonte to Holly Springs).	3	2	All	Moderate	Apex Parks and Recreation	$2,870,000	Local	3-5 years	In-Progress – Carry Forward	under construction
NRP-2	White Oak Creek Greenway.	3	2	Flood	Moderate	Apex Parks and Recreation	$284,000	Local	3-5 years	In-Progress – Carry Forward	under construction
NRP-3	During development review, ensure new development complies with floodplain development restrictions listed in UDO Section 6.2 Flood Damage Prevention Overlay District.	4	2	Flood	Moderate	Public Works and Transportation (Floodplain Administrator)	Staff Time	Local	Ongoing - Next 5 years	New	N/A

Town of Apex											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
NRP-4	During development review, ensure new development complies with UDO stream buffer standards.	4	2	Flood	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	Staff Time	Local	Ongoing - Next 5 years	New	N/A
NRP-5	During development review, ensure SCMs are designed in accordance with State criteria to safely pass 100-year storm.	4	2	Flood	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	Staff Time	Local	Ongoing - Next 5 years	New	N/A
Structural Projects											
SP-1	Improve communications abilities for emergency response by building new fiber optic internet infrastructure and replacing current radio systems.	2	1	All	Moderate	Police Dept	$915,000	Local	3-5 years	New	N/A
SP-2	Build Jessie Drive to connect TenTen Rd and NC-55. This will provide greater connectivity and make evacuation faster & safer.	3	2	All	Moderate	Public Works and Transportation	$6,000,000	Local	3-5 years	New	N/A
SP-3	Relocate Beaver Creek Sewer Line out of the creek.	3	2	Flood, Wildfire, Severe Winter Storm, Hurricane	Moderate	Water Resources (Stormwater and Utility Engineering Manager)	$1,500,000	Local	3-5 years	New	N/A
SP-4	Finish the Peakway loop road. Will provide greater connectivity, faster emergency response times, and make evacuation faster & safer.	3	2	All	High	Public Works and Transportation	$20,000,000	Local	More than 5 years	New	Design work is in progress
Emergency Services											
ES-1	Construct Fire Station #6	3	2	All Hazards	Moderate	Apex Fire	$4,175,000	Local	3-5 years	New	N/A
ES-2	Construct Fire Station #7	3	2	All Hazards	Moderate	Apex Fire	$4,000,000	Local	More than 5 years	New	N/A
ES-3	Relocate Fire Station #3 from its existing location because of the impacts of widening NC-55.	3	1	All Hazards	Moderate	Apex Fire	$4,000,000	Local	More than 5 years	New	N/A
ES-4	Keep Town website updated with information about Shearon Harris Siren Testing.	1	2	Radiological Incident	Moderate	Apex Public Information Officer	Staff Time	Local	Ongoing - Next 5 years	New	Ongoing activity that's just now being recognized for its mitigation potential
Public Education and Awareness											
PEA-1	Town website and utility billing announcing National Preparedness Month (September) reminding citizens to have a plan and be prepared.	1	1	All	Moderate	Administration (Communications Officer)	Less than $100,000	Local	Ongoing - Next 5 years	In-Progress – Carry Forward	On-going activity to be implemented annually
PEA-2	Include Environment Education Station and classroom at Nature Park.	1	1	All	Moderate	Apex Parks and Recreation	$1,000,000	Local	3-5 years	Not Started – Carry Forward	New target completion date is 2022
PEA-3	Post warning signage at local parks for lightning.	1	1	Severe Weather	Moderate	Apex Parks and Recreation	$100,000	Local	3-5 years	Not Started – Carry Forward	New implementation schedule is 3-5 years
PEA-4	Hand out hazard educational materials at Apex festivals.	1	1	All	Moderate	Planning Dept. & Water Resources	Less than $1,500	Local	Ongoing - Next 5 years	New	N/A
PEA-5	Use Social Media to inform residents about local hazards.	1	1	All	Moderate	Apex Public Information Officer & Planning Dept.	Staff Time	Local	Ongoing - Next 5 years	New	N/A

Annex D Town of Cary

D.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Cary.

Table D.1 – HMPC Members

Agency	Representative	Position or Title
Town Manager's Office	Emily Barrett	Sustainability Manager
Water Resources Department	Eric Kulz	Environmental Specialist
N/A	Tom Hegele	Citizen Stakeholder

D.2 COMMUNITY PROFILE

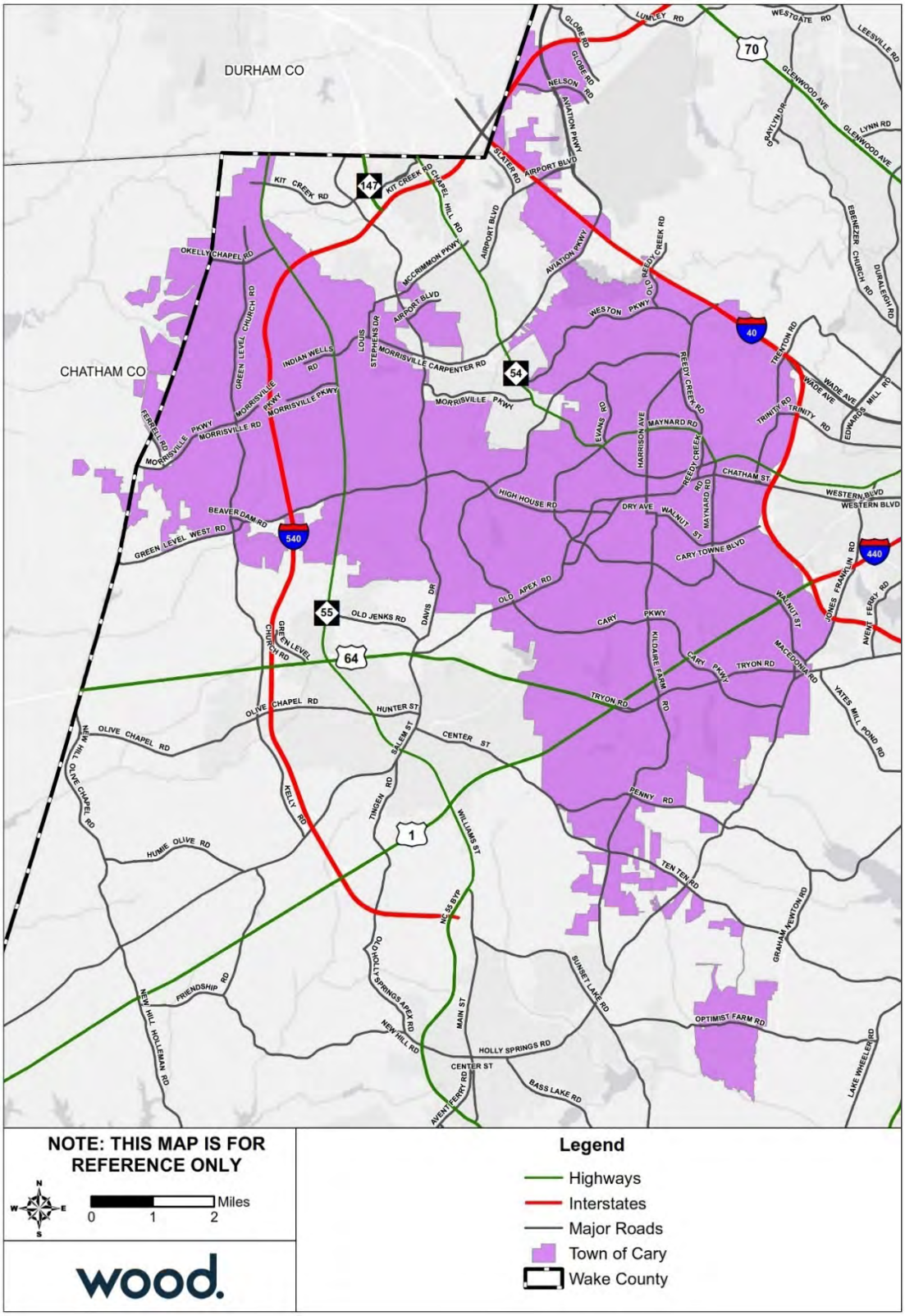
Geography

The Town of Cary is located in western Wake County. A small portion of the Town extends west into Chatham County. All statistics summarized in this section are for the entirety of the Town of Cary. It is neighbored by Apex and Holly Springs to the south, Raleigh to the north and east, Morrisville and RTP to the north and west, and Chatham County to the west. The Town is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Cary comprises a total land area of 54.3 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 3,375 acres of wetlands in Cary.

Figure D.1 shows a base map of the major transportation routes in the Town of Cary

Figure D.1 – Major Transportation Routes – Town of Cary



Source: Wake County GIS Open Data

Population and Demographics

Table D.2 provides population counts and growth estimates for the Town of Cary as compared to the County overall. Table D.3 provides demographic information for Cary as compared to the whole County.

Table D.2 – Population Counts, Cary, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Cary	94,536	135,234	159,715	24,481	18.1%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates
Note: The total population of Cary includes population residing in adjacent county.

Table D.3 – Racial Demographics, Cary, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Cary	69.9%	7.9%	16.8%	2.2%	2.8%	8.1%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates
*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Cary in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure D.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table D.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Cary	91	55	0	1,259	5	270	1	334	98	0	0	1	0	203	4	12	27	0	**2,360**

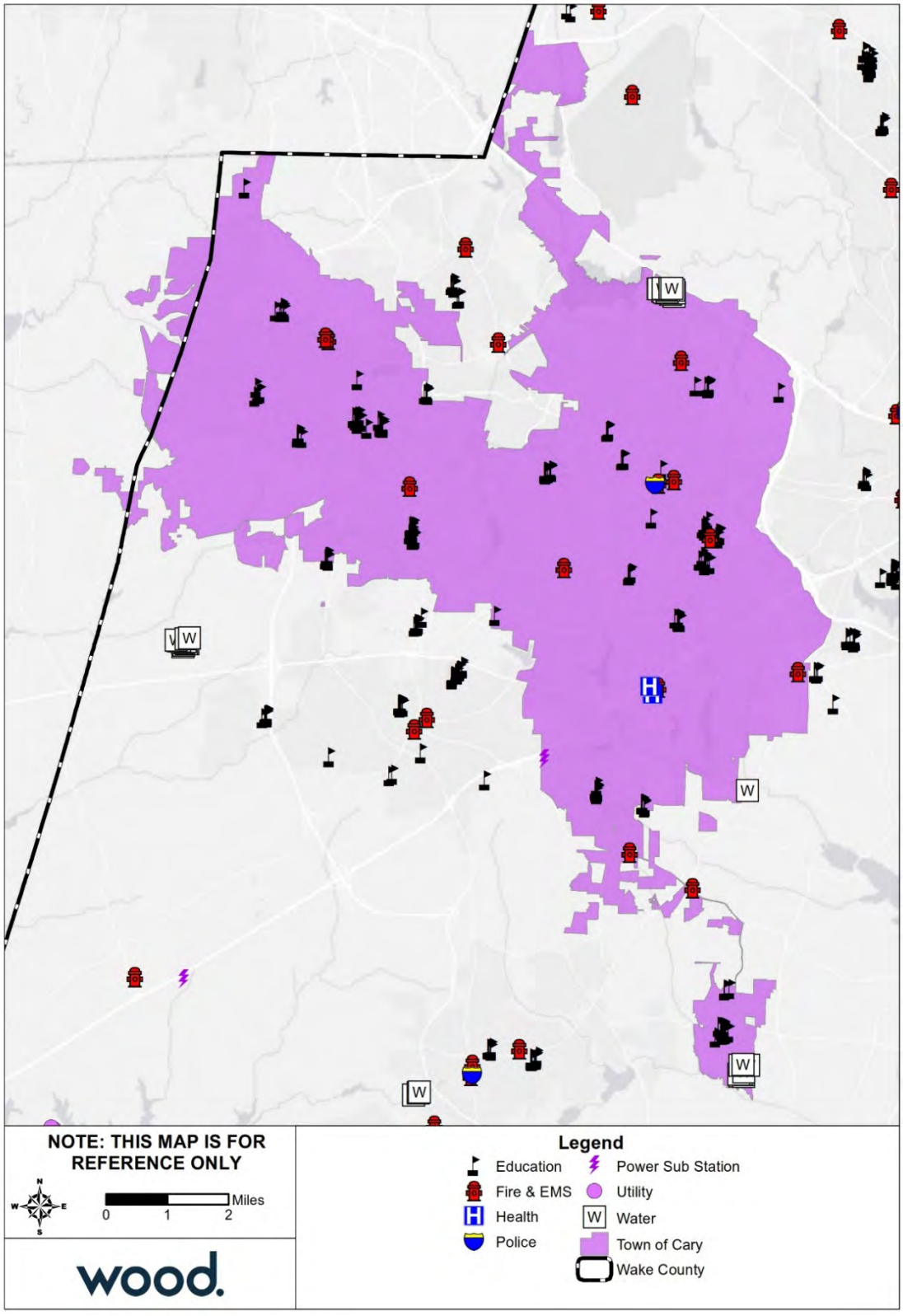
Source: NCEM Risk Management Tool

Table D.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Cary	437	519	65	87	0	48	26	0	**1,182**

Source: NCEM Risk Management Tool

Figure D.2 – Critical Facilities, Town of Cary



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Cary, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions. Table D.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table D.6 – Parcels Developed 2011 or Later

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	1	$382,654
Apartment	16	$427,896,601
Commercial	99	$549,618,033
Condo Complex	3	-
EXEMPT	13	$126,925,448
Forestry	1	$441,673
HOA	9	$137,300
Industrial	2	$6,713,793
Part Exempt	44	$78,060,753
Residential Less Than 10 Acres	7,062	$2,313,360,158
Retirement Home	1	$5,268,142
Grand Total	**7,251**	**$3,508,804,555**

Source: Wake County Open Data; retrieved April 8, 2019

There are seven listings on the National Register of Historic Places for the Town of Cary, including three historic districts. These sites are listed in the table below.

Table D.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
79003339	Page-Walker Hotel	5/29/1979	Building	Cary
84002540	Jones, Nancy, House	3/1/1984	Building	Cary
00000549	Carpenter Historic District	5/26/2000	District	Cary
01000340	Green Level Historic District	4/5/2001	District	Cary
01000425	Cary Historic District	4/25/2001	District	Cary
02000498	Utley--Council House	5/16/2002	Building	Cary
08000414	Ivey--Ellington House	5/15/2008	Building	Cary

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The table below details key housing statistics for Cary as compared to the County overall.

Table D.8 – Housing Statistics, Cary, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Cary	55,303	63,008	13.9%	66.0%	4.4%	$323,000

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Cary as compared to the County overall.

Table D.9 – Employment Statistics, Cary, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Cary	88,040	68.8	2.7	28.5	3.8

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table D.10 – Percent of Employed Population by Occupation, Cary, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Cary	61.8	10.4	19.7	3.9	4.3

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

D.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Cary than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

D.3.1 Flood

Table D.11 details the acreage of the Town of Cary total area by flood zone on the effective DFIRM. Per this assessment, over 7 percent of the Town of Cary falls within the mapped 1%-annual-chance floodplains.

Table D.11 – Flood Zone Acreage in the Town of Cary

Flood Zone	Acreage	Percent of Total (%)
Zone A	29.54	0.07
Zone AE	3,336.894	7.70
Zone X (500-year)	216.56	0.50
Zone X Unshaded	39,753.18	91.73
Total	**43,336.174**	**--**

Source: FEMA Effective DFIRM; Wake County GIS

Figure D.3 reflects the effective mapped flood hazard zones for the Town of Cary, and Figure D.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in the Town of Cary, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly

developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table D.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table D.12 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain, Town of Cary

Land Class	Number of Parcels	Sum of Building Value
Apartment	4	$92,009,343
Commercial	6	$132,211,547
EXEMPT	1	$54,874,633
Industrial	1	$4,945,183
Residential Less Than 10 Acres	38	$15,239,202
Grand Total	**50**	**$299,279,908**

Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Error! Reference source not found. provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector and flood event in the Town of Cary. **Error! Reference source not found.** provides counts and estimated damages for High Potential Loss Properties in the Town of Cary.

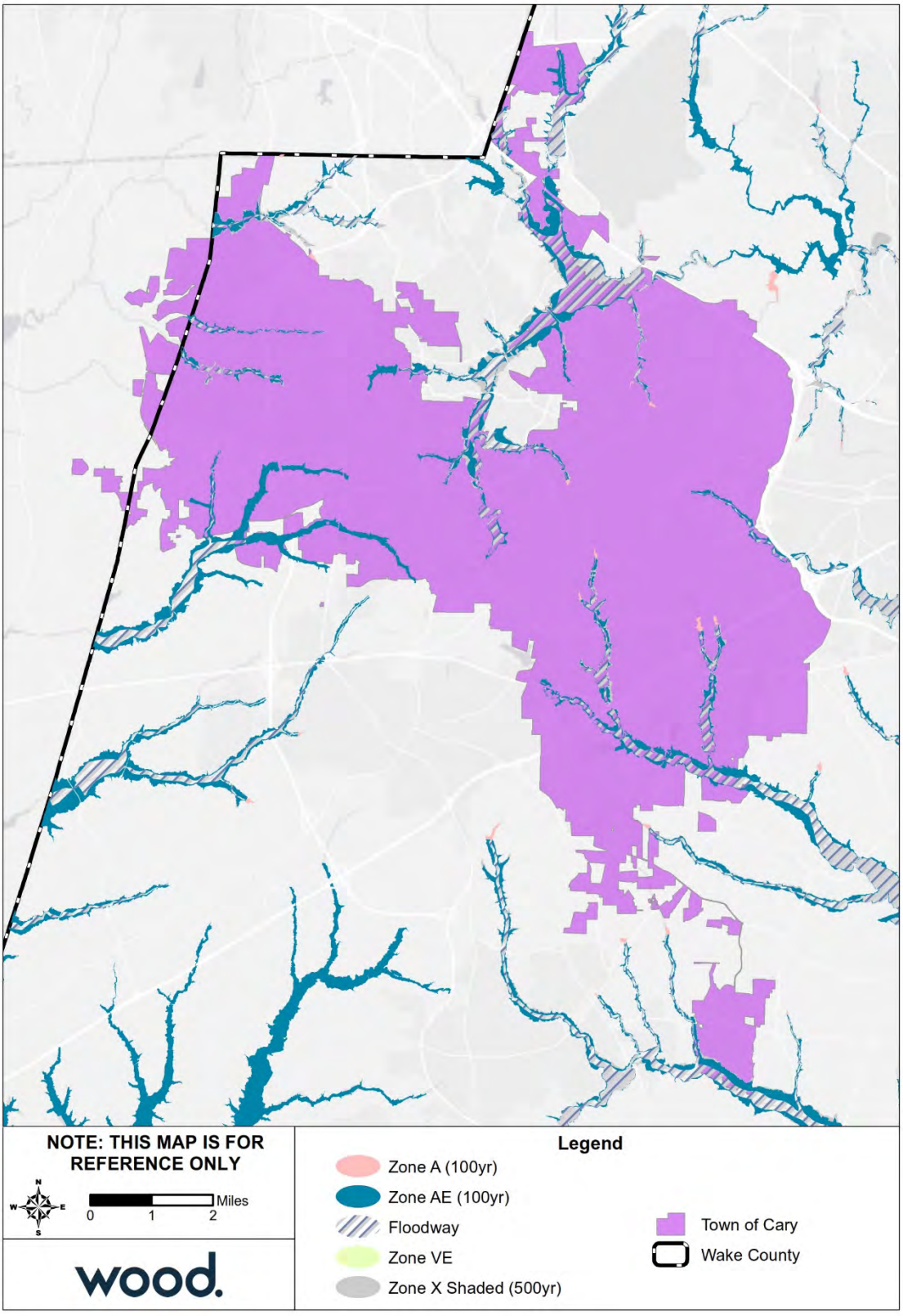
Table D.13 – Critical Facilities Exposed to Flooding, Town of Cary

Sector	Event	Number of Buildings at Risk	Estimated Damages
Commercial Facilities	100 Year	5	$255,617
Critical Manufacturing	100 Year	2	$553,715
	Floodway	1	$286
Healthcare and Public Health	100 Year	1	$74,308
Transportation Systems	100 Year	2	$181,103
All Categories	**100 Year**	**10**	**$1,064,743**
	Floodway	**1**	**$286**

Table D.14 – High Potential Loss Properties Exposed to Flooding, Town of Cary

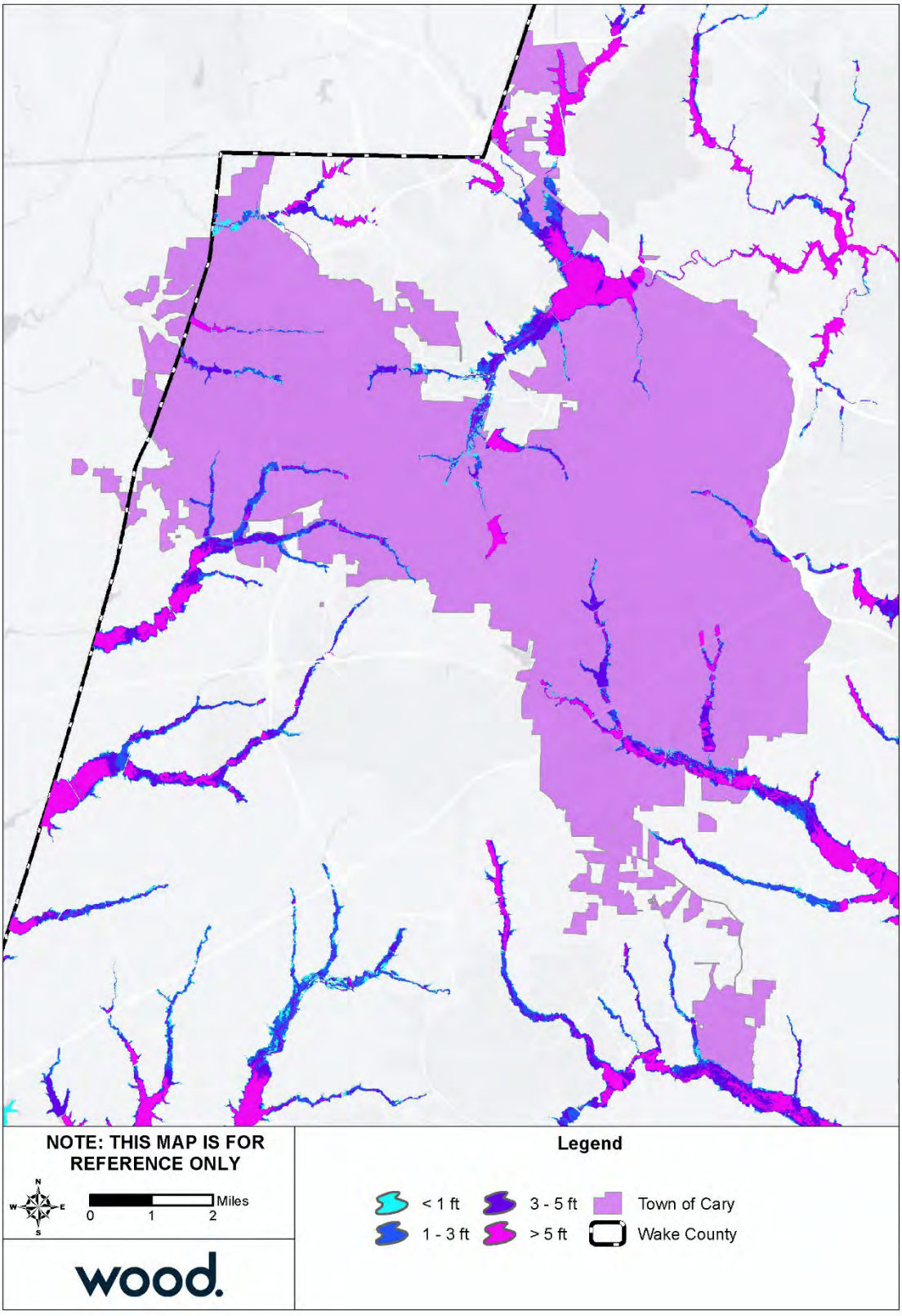
Category	Event	Number of Buildings at Risk	Estimated Damages
Commercial	100 Year	5	$965,335
All Categories	**100 Year**	**5**	**$965,335**

Figure D.3 – FEMA Flood Hazard Areas, Town of Cary



Source: FEMA Effective DFIRM

Figure D.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Cary



Source: FEMA Effective DFIRM

D.3.2 Wildfire

Table D.15 summarizes the acreage in the Town of Cary that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 13 percent the Town of Cary is not included in the WUI.

Table D.15 – Wildland Urban Interface Acreage, Town of Cary

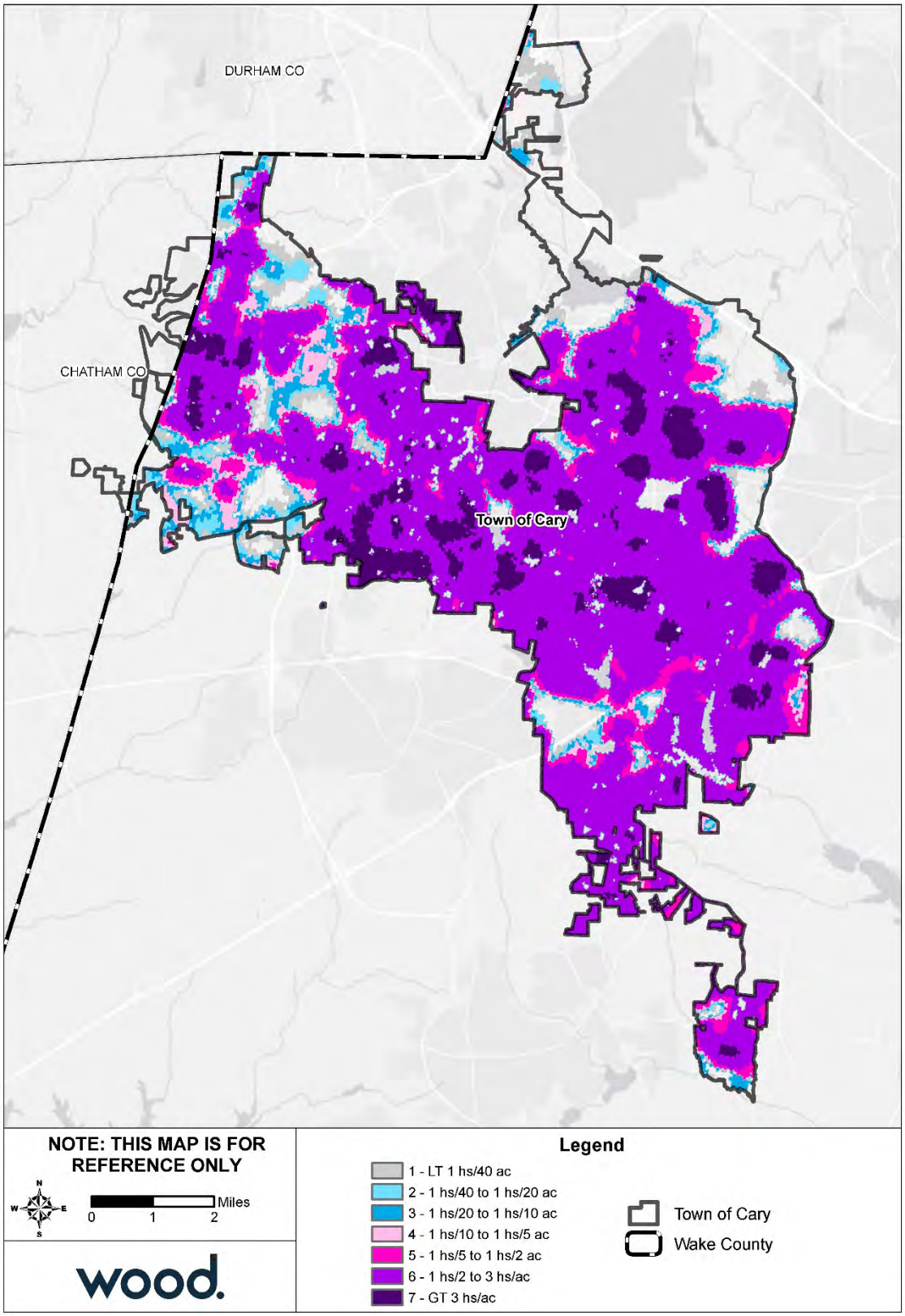
	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*5,588.0*	*13.2%*
	LT 1hs/40ac	1,554.2	3.7%
	1hs/40ac to 1hs/20ac	1,177.9	2.8%
	1hs/20ac to 1hs/10ac	1,614.3	3.8%
	1hs/10ac to 1hs/5ac	1,790.8	4.2%
	1hs/5ac to 1hs/2ac	3,243.2	7.7%
	1hs/2ac to 3hs/1ac	23,228.5	54.9%
	GT 3hs/1ac	4,087.0	9.7%
	Total	42,283.9	

Source: Southern Wildfire Risk Assessment

Figure D.5 depicts the WUI for the Town of Cary. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure D.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure D.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

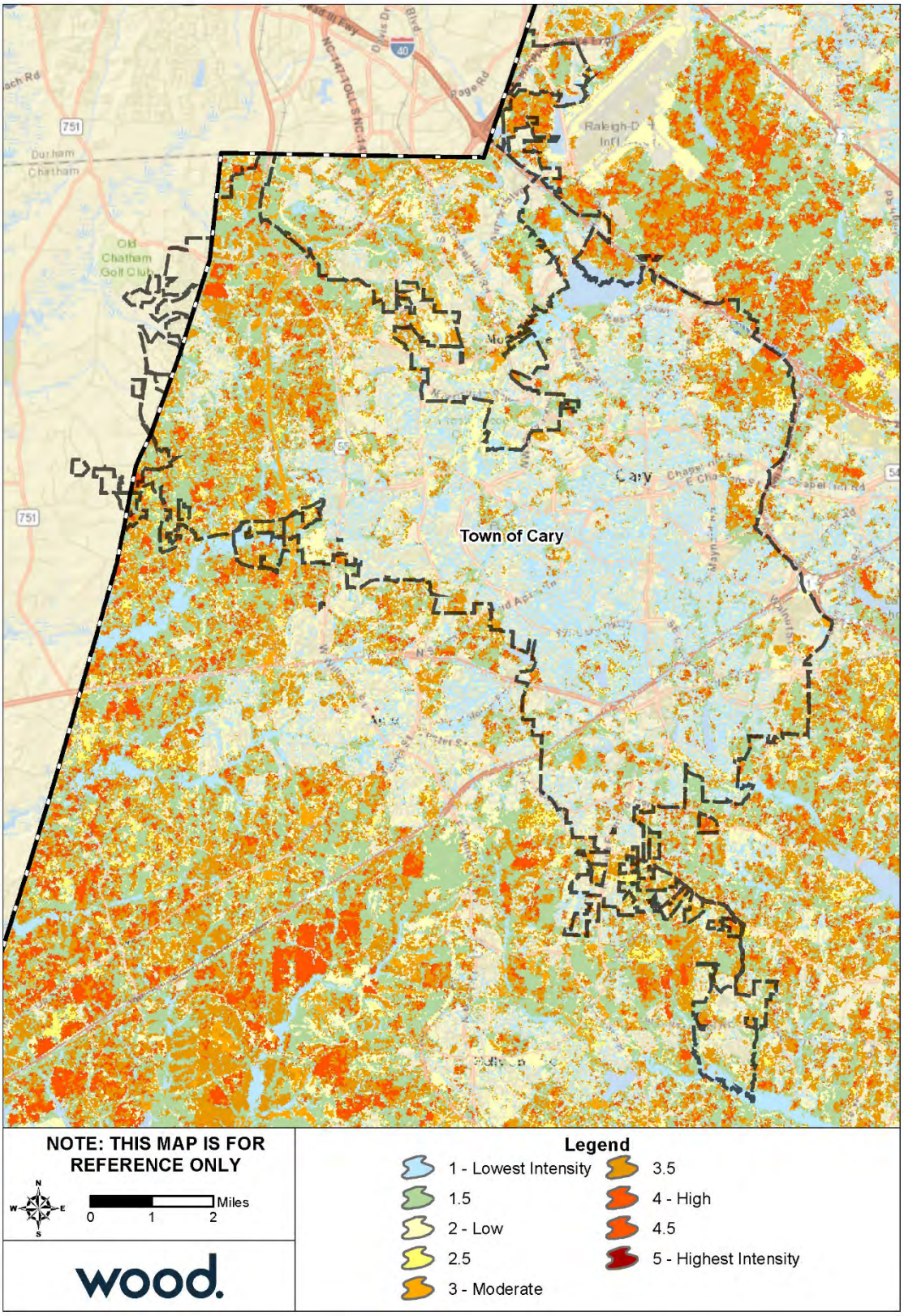
Potential fire intensity is highest in west and northeast Cary; while these areas are within the WUI, these areas have lower burn probability. Because these areas fall within the WUI, there is development potentially at risk to wildfire.

Figure D.5 – Wildland Urban Interface, Town of Cary



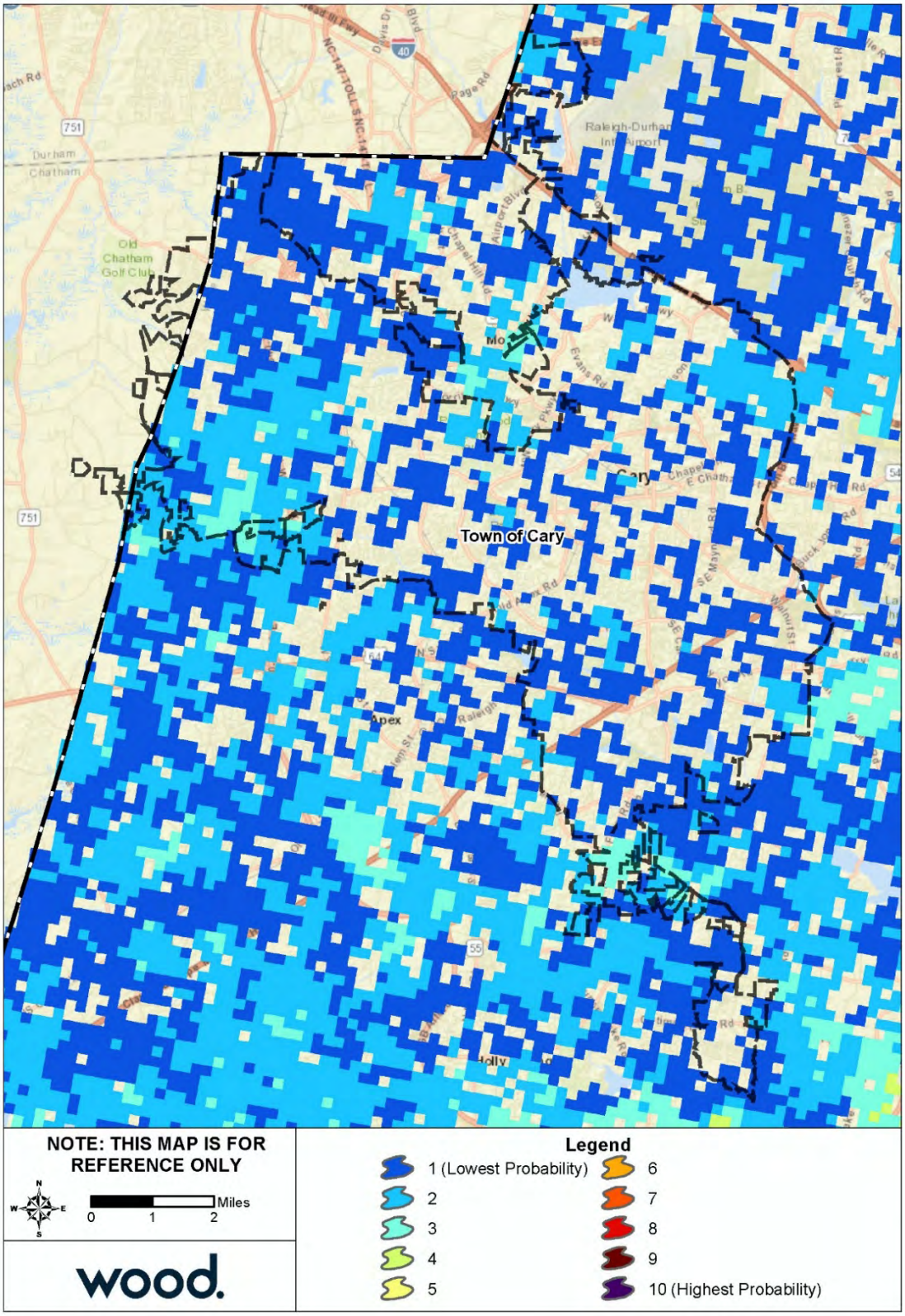
Source: Southern Wildfire Risk Assessment

Figure D.6 – Fire Intensity Scale, Town of Cary



Source: Southern Wildfire Risk Assessment

Figure D.7 – Burn Probability, Town of Cary



Source: Southern Wildfire Risk Assessment

D.4 CAPABILITY ASSESSMENT

D.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Cary were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Cary has an overall capability rating of High. The Town's Self-Assessment of key capability areas is summarized in Table D.16 below.

Table D.16 – Capability Self-Assessment, Cary

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	High
Fiscal Capability	High
Education and Outreach Capability	High
Mitigation Capability	High
Political Capability	High
Overall Capability	High

D.4.2 Floodplain Management

The Town of Cary joined the NFIP through emergency entry in July 1975 and has been a regular participant since July 1978. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table D.17 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	738	$364,550	$220,419,800	137	$2,431,293.63
2-4 Family	9	$3,119	$2,068,500	0	$0.00
All Other Residential	20	$5,944	$3,006,500	0	$0.00
Non-Residential	28	$43,885	$12,181,000	1	$13,680.75
Total	795	$417,498	$237,675,800	138	$2,444,974.38

Source: FEMA Community Information System, accessed November 2018

Table D.18 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	195	$151,960	$56,743,400	43	$879,969.16
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone					

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Standard	36	$53,141	$9,690,400	18	$320,961.62
Preferred	564	$212,397	$171,242,000	77	$1,244,043.60
Total	795	$417,498	$237,675,800	138	$2,444,974.38

Source: FEMA Community Information System, accessed November 2018

Table D.19 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	12	$20,853	$2,264,500	13	$493,539.53
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	64	$28,712	$19,597,000	19	$361,025.79
Standard	4	$6,329	$1,200,000	1	$30,412.98
Preferred	60	$22,383	$18,397,000	18	$330,612.81
Total	76	$49,565	$21,861,500	32	$854,565.32

Source: FEMA Community Information System, accessed November 2018

Table D.20 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	183	$131,107	$54,478,900	30	$386,429.63
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	536	$236,826	$161,335,400	76	$1,203,979.43
Standard	32	$46,812	$8,490,400	17	$290,548.64
Preferred	504	$190,014	$152,845,000	59	$913,430.79
Total	719	$367,933	$215,814,300	106	$1,590,409.06

Source: FEMA Community Information System, accessed November 2018

D.5 MITIGATION STRATEGY

Town of Cary											
Action #	Description	Goal	Objective	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
Prevention											
P-1	Town's Comprehensive Plan- The Town has an existing comprehensive plan which includes land use, parks and recreation, open space, transportation, utilities, and environment.	4	2	All	High	Cary Planning	$1M for plan development; implementation ongoing	General Fund	2-3 years	In-Progress – Carry Forward	Cary's comprehensive plan, called alternately the Cary Community Plan and the Imagine Cary Plan was finalized on January 24, 2017. Implementation in-process.
P-2	Adaptive Approach to Stormwater	4	1	Flood	High	Cary Stormwater	$900,000	General Fund and $300K Grant	Ongoing	New	Multi-pronged approach including 5 key components: 1) Working Group of residents and local experts to learn and advise 2) Maintenance, including Condition Assessment (a separately listed "action") 3) Open Space, examining how open space and tree canopy provide stormwater benefits 4) Model, hiring a firm to build a hynamic rainfall-runoff model to establish a baseline and test solutions and scenarios 5) Ordinance, looking at the stormwater ordinance as a way to achieve our risk mitigation goals
P-3	Stormwater Condition Assessment Program	4	2	Flood	High	Cary Stormwater	$750,000	General Fund	2-3 years	New	In phase 4, (1-GIS Assessment Tool, 2-GIS Mapping Data and assessment, 3-Modeling, 4-Maintenance) Assessment Tool completed. GIS Mapping 99% completed.
P-4	Develop flood model for upper Swift Creek watershed	2	2	Flood, Hurricane	High	Cary Stormwater	Unknown	Town Funds	1 year	New	N/A
P-5	Develop flood model for Symphony Lake	2	2	Flood, Hurricane	High	Cary Stormwater	Unknown	Town Funds	2-3 years	New	N/A
P-6	Engineering evaluation of Tryon Road dam	2	2	Dam Failure	Moderate	Cary Stormwater	Unknown	Town Funds	3-5 years	New	N/A
P-7	Conduct study and develop improvement plan for Twin Lakes dam	2	2	Dam Failure	High	Cary Stormwater	Unknown	Town Funds	3-5 years	New	N/A
P-8	Conduct flood study on Town-owned lake/dam, including breach analysis	2	2	River Flooding, Dam Failure	High	Cary Stormwater	Unknown	Town Funds	2-3 years	New	N/A
P-9	Triangle Regional Resiliency Partnership	4	1	River Flooding, Wildfire, Drought, Extreme Heat	Moderate	Town of Cary	Variable (depending on outside consultants)	General Funds	Ongoing	New	On-going partnership among Triangle area jurisdictions intended to do joint resilience planning and action. The group's first deliverable of a Triangle Regional Resilience Assessment was finalized late 2018. The group is continuing to meet and consider how it may implement recommendations of the assessment together.
Property Protection											
PP-1	Culvert Replacement - Arbor Brook	3	2	Flood	High	Cary Stormwater	$400,000	General Fund	1 year	New	Replace existing culverts with larger culverts
PP-2	Culvert Replacement - Two Creeks	3	2	Flood	High	Cary Stormwater	$800,000	General Fund	1 year	New	Replace existing culverts with larger culverts
Natural Resource Protection											
NRP-1	Downtown Park	3	2	Flood	High	Cary Stormwater and Facilities	$750,000	General Fund	2-3 years	New	In planning phase. Implementing SW management above and beyond state requirements. Detention of 2, 5 and 10-year storm reduces scour on receiving stream.
NRP-2	Buffer and UTB Protection	3	2	Flood	High	Cary Stormwater and Cary Planning	Over $10,000,000	Private (Developer) Funds	Ongoing - Next 5 Years	New	Extra 50-foot buffer (UTB) on USGS streams; no buffers platted in lots.
Structural Projects											
SP-1	Infrastructure improvements on Summer Lakes Dr.	3	2	Flood	High	Cary Stormwater	$900,000	General Fund	1 year	New	Replace existing undersized culverts
SP-2	Infrastructure improvements on Vincrest Ct	3	2	Flood	High	Cary Stormwater	$400,000	General Fund	2-3 years	New	Replace existing undersized culverts
SP-3	Update Water Shortage Response Plan	2	4	Drought	High	Town of Cary	Staff Time	N/A	1 year	New	N/A

Town of Cary											
Action #	Description	Goal	Objective	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
SP-4	Water System Risk Analysis	3	1	All	High	Town of Cary	$89,000	General Fund	Ongoing - 1 Year	New	The Water System Risk Analysis is a comprehensive look at the risks to our water system. It is being done to comply with the American Water Infrastructure Act of 2018. It will result in a new emergency response plan for our water system.
Emergency Services											
ES-1	Provide and enhance technical rescue capabilities throughout the Town.	2	1	All	High	Cary Fire	Unknown	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Cary's Fire Department has a technical rescue training program that we coordinate with Morrisville and Apex, NC. We train on all disciplines of technical rescue.
ES-2	Provide after-action report of emergency response to severe weather events in order to improve planning for future disasters.	2	2	All	High	Cary Fire, Water Resources, and Facilities Design & Transportation Services	Unknown	General Fund	Ongoing - Next 5 Years	In-Progress – Carry Forward	Cary's key emergency response departments have formal after-action meetings to learn from what went well and seek opportunities to improve. This occurs after each event, so is ongoing in nature.
ES-3	Establish a relationship/partnership with the Renaissance Computing Institute (RENCI) to create a web-based tool capable of providing real-time flood data to emergency managers and historic data for future emergency response planning.	2	2	All	Low	Cary Fire and Technology Services	Unknown	General Fund	Ongoing – Next 5 Years	In-Progress – Carry Forward	Still in the early stages of developing this partnership.
ES-4	Partnership with FBI Terrorism Task Force	2	2	Terrorism	Moderate	Town of Cary, Town of Cary Police	$100,000	General Fund	Ongoing	New	Since 2011 the Town of Cary Police have an officer assigned full time to the FBI Terrorism Task Force to maintain a relationship with the FBI. FBI Terrorism Task Force located in the FBI Raleigh Office located in the Town of Cary off Cary Parkway near US 1. Wake County Emergency Management has a plan for large scale events that impact Wake County. Those plans include guidance for law enforcement as part of a multi-agency response to all sorts of issues that could include the unlikely event of a terrorist attack.
ES-5	Inclement Weather Response Plan	2	1	Severe Winter Storm, Thunderstorm, Hurricane	Moderate	Town of Cary, Town of Cary Public Works	$100,000 - $1 Million (depending on number and type)	General Fund	Ongoing	New	The town commits significant Town-wide resource allocation and operational commitment to ensuring all aspects of winter weather events are planned, executed, and reviewed to maximize positive recovery outcomes for its citizens. The Town has similar structure and programs for thunderstorm or wind events.
Public Education and Awareness											
PEA-1	Environmental Education "green infrastructure" signage on Dry Avenue Properties that were bought out due to flooding. Signs to be installed early 2019	1	1	Flood	Low	Cary Stormwater and Sustainability	$11,000	Local	Ongoing - Next 5 Years	New	N/A
PEA-2	Citizen volunteers make up the Community Emergency Response Team (CERT). CERT training is a Citizens Corps program designed to enable citizens to care for themselves and their neighbors during the first three days following a disaster event. Participants are educated about disaster preparedness, CERT organization, light search and rescue, medical care, fire extinguisher use and disaster psychology.	1	2	All	Moderate	Cary Police Department and Fire Department	$1,000/year	Donations	Ongoing - Next 5 Years	New	N/A

Annex E Town of Fuquay-Varina

E.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Fuquay-Varina.

Table E.1 – HMPC Members

Agency	Representative	Position or Title
Planning Department	Samantha Smith	Planning Director
Planning Department	Alyssa Stafford	Planner
N/A	Ed Ridpath	Citizen Stakeholder

E.2 COMMUNITY PROFILE

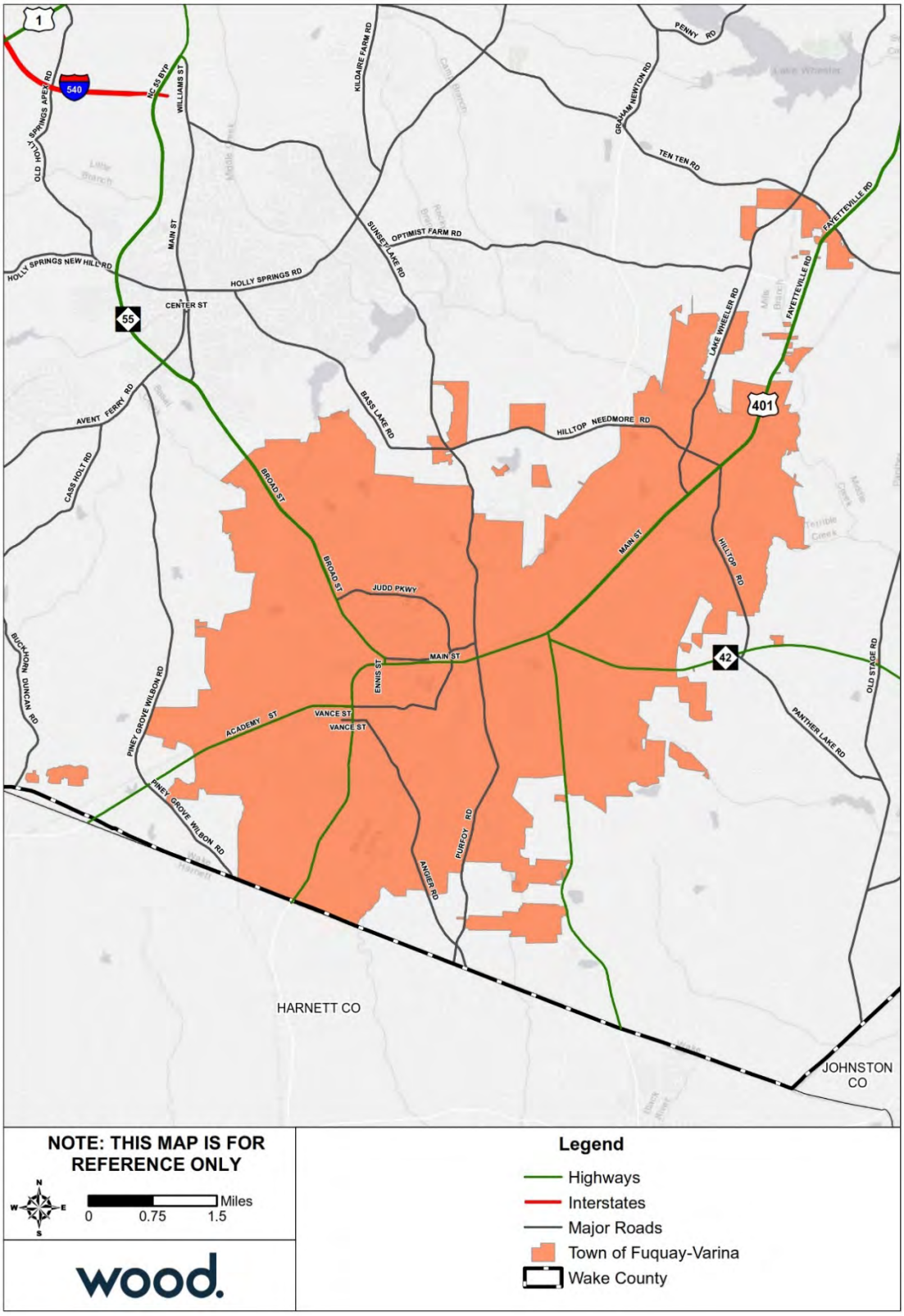
Geography

The Town of Fuquay-Varina is located in southern Wake County. It is neighbored by Holly Springs to the northwest, Angier to the southeast, and Harnett County to the southwest. The Town is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Fuquay-Varina comprises a total land area of 12.1 square miles.

Figure E.1 shows a base map of the major transportation routes in the Town of Fuquay-Varina.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 1,450 acres of wetlands in Fuquay-Varina.

Figure E.1 – Major Transportation Routes – Town of Fuquay-Varina



Source: Wake County GIS Open Data

Population and Demographics

Table E.2 provides population counts and growth estimates for the Town of Fuquay-Varina as compared to the County overall. Table E.3 provides demographic information for Fuquay-Varina as compared to the whole County.

Table E.2 – Population Counts, Fuquay-Varina, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Fuquay-Varina	7,898	17,937	24,373	6,436	35.9%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates

Table E.3 – Racial Demographics, Fuquay-Varina, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Fuquay-Varina	77.5%	15.4%	1.6%	2.8%	2.7%	9.4%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates

*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Fuquay-Varina in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure E.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table E.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Fuquay-Varina	136	17	0	275	0	150	1	69	27	0	0	0	0	37	0	3	5	0	**720**

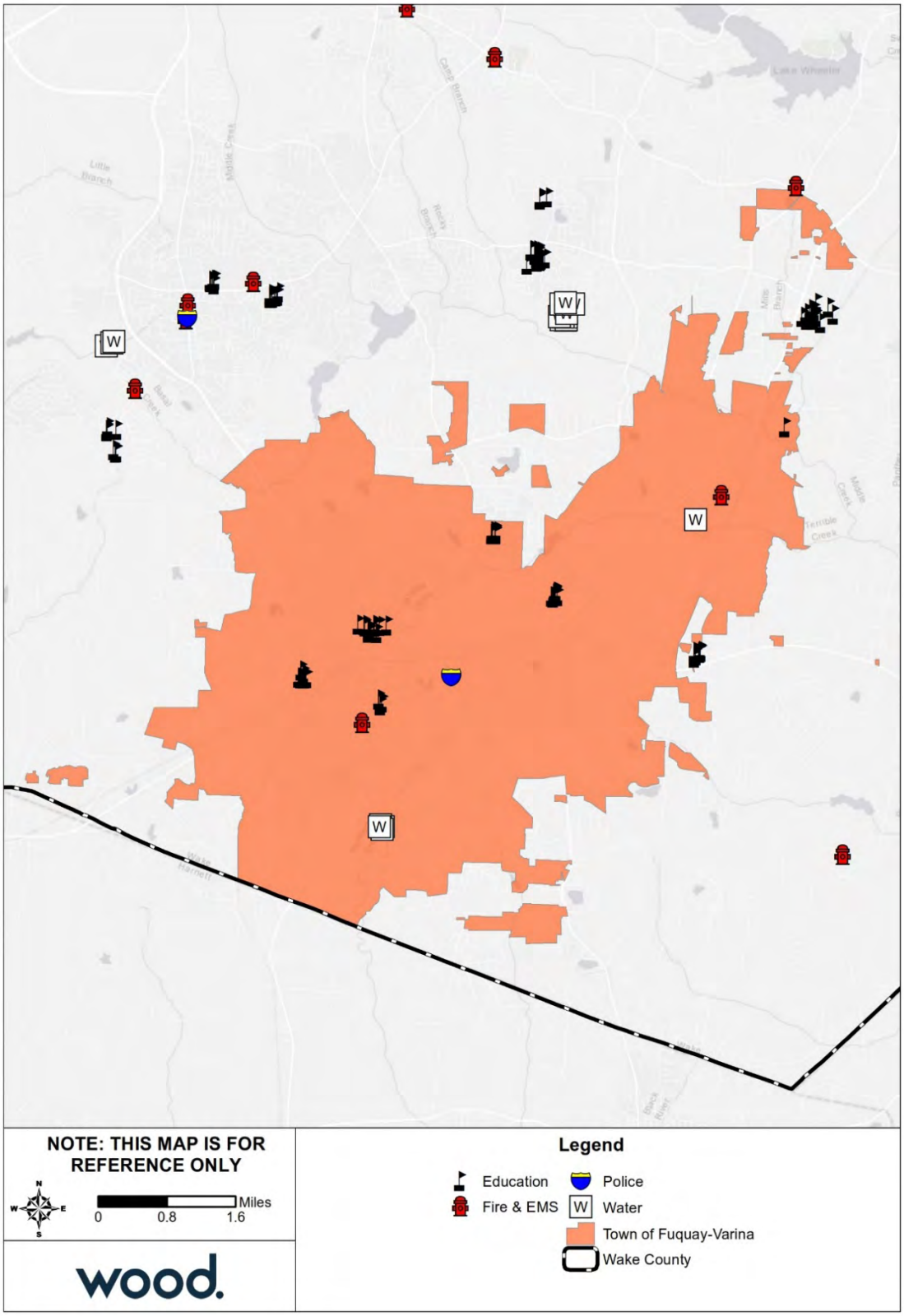
Source: NCEM Risk Management Tool

Table E.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Fuquay-Varina	19	52	16	15	1	17	5	0	**125**

Source: NCEM Risk Management Tool

Figure E.2 – Critical Facilities, Town of Fuquay-Varina



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Fuquay-Varina, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table E.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table E.6 – Parcels Developed 2011 or Later, Town of Fuquay-Varina

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	2	$510,076
Apartment	5	$56,588,768
Commercial	35	$39,296,320
EXEMPT	4	$4,553,482
HOA	1	-
Industrial	5	$4,294,864
Part Exempt	4	$916,806
Residential Less than 10 Acres	3,809	$847,692,058
Retirement Home	1	$9,101,418
Vacant	2	-
Grand Total	**3,868**	**$962,953,892**

Source: Wake County Open Data; retrieved April 8, 2019

There are 12 listings on the National Register of Historic Places for the Town of Fuquay-Varina, including 4 historic districts. These sites are listed in the table below.

Table E.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
14000230	Fuquay Springs Historic District (Boundary Increase)	5/19/2014	District	Fuquay Varina
14001023	Stevens, Wayland H. and Mamie Burt, House	12/10/2014	Building	Fuquay Varina
86003457	Fuquay Mineral Spring	12/4/1986	Site	Fuquay-Varina
89002352	Jones--Johnson--Ballentine Historic District	1/26/1990	District	Fuquay-Varina
89002351	Varina Commercial Historic District	1/31/1990	District	Fuquay-Varina
91001375	Johnson, J. Beale, House	9/5/1991	Building	Fuquay-Varina
97000195	Ben--Wiley Hotel	2/27/1997	Building	Fuquay-Varina
02000495	Fuquay Springs High School	5/16/2002	Building	Fuquay-Varina
07000352	Fuquay-Varina Woman's Club Clubhouse	4/24/2007	Building	Fuquay-Varina
96001398	Fuquay Springs Historic District	11/29/1996	District	Fuquay-Varina
05001028	Johnson, Kemp B., House	9/15/2005	Building	Fuquay-Varina
05001448	Fuquay Springs Teacherage	12/23/2005	Building	Fuquay-Varina

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The table below details key housing statistics for Fuquay-Varina as compared to the County overall.

Table E.8 – Housing Statistics, Fuquay-Varina, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Fuquay-Varina	7,325	8,626	17.8%	69.8%	4.1%	$221,000

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Fuquay-Varina as compared to the County overall.

Table E.9 – Employment Statistics, Fuquay-Varina, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Fuquay-Varina	12,407	65.9	3.9	29.9	5.6

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table E.10 – Percent of Employed Population by Occupation, Fuquay-Varina, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Fuquay-Varina	47.3	16.7	22.4	5.3	8.3

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

E.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Fuquay-Varina than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

E.3.1 Flood

Table E.11 details the acreage of the Town of Fuquay-Varina by flood zone on the effective DFIRM. Per this assessment, over 5 percent of the Town of Fuquay-Varina falls within the mapped 1%-annual-chance floodplains.

Table E.11 – Flood Zone Acreage in the Town of Fuquay-Varina

Flood Zone	Acreage	Percent of Total (%)
Zone A	14.13	0.07
Zone AE	1,033.76	5.40
Zone X (500-year)	135.68	0.71
Zone X Unshaded	17,977.26	91.80
Total	**19,160.83**	--

Source: FEMA Effective DFIRM; Wake County GIS

Figure E.3 reflects the effective mapped flood hazard zones for the Town of Fuquay-Varina, and Figure E.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in Town of Fuquay-Varina, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. For parcels where updated building footprints were available, the parcel was considered exposed only if the building intersected the floodplain boundary, otherwise, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain. However

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

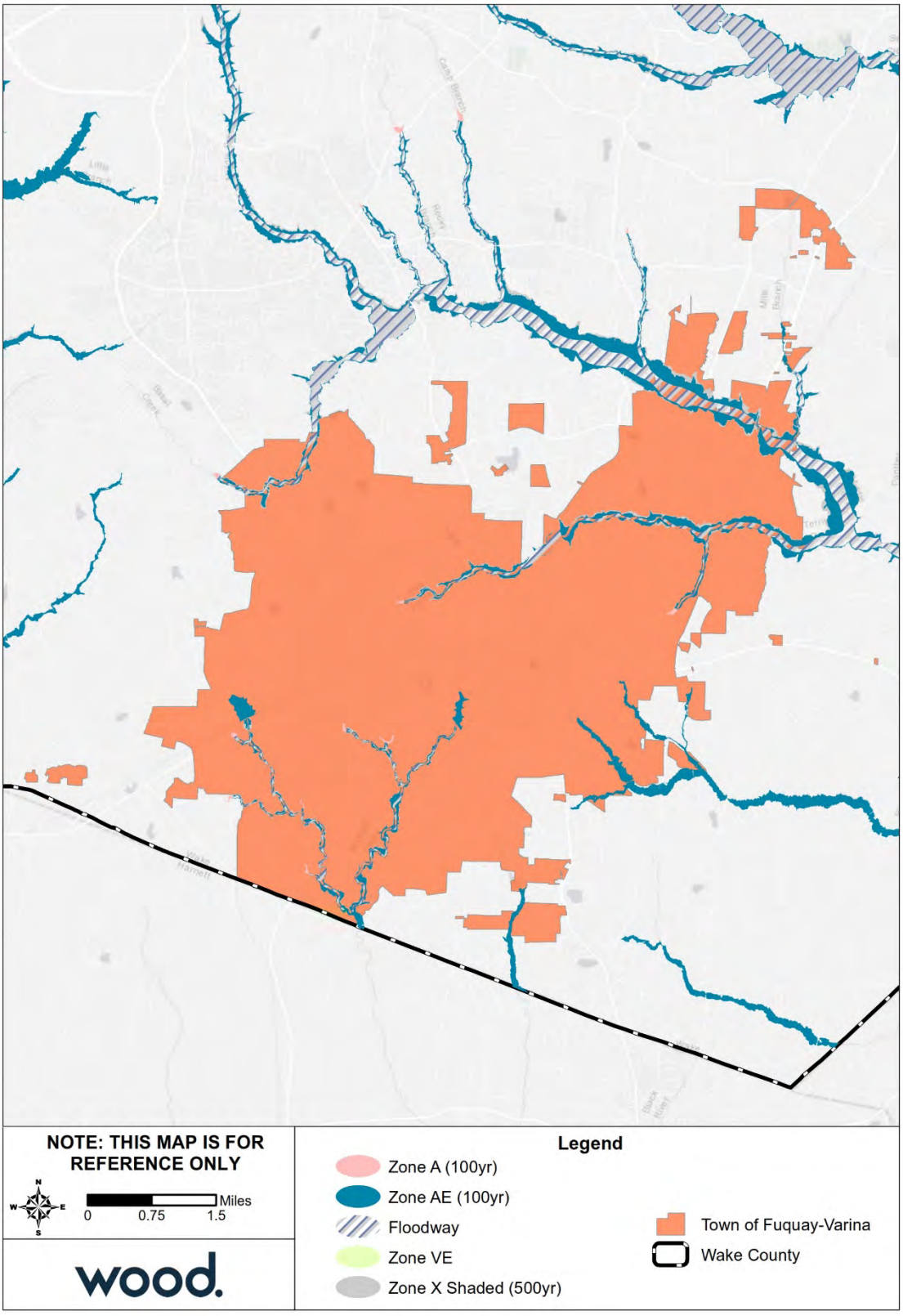
Table E.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table E.12 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain, Town of Fuquay-Varina

Land Class	Number of Parcels	Sum of Building Value
Commercial	1	$5,138,598
Industrial	3	$955,917
Residential Less Than 10 Acres	58	$12,968,191
Grand Total	**62**	**$19,062,706**

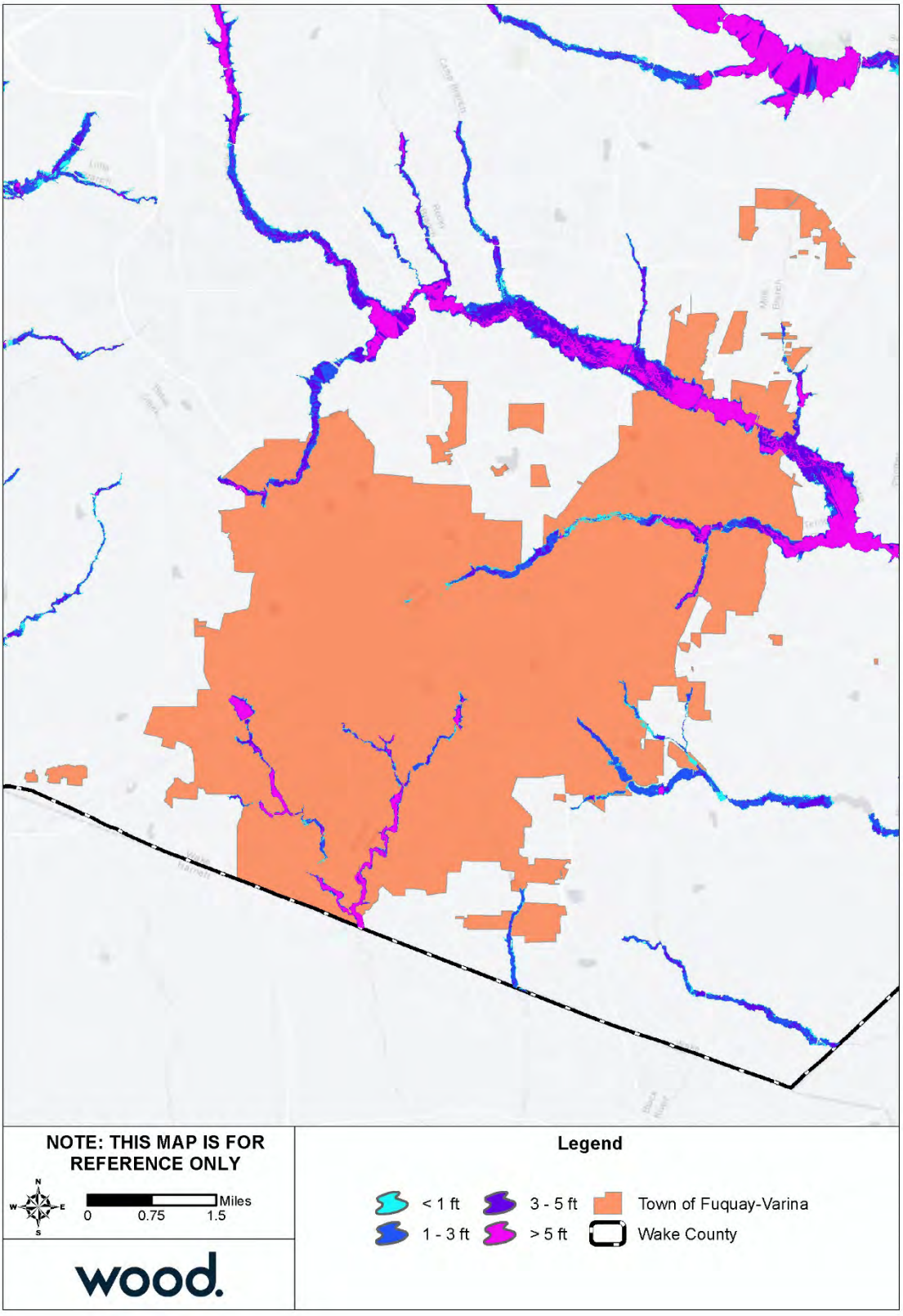
Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Figure E.3 – FEMA Flood Hazard Areas, Town of Fuquay-Varina



Source: FEMA Effective DFIRM

Figure E.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Fuquay-Varina



Source: FEMA Effective DFIRM

E.3.2 Wildfire

Table E.13 summarizes the acreage in the Town of Fuquay Varina that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 8 percent of the Town of Fuquay Varina is not included in the WUI.

Table E.13 – Wildland Urban Interface Acreage, Town of Fuquay-Varina

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*1,653.7*	*8.6%*
	LT 1hs/40ac	1,157.2	6.0%
	1hs/40ac to 1hs/20ac	1,275.1	6.7%
	1hs/20ac to 1hs/10ac	1,676.9	8.8%
	1hs/10ac to 1hs/5ac	2,243.2	11.7%
	1hs/5ac to 1hs/2ac	4,180.1	21.8%
	1hs/2ac to 3hs/1ac	6,774.3	35.4%
	GT 3hs/1ac	200.1	1.0%
	Total	19,160.6	

Source: Southern Wildfire Risk Assessment

Figure E.5 depicts the WUI the Town of Fuquay-Varina. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure E.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure E.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

Potential fire intensity is highest in central Fuquay-Varina as well as some areas in the southwest and northeast. These areas are generally within the WUI, but in the central area, there is a lower burn probability. The southern and eastern regions of the Town have moderate burn probabilities, and some areas within these regions have relatively high potential fire intensity and fall within the WUI, putting some development potentially at risk.

Table E.14 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector at risk to wildfire hazard. Table E.15 provides counts and estimated damages for High Potential Loss Properties in the Town of Fuquay-Varina.

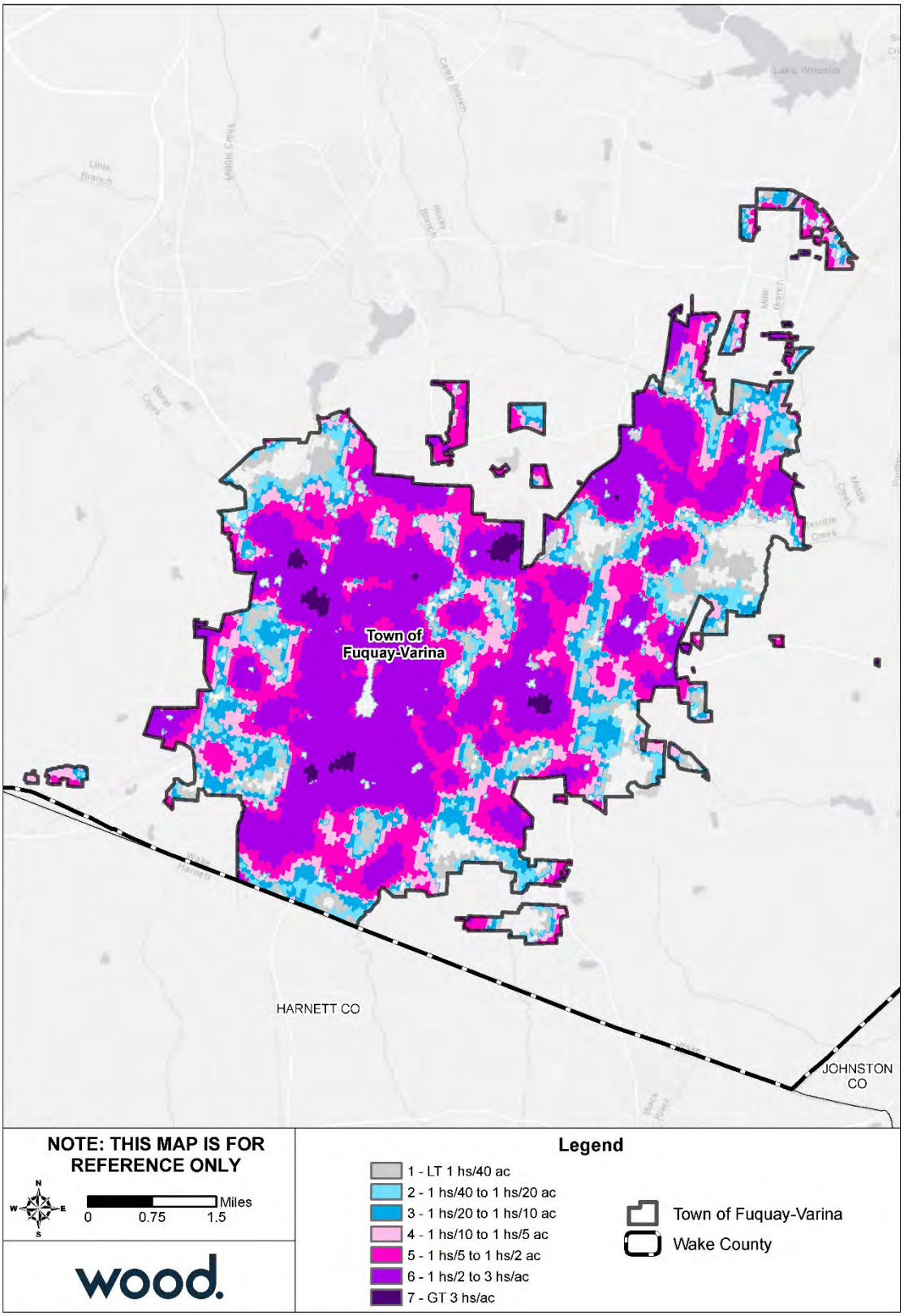
Table E.14 – Critical Facilities Exposed to Wildfire, Town of Fuquay-Varina

Sector	Event	Number of Buildings at Risk	Estimated Damages
Commercial Facilities	Wildfire Hazard	2	$3,985,087
Critical Manufacturing	Wildfire Hazard	1	$3,305,808
All Categories	**Wildfire Hazard**	**3**	**$7,290,895**

Table E.15 – High Potential Loss Properties Exposed to Wildfire, Town of Fuquay-Varina

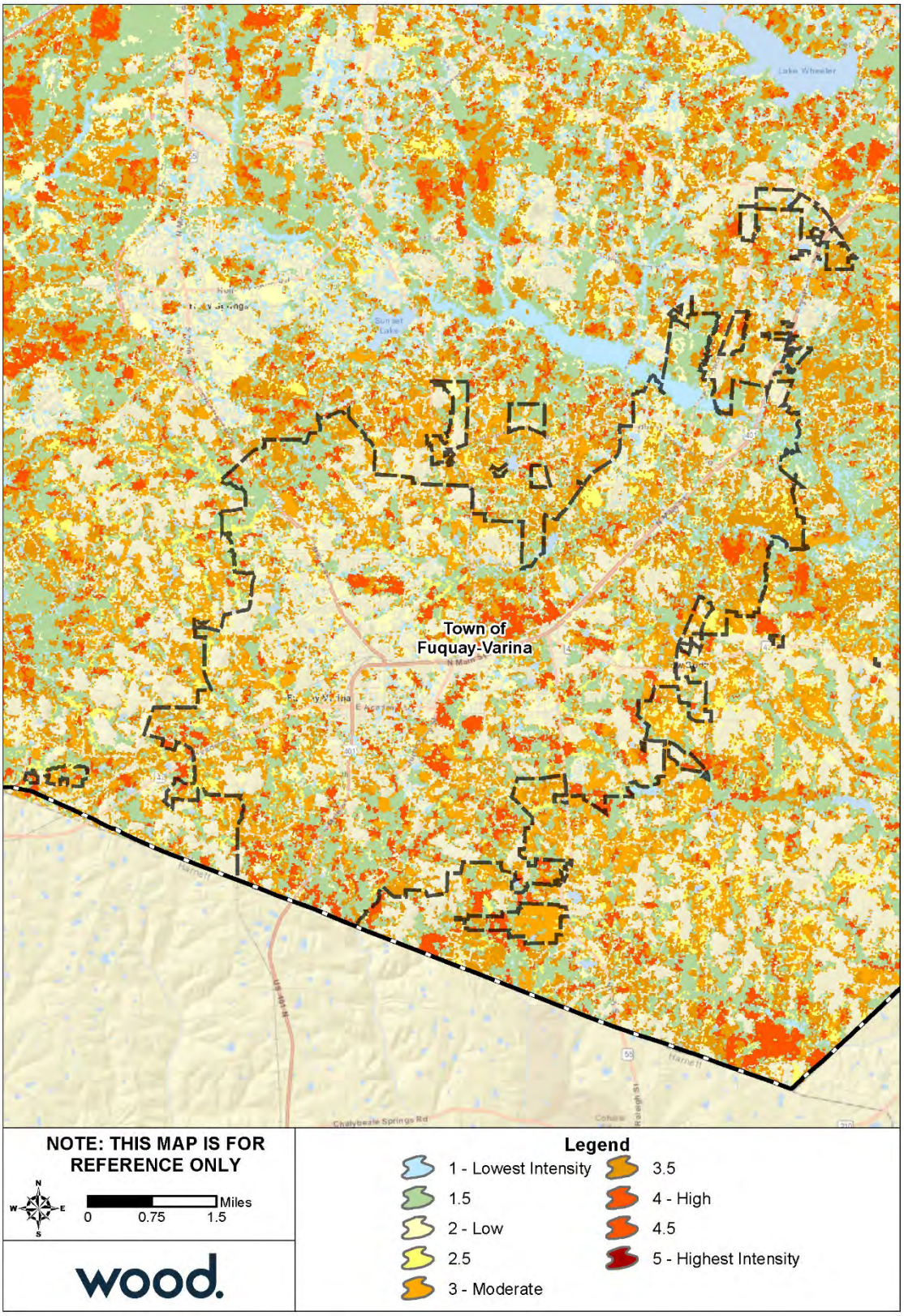
Category	Event	Number of Buildings at Risk	Estimated Damages
Commercial	Wildfire Hazard	1	$3,321,296
Residential	Wildfire Hazard	2	$3,915,097
All Categories	**Wildfire Hazard**	**3**	**$7,236,393**

Figure E.5 – Wildland Urban Interface, Fuquay-Varina



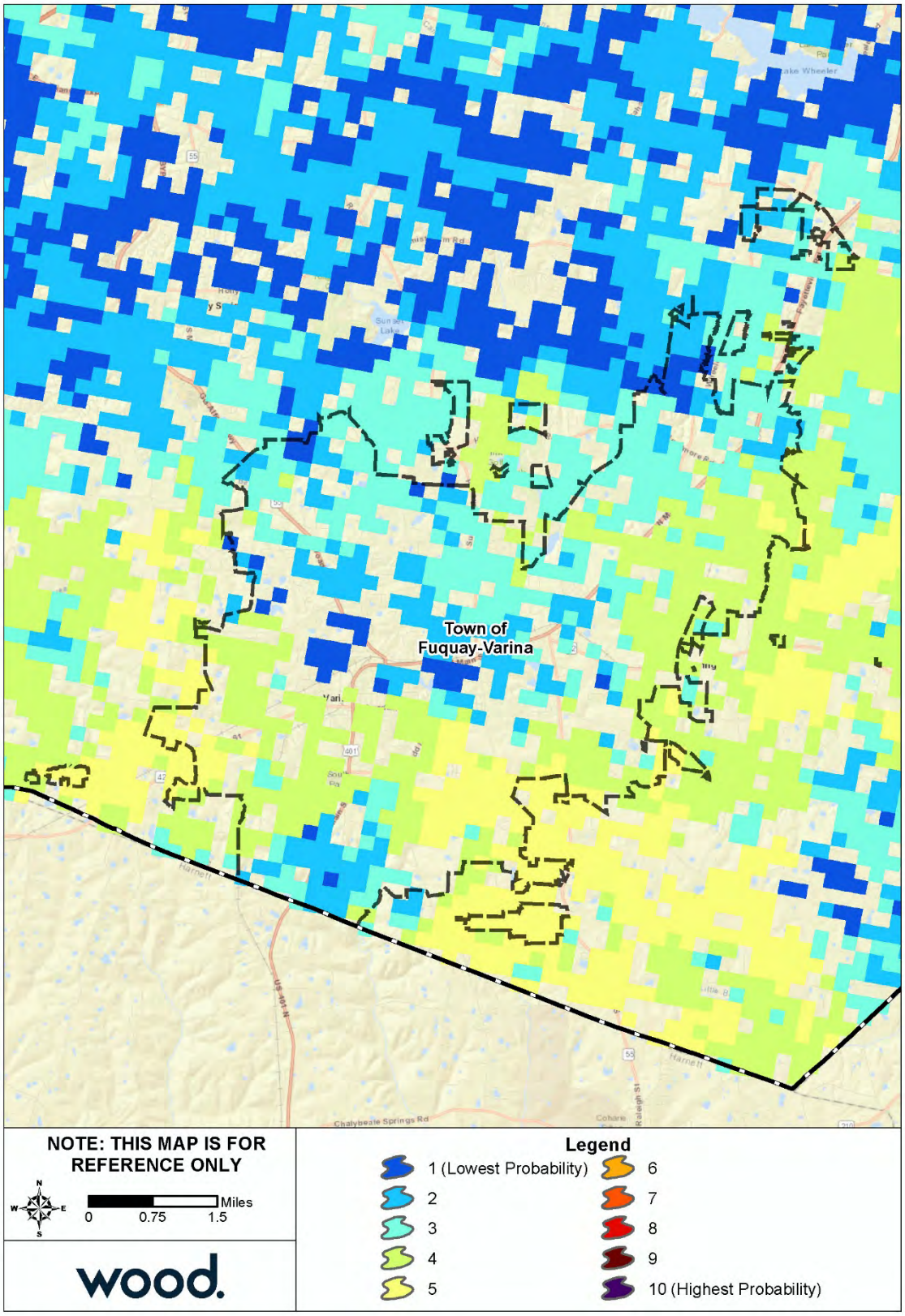
Source: Southern Wildfire Risk Assessment

Figure E.6 – Fire Intensity Scale, Fuquay Varina



Source: Southern Wildfire Risk Assessment

Figure E.7 – Burn Probability, Fuquay Varina



Source: Southern Wildfire Risk Assessment

E.4 CAPABILITY ASSESSMENT

E.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Fuquay-Varina were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Fuquay-Varina has an overall capability rating of High. The Town's Self-Assessment of key capability areas is summarized in Table E.16 below.

Table E.16 – Capability Self-Assessment, Fuquay-Varina

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	High
Fiscal Capability	High
Education and Outreach Capability	High
Mitigation Capability	High
Political Capability	High
Overall Capability	High

E.4.2 Floodplain Management

The Town of Fuquay-Varina joined the NFIP through emergency entry in January 1975 and has been a regular participant since November 1978. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table E.17 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	126	$49,897	$34,163,900	3	$107,051.14
2-4 Family	0	$0	$0	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	1	$3,583	$750,000	0	$0.00
Total	127	$53,480	$34,913,900	3	$107,051.14

Source: FEMA Community Information System, accessed November 2018

Table E.18 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	17	$12,397	$3,586,100	2	$101,268.39
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
B, C & X Zone					
Standard	1	$127	$5,800	0	$0.00
Preferred	109	$40,956	$31,322,000	1	$5,782.75
Total	127	$53,480	$34,913,900	3	$107,051.14

Source: FEMA Community Information System, accessed November 2018

Table E.19 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	4	$5,225	$853,500	2	$101,268.39
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	8	$2,894	$2,170,000	1	$5,782.75
Standard	0	$0	$0	0	$0.00
Preferred	8	$2,894	$2,170,000	1	$5,782.75
Total	12	$8,119	$3,023,500	3	$107,051.14

Source: FEMA Community Information System, accessed November 2018

Table E.20 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	13	$7,172	$2,732,600	0	$0.00
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	102	$38,189	$29,157,800	0	$0.00
Standard	1	$127	$5,800	0	$0.00
Preferred	101	$38,062	$29,152,000	0	$0.00
Total	115	$45,361	$31,890,400	0	$0.00

Source: FEMA Community Information System, accessed November 2018

E.5 MITIGATION STRATEGY

Town of Fuquay-Varina											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Require pre and post construction certification for residential lot development within 10 feet of Wake County Flood Hazard Soils.	4	1	Flood	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of permit review process
P-2	Annually calculate acreage of flood prone property preserved as open space.	2	2	Flood, Hurricane	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of an annual report
P-3	Map storm water drainage system as part of Phase II Stormwater Management Plan.	2	2	Flood	High	Fuquay-Varina Engineering	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of infrastructure acceptance / ongoing project to work on historical data inclusion
P-4	Provide for public dissemination building inspections brochures regarding high winds, water damage prevention, and tie downs for accessory structures.	1	1	Flood, Tornado, Hurricane, Severe Weather	Moderate	Fuquay-Varina Inspections	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Brochures continuously made available to public at Town Hall
P-5	Review and update of drought policy for water conservation	2	2	Drought	High	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	3-5 years	New	N/A
P-6	Review and update requirements for mast arms to be installed over strain poles	3	2	Severe Weather, Severe Winter Storm, Hurricane, Tornado	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	3-5 years	New	N/A
P-7	Review and update the 2014 Comprehensive Systemwide Parks, Recreation & Cultural Resources Master Plan for inclusion of hazard safety information at facilities	4	2	Flood, Earthquake, Extreme Heat, Severe Weather, Tornado	High	Fuquay-Varina Planning and Parks, Recreation, & Cultural Resources	Budgeted Staff Time	Annual Budget	3-5 years	New	N/A
Property Protection											
PP-1	Continue to enforce the Flood Damage Prevention Ordinance for all new construction or substantial building rehabilitations.	4	1	Flood, Hurricane	High	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
PP-2	Require minimum finished floor elevation in known FEMA flood hazard zones be minimum 2' above base flood elevation.	4	1	Flood, Hurricane	High	Fuquay-Varina Planning and Inspections	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
PP-3	Identify and inventory buildings that are located in FEMA flood zones to determine which structures may be prone to flooding (possible relocation and/or elevation).	3	1	Flood, Hurricane	High	Fuquay-Varina Planning and Engineering	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	We reference the Dept of Public Safety's report
Natural Resource Protection											
NRP-1	Work with the U.S. Army Corps of Engineers on wetland protection.	4	1	Flood, Hurricane	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
NRP-2	Use Open Space Ordinance to protect wildlife habitat.	4	1	All	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
NRP-3	Notify Wake County of any illegal stream dumping instances	3	1	Flood, Dam Failure, Hurricane	Moderate	Fuquay-Varina Planning and Public Utilities	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
NRP-4	Enforce standards for tree protection and control of clear cutting (Town has received legislative authority to enact tree protection and control of clearcutting standards.)	4	1	Flood, Wildfire, Landslide	High	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
NRP-5	Install low flow/high efficiency toilets at new town hall	3	1	Drought	Low	All Departments	To Be Determined	Annual Budget	1 year	New	N/A
Structural Projects											
S-1	Install a generator at the new town hall	3	1	All	High	All Departments	To Be Determined	Annual Budget	1 year	New	N/A
S-2	Install security cameras on new town hall	3	1	Terrorism	High	All Departments	To Be Determined	Annual Budget	1 year	New	N/A
Emergency Services											
ES-1	Maintain current warning system with local sirens on elevated platforms and use of the Emergency Broadcast System.	1	2	All	High	Fuquay-Varina Planning, Fire and Police	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation

Town of Fuquay-Varina											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
ES-2	Coordinate an incident command course for all Town employees, related to Emergency Operations Plan and Disaster Operations Plan for the Town.	2	1	All	Moderate	Fuquay-Varina Fire and Police	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Lack of staffing has prevented implementation
ES-3	Conduct a scenario-based training exercise, related to Emergency Operations Plan and Disaster Operations Plan for the Town.	2	1	All	Moderate	Fuquay-Varina Fire and Police	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Lack of staffing has prevented implementation
ES-4	Assist Wake County Emergency Management with updating list of local hazardous materials sites.	2	1	Hazardous Materials Incident, Radiological Emergency	Moderate	Fuquay-Varina Fire and Wake County Emergency Management	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
ES-5	Continue Pre-Fire Incident Plan program for all commercial facilities within the Town limits.	3	2	All	High	Fuquay-Varina Fire	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
ES-6	Address securing and cleaning up affected hazardous areas when revising Disaster Operations Plan.	4	2	All	High	Fuquay-Varina Planning, Fire and Police	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
ES-7	Continue to evaluate and improve response and recovery methods following each hazard event.	2	2	All	High	Fuquay-Varina Fire and Police	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
ES-8	Finalize implementation of new/updated radio communication equipment.	2	1	All	Moderate	Fuquay-Varina Fire and Police	$55,000	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Police Department's portion completed. Fire Department anticipated completion, June 2019
Public Education and Awareness											
PEA-1	Maintain floodplain maps for public use and produce other maps as needed.	1	1	Flood, Hurricane	Moderate	Fuquay-Varina Planning and Engineering	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
PEA-2	Develop and maintain a hazard mitigation section on the Town website that is updated every 5 years as the plan is updated.	1	1	All	High	Fuquay-Varina Public Information and Information Technology	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
PEA-3	Collect educational materials on disaster preparedness and display at public library and local government offices.	1	1	All	High	Fuquay-Varina Planning, Inspections, Police, and Fire	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Lack of staffing has prevented implementation
PEA-4	Educate public on importance of channel maintenance as part of Phase II Stormwater Management Plan.	1	1	Flood, Dam Failure, Hurricane	Moderate	Fuquay-Varina Engineering	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
PEA-5	Work with local real estate agents to ensure that potential buyers are aware of properties that are exposed to potential flood damage.	1	1	Flood, Dam Failure, Hurricane	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Continued function of normal operation
PEA-6	Require delineation of Wake County Flood Hazard Soils, FEMA flood zones, and wetlands on final plats.	3	2	Flood, Dam Failure, Hurricane	Moderate	Fuquay-Varina Planning	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	In-Progress – Carry Forward	Part of development and permit review process
PEA-7	Annual participation in Severe Weather Preparedness Week (March 3-9) via Weather Channel (social media campaign, newsletter, published materials)	1	1	All	High	Fuquay Varina Planning and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A
PEA-8	Annual participation in National Preparedness Month (September) Ready.gov (social media campaign, newsletter, published materials)	1	1	All	High	Fuquay Varina Planning and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A
PEA-9	Annual participation in Hurricane Prep Week (May 13-19) ReadyNC.gov (social media campaign, newsletter, published materials)	1	1	Flood, Landslide, Hurricane	High	Fuquay Varina Planning and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A
PEA-10	Annual participation in Earthquake Awareness Month and National Earthquake Drill (February & October) Ready.gov (social media campaign, newsletter, published materials)	1	1	Earthquake	High	Fuquay Varina Planning and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A
PEA-11	Annual participation in National Dam Safety Awareness Day (May 31) Ready.gov (social media campaign, newsletter, published materials)	1	1	Dam Failure	High	Fuquay Varina Planning and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A
PEA-12	Structured public education through social media, brochures, and flyers in critical facilities	1	1	All	High	Fuquay Varina Planning, Fire & Police, and Public Information	Budgeted Staff Time	Annual Budget	Ongoing - Next 5 Years	New	N/A

Annex F Town of Garner

F.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Garner.

Table F.1 – HMPC Members

Agency	Representative	Position or Title
Planning Department	David Bamford	Planning Services Manager
Planning Department	Jeff Triezenberg	Planning Director

F.2 COMMUNITY PROFILE

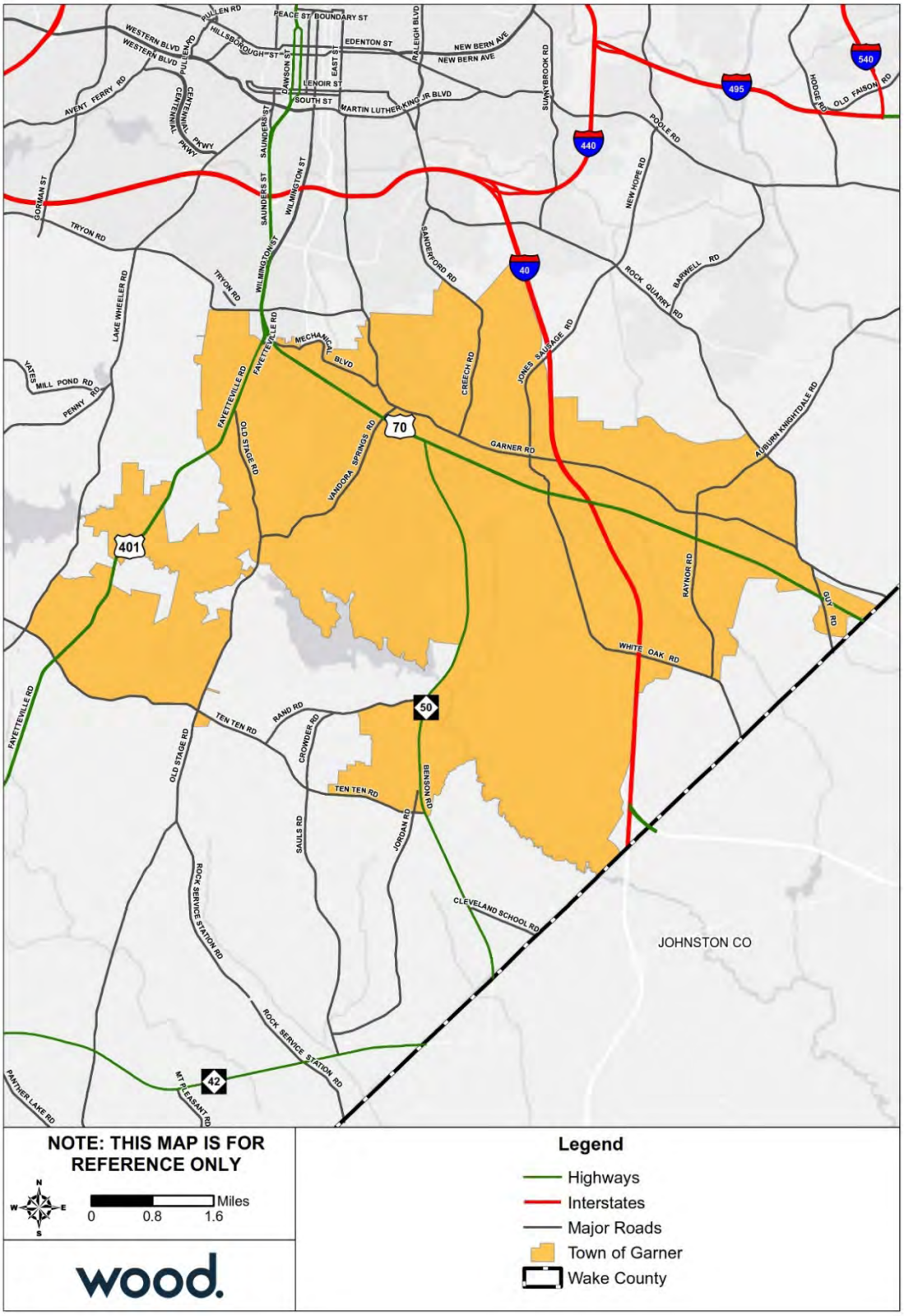
Geography

The Town of Garner is located in southeastern Wake County. It is neighbored by Raleigh to the northwest. Garner is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. The Town comprises a total land area of 14.8 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 3,961 acres of wetlands in Garner.

Figure F.1 shows a base map of major transportation routes in the Town of Garner.

Figure F.1 – Major Transportation Routes – Town of Garner



Source: Wake County GIS Open Data

Population and Demographics

Table F.2 provides population counts and growth estimates for the Town of Garner as compared to the County overall. Table F.3 provides demographic information for Garner as compared to the whole County.

Table F.2 – Population Counts, Garner, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Garner	17,575	25,745	28,048	2,303	8.9%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates

Table F.3 – Racial Demographics, Garner, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Garner	61.9%	32.5%	1.9%	1.4%	2.2%	10.8%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates
*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Garner in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure F.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table F.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Garner	67	19	0	297	0	309	0	110	23	0	0	0	0	27	1	3	4	0	**860**

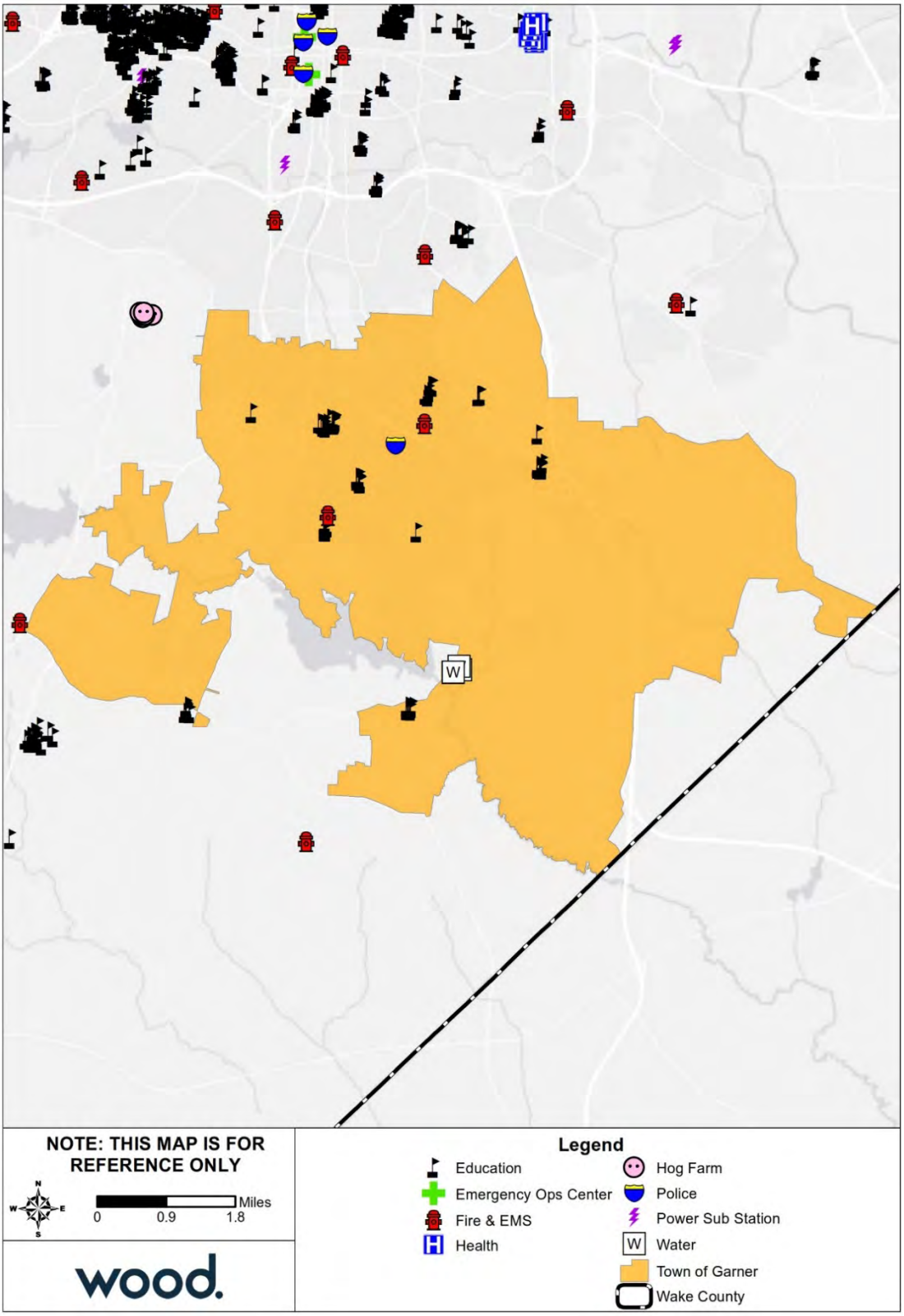
Source: NCEM Risk Management Tool

Table F.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Garner	69	84	59	23	0	17	2	0	**254**

Source: NCEM Risk Management Tool

Figure F.2 – Critical Facilities, Town of Garner



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Garner, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table F.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table F.6 – Parcels Developed 2011 or Later, Town of Garner

Land Class	Number of Parcels	Sum of Building Value
Agriculture	1	$164,497
Apartment	6	$104,048,398
Commercial	34	$70,473,139
EXEMPT	8	$77,248,963
Forestry	1	$255,900
HOA	1	$230,967
Industrial	13	$21,498,216
Mobile Home Park	1	$137,073
Part Exempt	7	$10,751,847
Residential Less Than 10 Acres	628	$150,682,569
Retirement Home	3	$19,861,451
Vacant	1	-
Grand Total	**704**	**$455,353,020**

Source: Wake County Open Data; retrieved April 8, 2019

There are three listings on the National Register of Historic Places for the Town of Garner. These sites are listed in the table below.

Table F.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
89002157	Downtown Garner Historic District	12/21/1989	District	Garner
93000544	Edenwood	7/2/1993	Building	Garner
09001106	Meadowbrook Country Club	12/16/2009	District	Garner

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The table below details key housing statistics for Garner as compared to the County overall.

Table F.8 – Housing Statistics, Garner, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Garner	10,993	11,633	6.4%	60.5%	7.5%	$167,700

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Garner as compared to the County overall.

Table F.9 – Employment Statistics, Garner, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Garner	15,338	64.6	4.1	31.2	6.0

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table F.10 – Percent of Employed Population by Occupation, Garner, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Garner	42.2	15.8	24.9	8.3	8.8

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

F.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Garner than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

F.3.1 Flood

Table F.11 details the acreage of the Town of Garner by flood zone on the effective DFIRM. Per this assessment, over 7 percent of Garner falls within the mapped 1%-annual-chance floodplains.

Table F.11 – Flood Zone Acreage in the Town of Garner

Flood Zone	Acreage	Percent of Total (%)
Zone A	33.81	0.14
Zone AE	1,853.73	7.35
Zone X (500-year)	177.48	0.71
Zone X Unshaded	22,919.84	91.80
Total	**24,966.86**	--

Source: FEMA Effective DFIRM; Wake County GIS

Figure F.3 reflects the effective mapped flood hazard zones for the Town of Garner, and Figure F.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in the Town of Garner, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table F.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table F.12 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain, Town of Garner

Land Class	Number of Parcels	Sum of Building Value
Commercial	1	$627,557
EXEMPT	2	$19,510,405
Industrial	2	$2,617,038
Residential Less Than 10 Acres	4	$761,238
Retirement Home	2	$16,116,150
Grand Total	**11**	**$39,632,388**

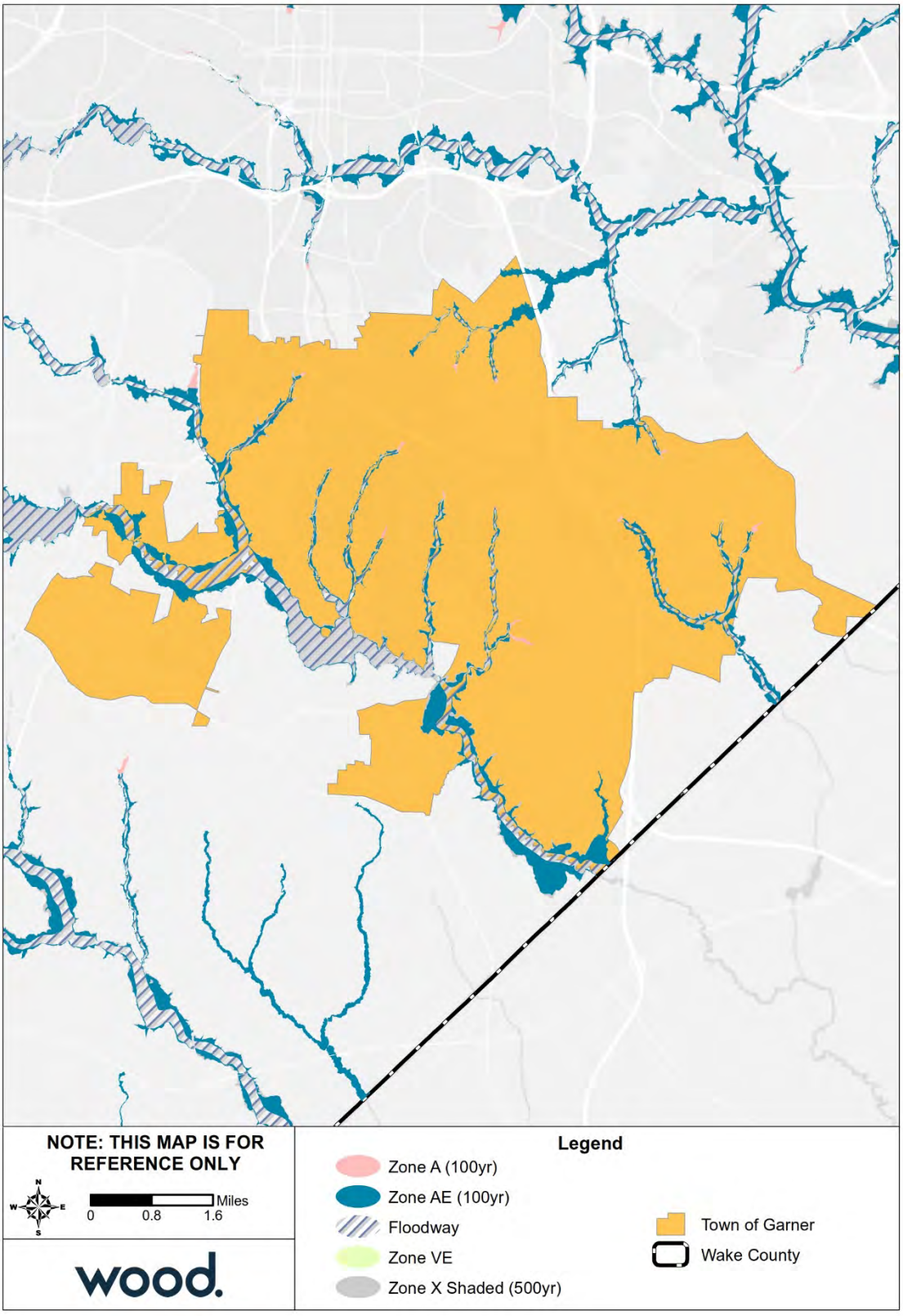
Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Table F.13 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector and flood event in the Town of Garner.

Table F.13 – Critical Facilities Exposed to Flooding, Town of Garner

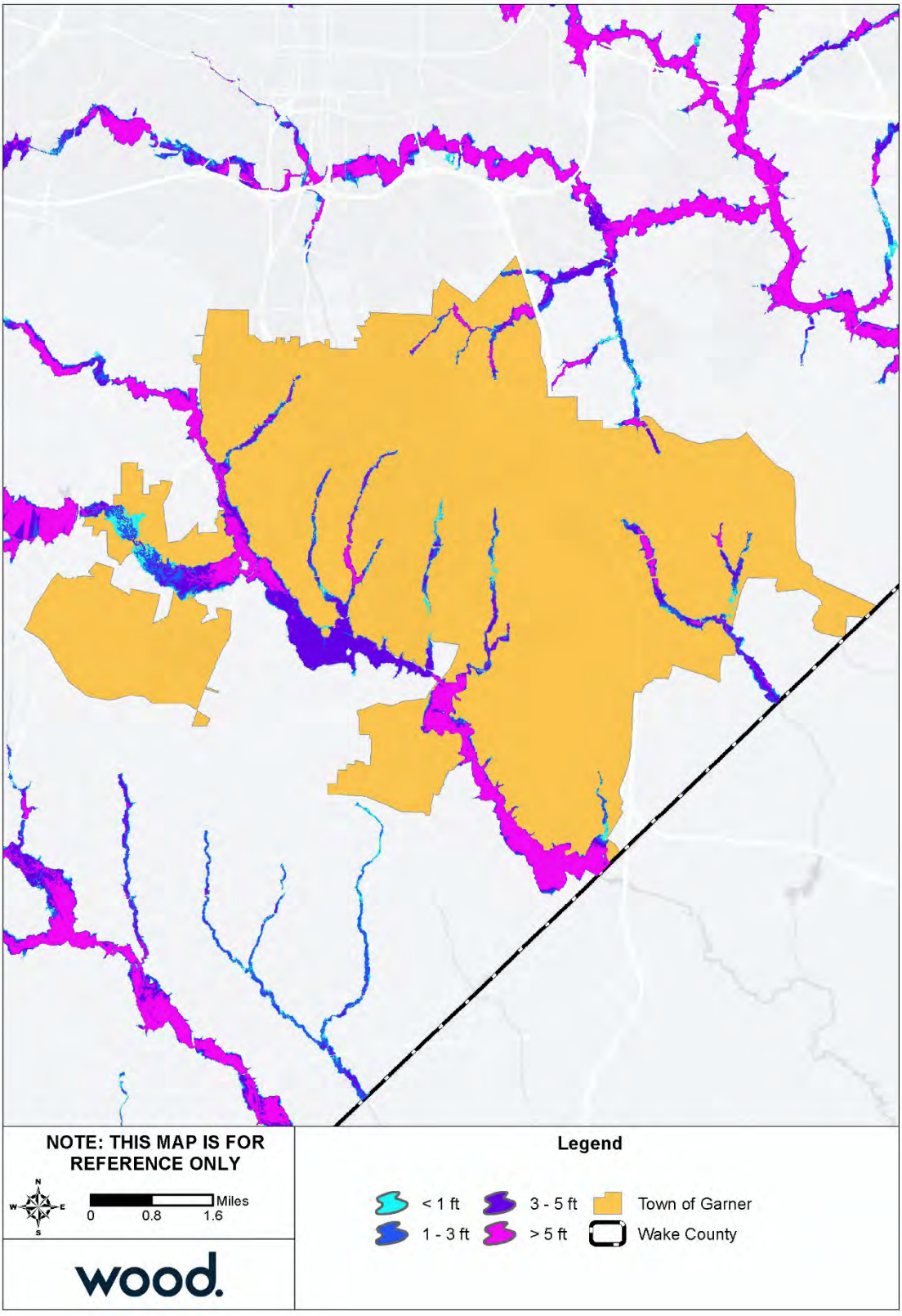
Sector	Event	Number of Buildings at Risk	Estimated Damages
Commercial Facilities	100 Year	1	$1,279
All Categories	**100 Year**	**1**	**$1,279**

Figure F.3 – FEMA Flood Hazard Areas, Town of Garner



Source: FEMA Effective DFIRM

Figure F.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Garner



Source: FEMA Effective DFIRM

F.3.2 Wildfire

Table F.14 summarizes the acreage in the Town of Garner that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 16 percent of the Town of Garner is not included in the WUI.

Table F.14 – Wildland Urban Interface Acreage, Town of Garner

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*4,028.2*	*16.1%*
	LT 1hs/40ac	2,057.0	8.2%
	1hs/40ac to 1hs/20ac	1,503.9	6.0%
	1hs/20ac to 1hs/10ac	1,864.0	7.5%
	1hs/10ac to 1hs/5ac	2,475.4	9.9%
	1hs/5ac to 1hs/2ac	4,206.6	16.8%
	1hs/2ac to 3hs/1ac	8,619.4	34.5%
	GT 3hs/1ac	212.4	0.9%
	Total	24,966.8	

Source: Southern Wildfire Risk Assessment

Figure F.5 depicts the WUI for the Town of Garner. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure F.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure F.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

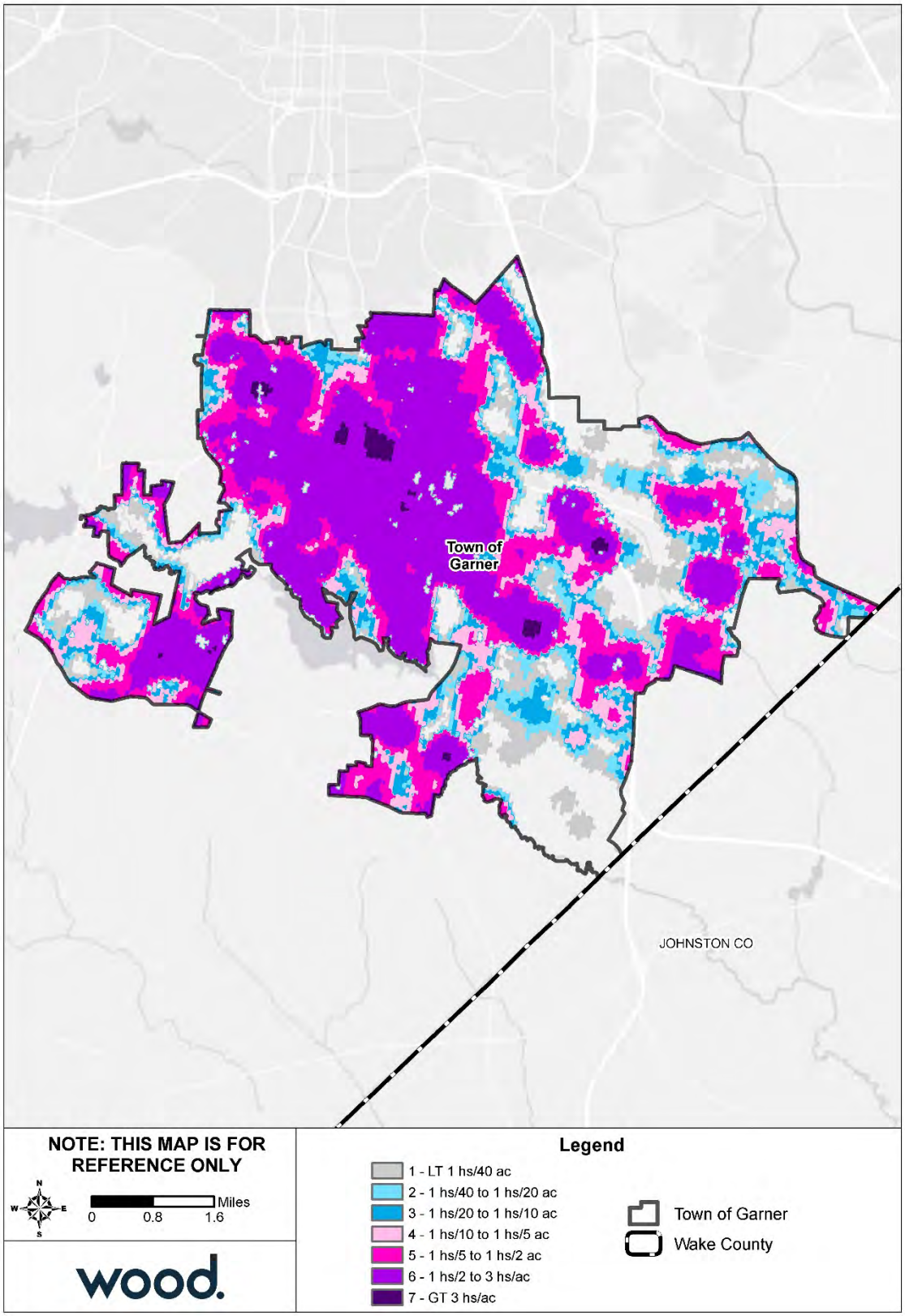
Potential fire intensity is highest in southwest and east Garner. Some of these areas do fall within the WUI but have a lower burn probability. The area of greatest risk in the Town of Garner are in the central-eastern region where WUI overlays with moderate burn probability and moderate to high potential fire intensity levels.

Table F.15 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector at risk to wildfire hazard.

Table F.15 – Critical Facilities Exposed to Wildfire, Town of Garner

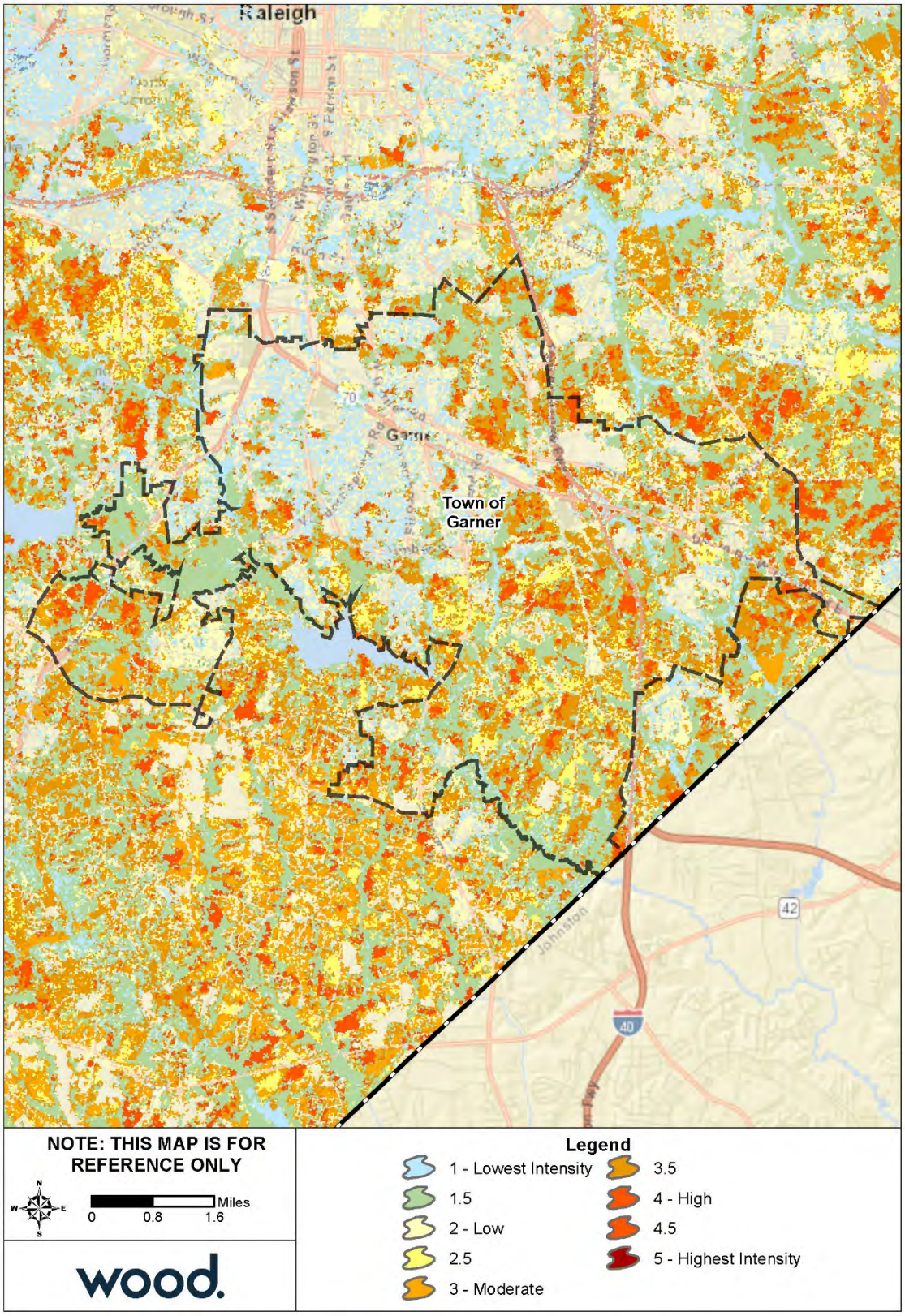
Sector	Event	Number of Buildings at Risk	Estimated Damages
Critical Manufacturing	Wildfire Hazard	1	$19,571,810
All Categories	**Wildfire Hazard**	**1**	**$19,571,810**

Figure F.5 – Wildland Urban Interface, Town of Garner



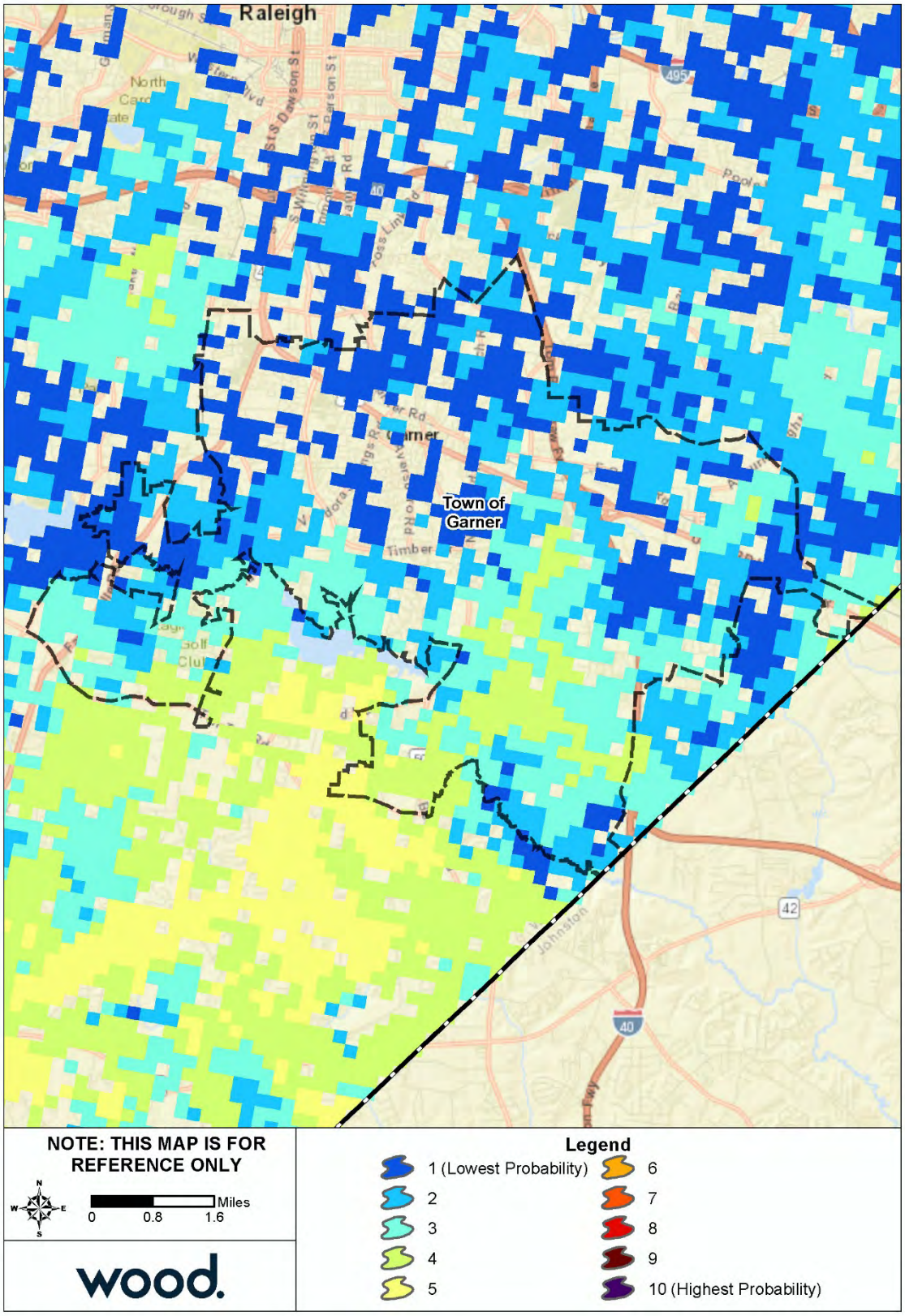
Source: Southern Wildfire Risk Assessment

Figure F.6 – Fire Intensity Scale, Town of Garner



Source: Southern Wildfire Risk Assessment

Figure F.7 – Burn Probability, Town of Garner



Source: Southern Wildfire Risk Assessment

F.4 CAPABILITY ASSESSMENT

F.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Garner were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Garner has an overall capability rating of Moderate. The Town's Self-Assessment of key capability areas is summarized in Table F.16 below.

Table F.16 – Capability Self-Assessment, Garner

Capability Area	Rating
Plans, Ordinances, Codes and Programs	Moderate
Administrative and Technical Capability	Moderate
Fiscal Capability	High
Education and Outreach Capability	Moderate
Mitigation Capability	Moderate
Political Capability	Moderate
Overall Capability	Moderate

F.4.2 Floodplain Management

The Town of Garner joined the NFIP through emergency entry in November 1974 and has been a regular participant since July 1978. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table F.17 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	126	$81,260	$32,717,500	20	$145,059.32
2-4 Family	3	$6,314	$308,300	0	$0.00
All Other Residential	3	$2,304	$1,500,000	0	$0.00
Non-Residential	1	$1,204	$300,000	1	$22,684.95
Total	133	$91,082	$34,825,800	21	$167,744.27

Source: FEMA Community Information System, accessed November 2018

Table F.18 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	46	$52,704	$10,132,200	17	$121,765.09
A Zones	2	$6,185	$288,300	1	$2,531.54
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone					

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Standard	2	$1,578	$318,300	0	$0.00
Preferred	83	$30,615	$24,087,000	3	$43,447.64
Total	133	$91,082	$34,825,800	21	$167,744.27

Source: FEMA Community Information System, accessed November 2018

Table F.19 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	35	$46,111	$7,427,900	15	$118,270.13
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	27	$9,775	$6,966,200	2	$4,832.43
Standard	1	$662	$99,200	0	$0.00
Preferred	26	$9,113	$6,867,000	2	$4,832.43
Total	62	$55,886	$14,394,100	17	$123,102.56

Source: FEMA Community Information System, accessed November 2018

Table F.20 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	11	$6,593	$2,704,300	2	$3,494.96
A Zones	2	$6,185	$288,300	1	$2,531.54
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	58	$22,418	$17,439,100	1	$38,615.21
Standard	1	$916	$219,100	0	$0.00
Preferred	57	$21,502	$17,220,000	1	$38,615.21
Total	71	$35,196	$20,431,700	4	$44,641.71

Source: FEMA Community Information System, accessed November 2018

F.5 MITIGATION STRATEGY

Town of Garner											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Evaluate the need for regulations to encourage use of low impact development site planning principles to help control stormwater volume impacts.	4	1	Flood, Dam Failure, Hurricane	Moderate	Garner Engineering and Planning	Staff time	Local	2-3 years (2021)	Not Started – Carry Forward	Will be considered during our development code (UDO) update over the next 2 years
P-2	UDO: Continue to provide stream and creek buffers, and floodplain and wetland protection.	3	2	Flood, Dam Failure, Hurricane	High	Garner Planning	Staff time	Local	2-3 years (2021)	In-Progress – Carry Forward	Will be considered during our development code (UDO) update over the next 2 years
P-3	Provide adequate water supply through storage and interconnection with other public water systems.	3	2	Drought	Moderate	City of Raleigh and Garner Engineering	TBD	Local	2-3 years (2020)	In-Progress – Carry Forward	Support City of Raleigh's effort with the reservoir project at NC 50 and New Bethel Church Road
P-4	Garner Transportation Plan – Continue to address disaster preparedness (evacuation) through road interconnectivity, paved roads, and widening of roads.	4	2	Flood, Dam Failure, Earthquake, Hurricane, Severe Weather, Severe Winter Weather, Tornado, Hazardous Materials Incident, Radiological Emergency, Terrorism	Moderate	Garner Planning and Public Works	Improvement costs TBD on case-by-case basis	Local, State, Federal	Ongoing - Next 5 Years	In-Progress – Carry Forward	The Town's emergency preparedness plan follows the Wake County for routes. The Town's 2018 Transportation Plan does encourage and promote interconnectivity.
P-5	Develop for public dissemination building inspections brochures regarding high winds, water damage prevention, and tie downs for accessory structures.	1	1	Flood, Dam Failure, Earthquake, Hurricane, Severe Weather, Severe Winter Weather, Tornado	Moderate	Garner Inspections	Staff time and materials	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	We do this annually - seasonal brochures based on weather threats
P-6	The Town will inventory all its structures located within or immediately adjacent to known flood hazard areas.	2	2	Flood	Moderate	Garner Planning and Engineering	Staff time	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Town reviews when data is available (Flood Plain mapping, new LIDAR data)
P-7	In the upcoming zoning and development ordinance update / re-write (UDO), look for ways discourage and steer high density residential and other at-risk populations (daycares, schools, and retirement facilities as examples)	4	1	Hazardous Materials	Moderate	Garner Planning and Fire / Building Inspections	Staff time	Local	2-3 years	New	The Town will update the UDO (Zoning & Development code) soon
Property Protection											
PP-1	The Town has a service to respond to requests and questions from citizens regarding actions they may take to improve drainage, halt erosion, and to relocate, renovate or retrofit structures being flooded.	1	1	Flood	Moderate	Garner Engineering	Staff time	Local, Private	Ongoing - Next 5 Years	In-Progress – Carry Forward	Normal operations; ongoing activity.
Natural Resource Protection											
NRP-1	Develop and adopt a conservation subdivision ordinance to help preserve significant natural features.	4	1	Flood, Hurricane, Severe Weather, Tornado, Winter Storm	Moderate	Garner Planning	Staff time	Local	2-3 Years (2021)	Not Started – Carry Forward	Will be considered during our development code (UDO) update over the next 2 years
Structural Projects											
SP-1	Pursue stream restoration projects	3	2	Flood	High	Garner Engineering	TBD	Local, Regional, State, Federal	2-3 Years (2021)	Not Started – Carry Forward	Consideration as a capital project under the "stormwater" category as problem areas are identified.
Emergency Services											
ES-1	Develop a Business Continuity Plan that is the primary document housing all disaster related plans and procedures including Hazard Mitigation Plan, Debris Management Plan, Multi-Hazard Plan as well as disaster response plans for all Town departments.	2	2	All Hazards	High	Garner Police, Public Works, and Administration	$25,000-$50,000	Local	2-3 Years	In-Progress – Carry Forward	Target 2021
Public Education and Awareness											

Town of Garner											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
PEA-1	Town website will be updated with public access to information pertaining to evacuation routes, emergency contact numbers, and detailed weather reports in case of emergency.	1	2	Flood, Hurricane, Earthquake, Severe Weather, Tornado, Severe Winter Storm, Wildfire, Hazardous Materials Incident, Radiological Emergency	Moderate	Police & Fire Departments, Garner Communications	Staff time	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Target 2021
PEA-2	Develop and maintain a hazard mitigation section on the Town website.	1	1	All Hazards	Moderate	Garner Communications, and Garner IT	Staff time	Local	2-3 Years	Not Started – Carry Forward	Target 2021
PEA-3	Website - The Town maintains its own website which is able to provide up to date information for the public. Town continuously updates the site with additional resources.	1	1	All Hazards	High	Garner Police & Fire, Communications, and Garner IT	Staff time	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Completed the initial effort; it is in place and on-going

Annex G Town of Holly Springs

G.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Holly Springs.

Table G.1 – HMPC Members

Agency	Representative	Position or Title
Town of Holly Springs	Kimberly Keyes	Project and Construction Manager
Engineering Department	Daniel Colavito	Environmental Specialist
N/A	John Sutherland	Citizen Stakeholder

G.2 COMMUNITY PROFILE

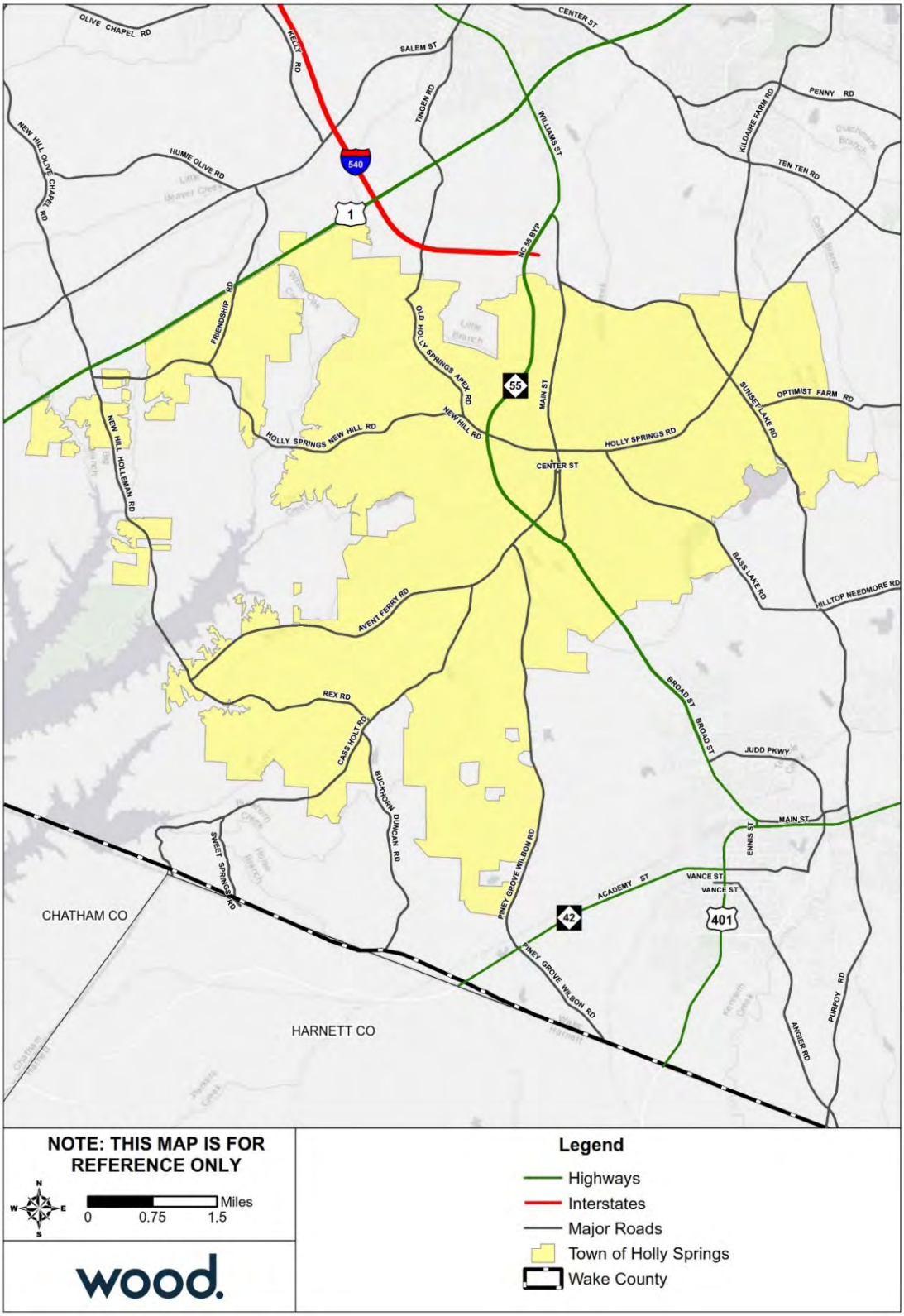
Geography

The Town of Holly Springs is located in southwestern Wake County. It is neighbored by Apex to the north and northwest, Cary to the north and northeast, and Fuquay-Varina to the southeast. The Town is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Holly Springs comprises a total land area of 15.0 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 1,617 acres of wetlands in Holly Springs.

Figure G.1 shows a base map of major transportation routes in the Town of Holly Springs.

Figure G.1 – Major Transportation Routes – Town of Holly Springs



Source: Wake County GIS Open Data

Population and Demographics

Table G.2 provides population counts and growth estimates for the Town of Holly Springs as compared to the County overall. Table G.3 provides demographic information for Holly Springs as compared to the whole County.

Table G.2 – Population Counts, Holly Springs, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Holly Springs	9,192	24,661	31,827	7,166	29.1%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates

Table G.3 – Racial Demographics, Holly Springs, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Holly Springs	79.6%	11.9%	2.5%	1.8%	3.8%	6.5%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates

*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Holly Springs in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure G.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table G.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Holly Springs	68	6	0	118	0	42	0	37	3	0	0	0	0	9	0	5	3	0	**291**

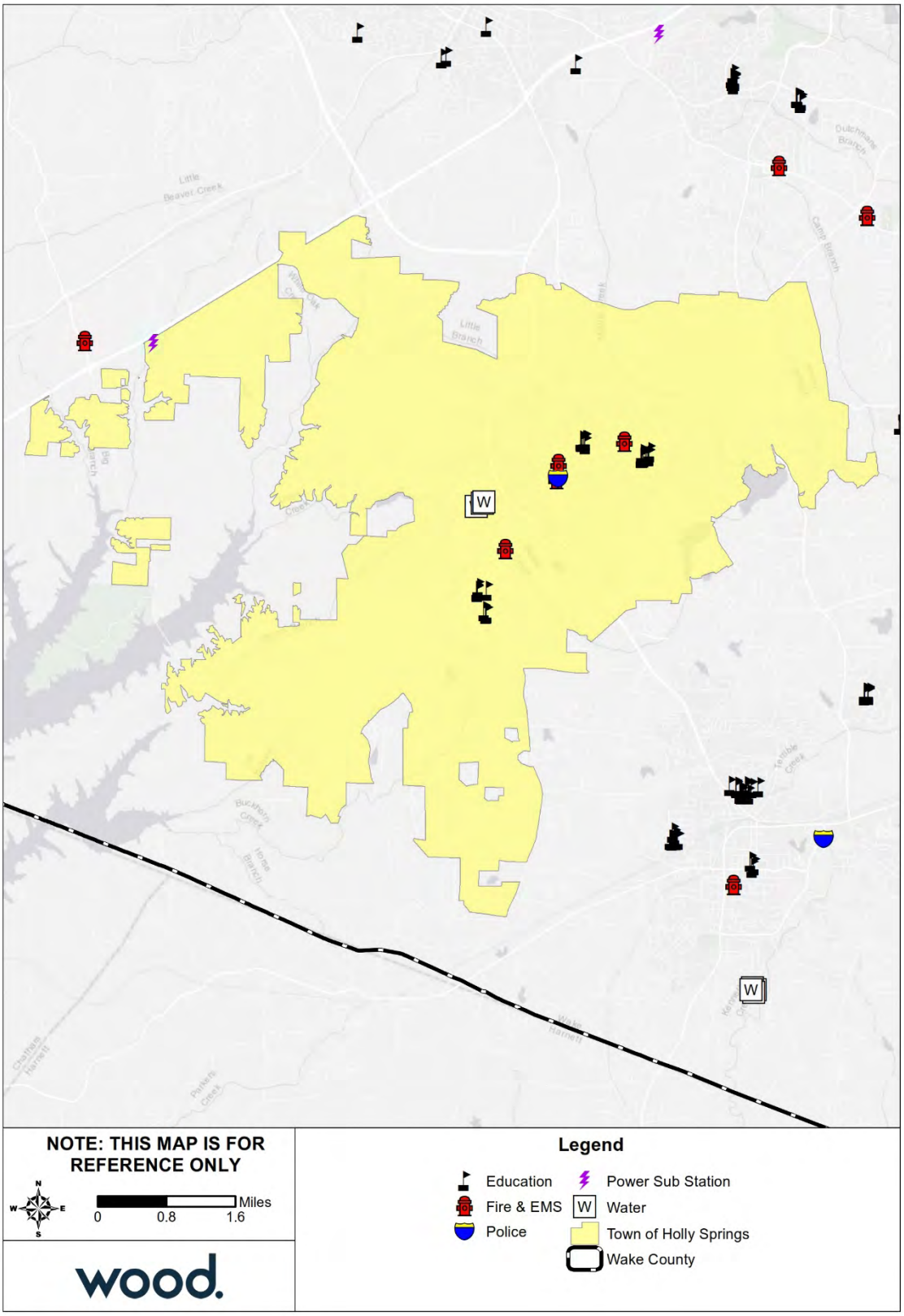
Source: NCEM Risk Management Tool

Table G.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Holly Springs	14	26	14	14	0	5	2	0	**75**

Source: NCEM Risk Management Tool

Figure G.2 – Critical Facilities, Town of Holly Springs



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Holly Springs, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table G.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table G.6 – Parcels Developed 2011 or Later, Town of Holly Springs

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	6	$2,361,258
Agriculture	2	$981,809
Apartment	4	$50,897,618
Commercial	37	$101,721,338
EXEMPT	8	$36,391,243
Golf Course	1	$76,222
HOA	8	$352,756
Industrial	3	$5,962,559
Part Exempt	10	$2,763,591
Residential Less Than 10 Acres	3,525	$1,060,818,168
Vacant	2	-
Grand Total	**3,606**	**$1,262,326,562**

Source: Wake County Open Data; retrieved April 8, 2019

There are two listings on the National Register of Historic Places for the Town of Holly Springs. These sites are listed in the table below.

Table G.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
97000218	Leslie--Alford--Mims House	3/8/1997	Building	Holly Springs
10000164	Holly Springs Masonic Lodge	4/7/2010	Building	Holly Springs

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The following table details key housing statistics for Holly Springs as compared to the County overall.

Table G.8 – Housing Statistics, Holly Springs, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2016)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Holly Springs	8,658	10,425	20.4%	82.2%	3.0%	$264,500

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Holly Springs as compared to the County overall.

Table G.9 – Employment Statistics, Holly Springs, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Holly Springs	16,121	69.4	2.6	27.7	3.6

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table G.10 – Percent of Employed Population by Occupation, Holly Springs, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Holly Springs	54.8	9.3	24.3	3.7	7.9

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

G.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Holly Springs than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

G.3.1 Flood

Table G.11 details the acreage of the Town of Holly Springs by flood zone on the effective DFIRM. Per this assessment, over 7 percent of Holly Springs falls within the mapped 1%-annual-chance floodplains.

Table G.11 – Flood Zone Acreage in the Town of Holly Springs

Flood Zone	Acreage	Percent of Total (%)
Zone A	2.51	0.01
Zone AE	1,063.67	7.35
Zone X (500-year)	59.35	0.29
Zone X Unshaded	19,253.06	94.48
Total	**20,378.59**	**--**

Source: FEMA Effective DFIRM; Wake County GIS

Figure G.3 reflects the effective mapped flood hazard zones for the Town of Holly Springs, and Figure G.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in Town of Holly Springs, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

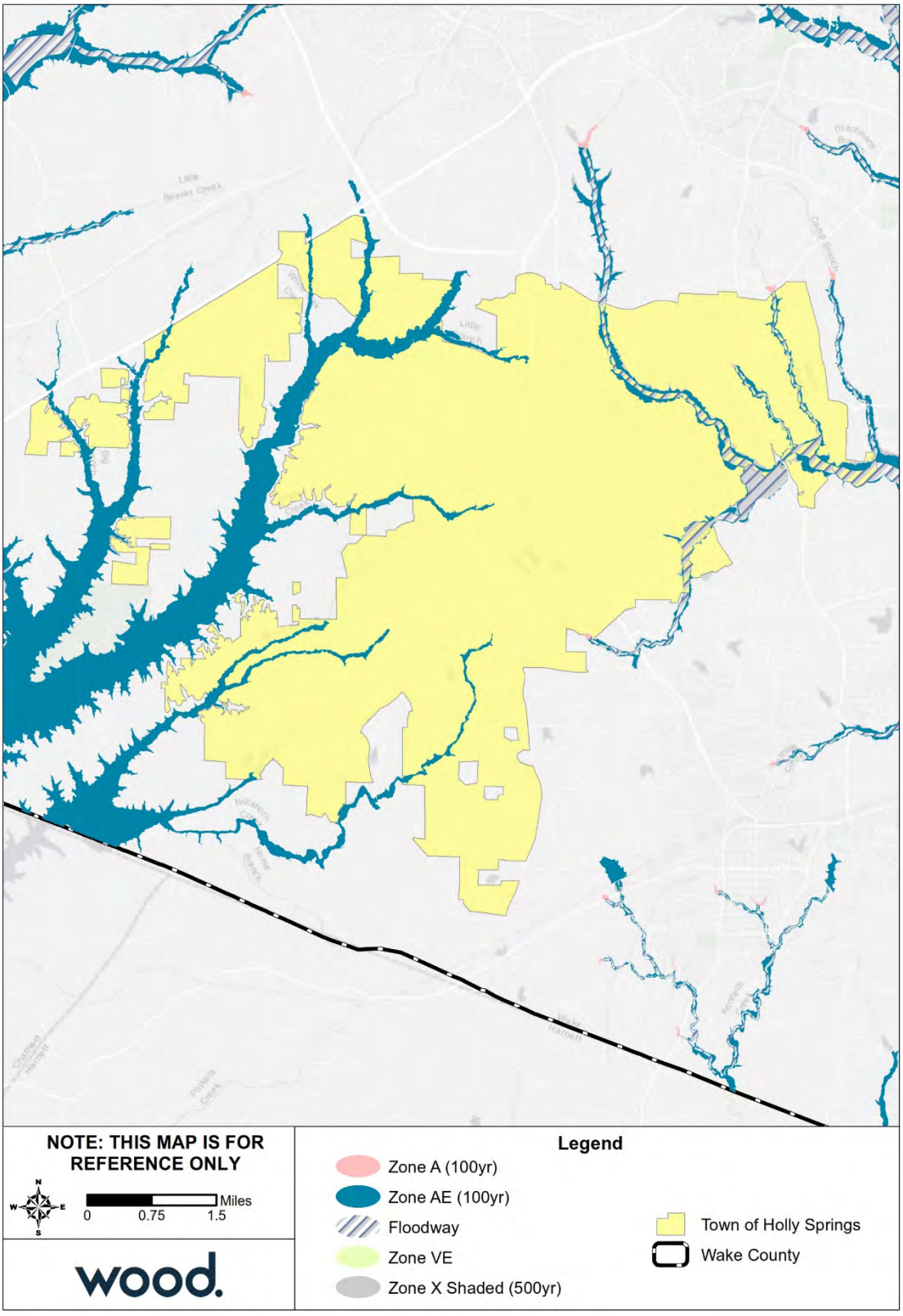
Table G.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table G.12 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain, Town of Holly Springs

Land Class	Number of Parcels	Sum of Building Value
Golf Course	1	$76,222
Residential Less Than 10 Acres	34	$12,917,905
Grand Total	**35**	**$12,994,127**

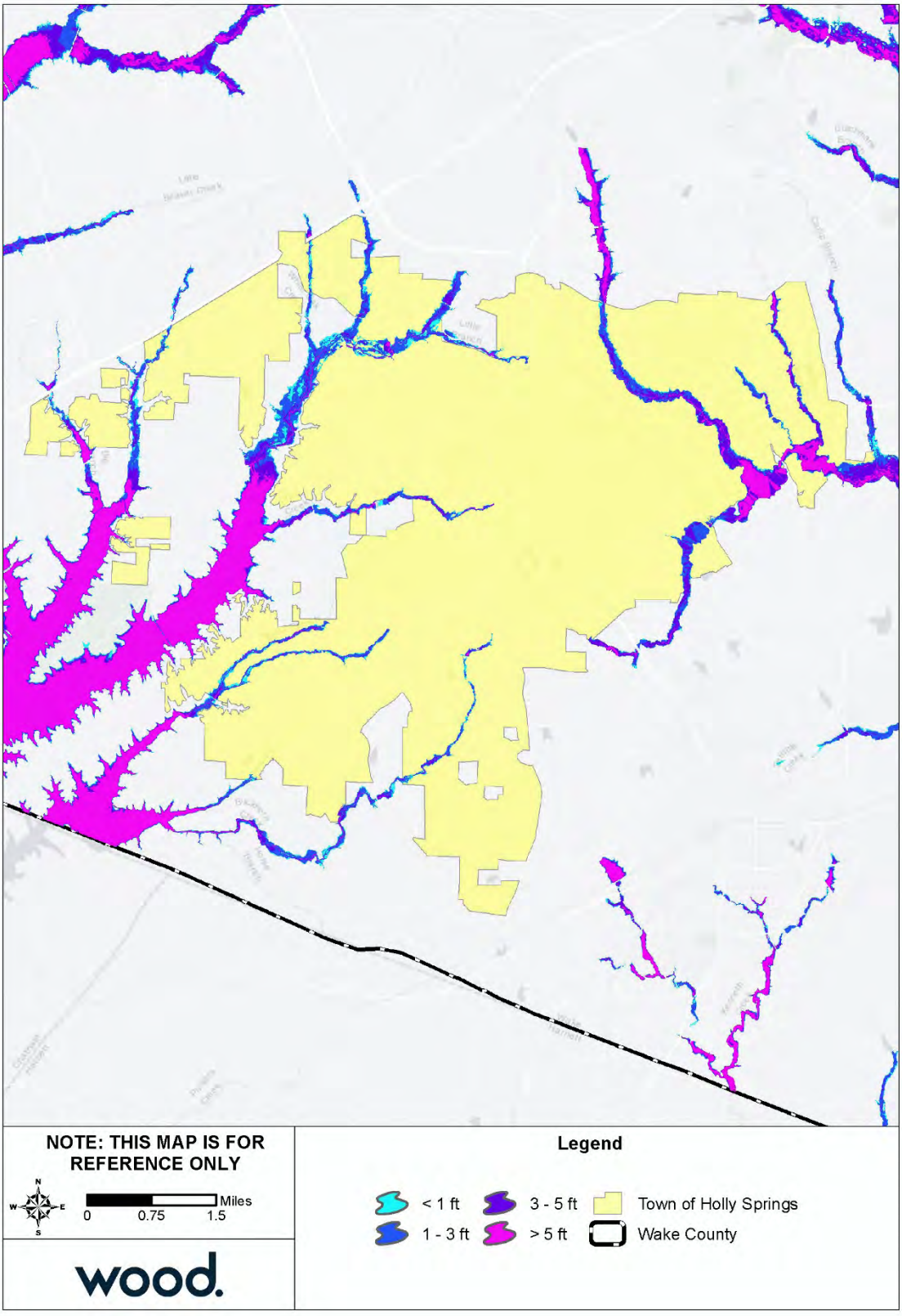
Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Figure G.3 – FEMA Flood Hazard Areas, Town of Holly Springs



Source: FEMA Effective DFIRM

Figure G.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Holly Springs



Source: FEMA Effective DFIRM

G.3.2 Wildfire

Table G.13 summarizes the acreage in the Town of Holly Springs that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 24 percent of the Town of Holly Springs is not included in the WUI.

Table G.13 – Wildland Urban Interface Acreage, Town of Holly Springs

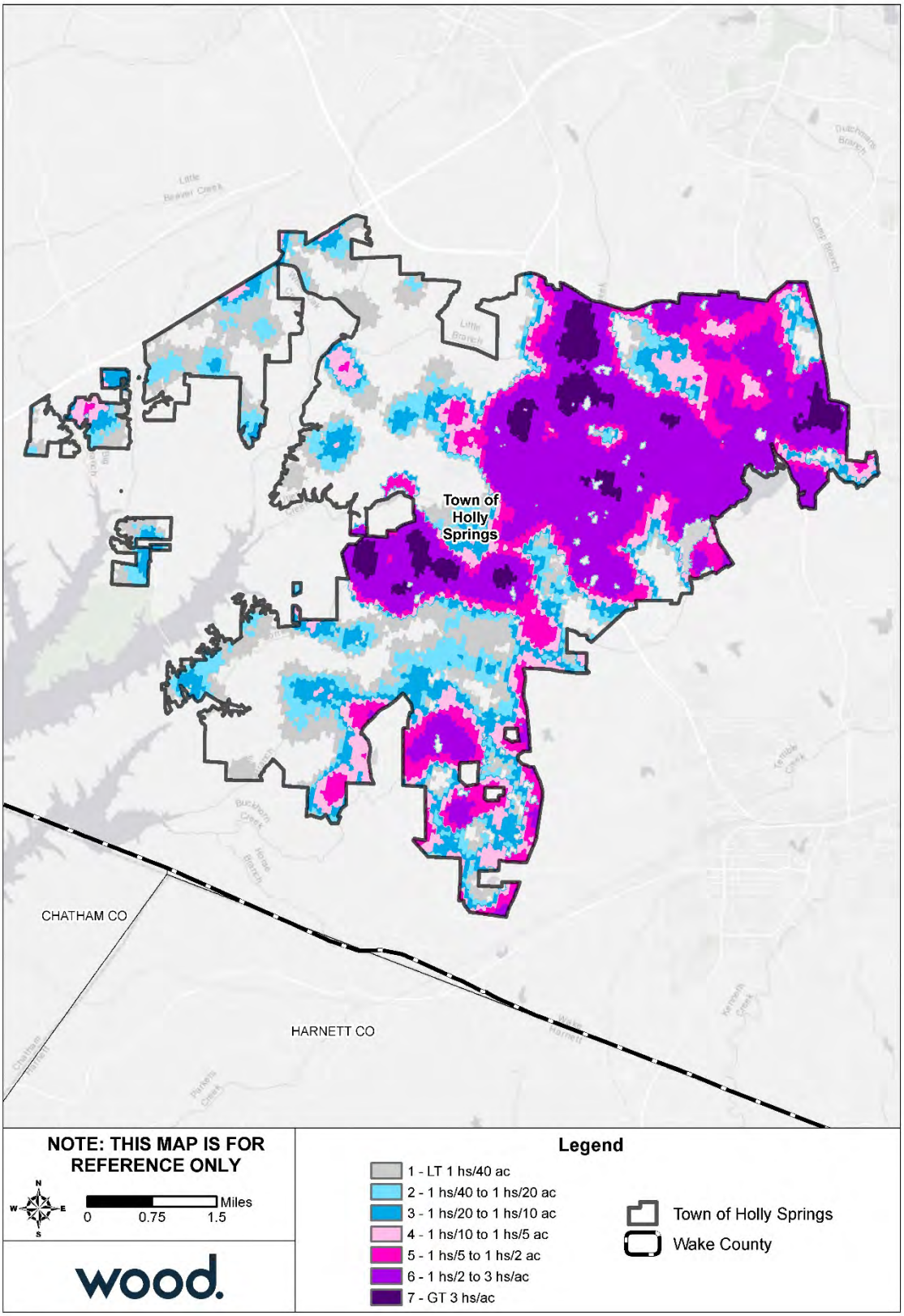
	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*4,967.0*	*24.3%*
	LT 1hs/40ac	2,520.9	12.3%
	1hs/40ac to 1hs/20ac	1,814.0	8.9%
	1hs/20ac to 1hs/10ac	1,783.3	8.7%
	1hs/10ac to 1hs/5ac	1,588.4	7.8%
	1hs/5ac to 1hs/2ac	2,045.1	10.0%
	1hs/2ac to 3hs/1ac	4,961.7	24.3%
	GT 3hs/1ac	757.2	3.7%
	Total	20,437.5	

Source: Southern Wildfire Risk Assessment

Figure G.5 depicts the WUI for the Town of Holly Springs. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure G.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure G.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

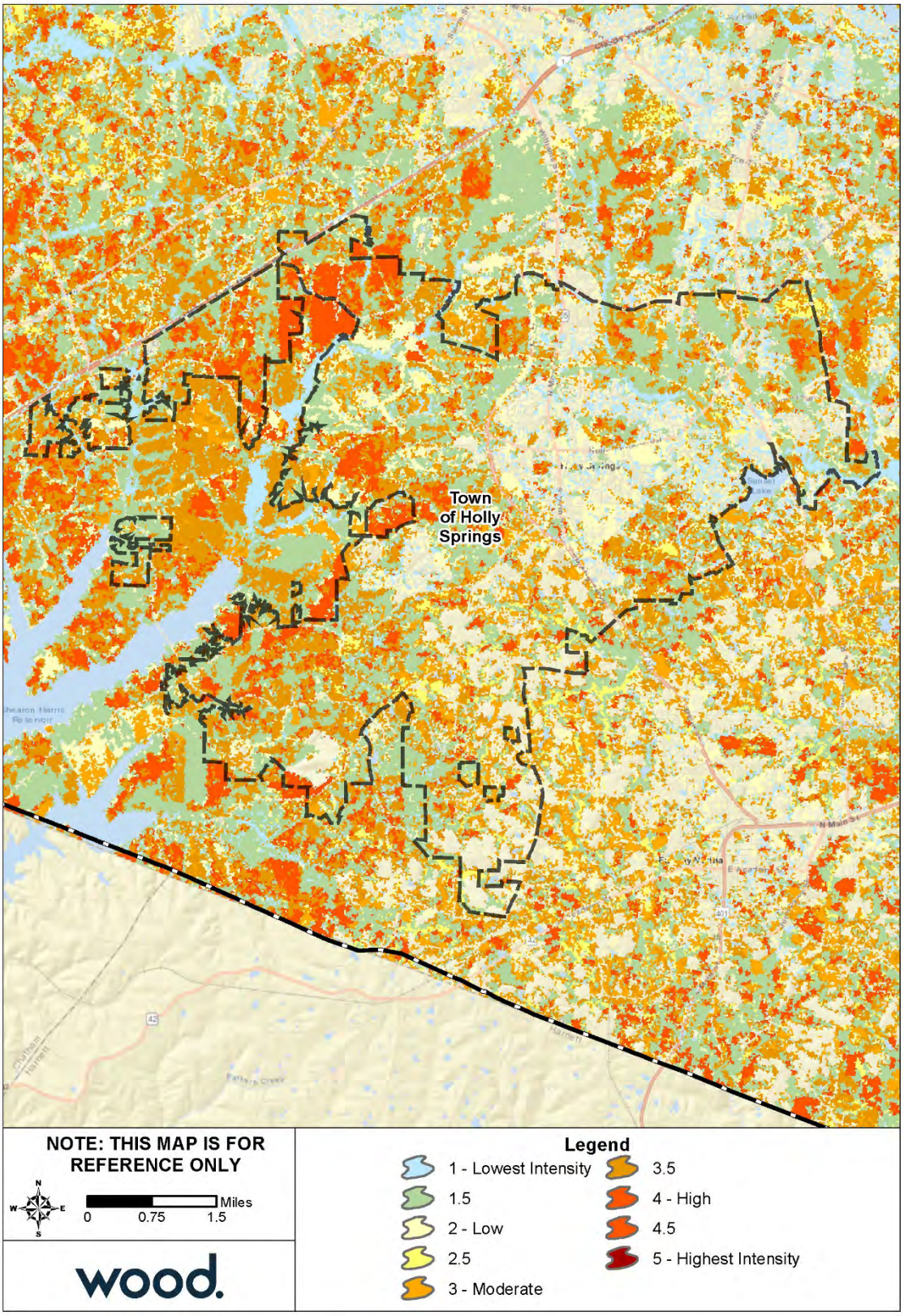
Potential fire intensity is highest in northwest and west Holly Springs. These areas are largely outside of the WUI and have low burn probability. Southeast Holly Springs has a moderate burn probability, however potential fire intensity is relatively low in most of the area.

Figure G.5 – Wildland Urban Interface, Town of Holly Spring



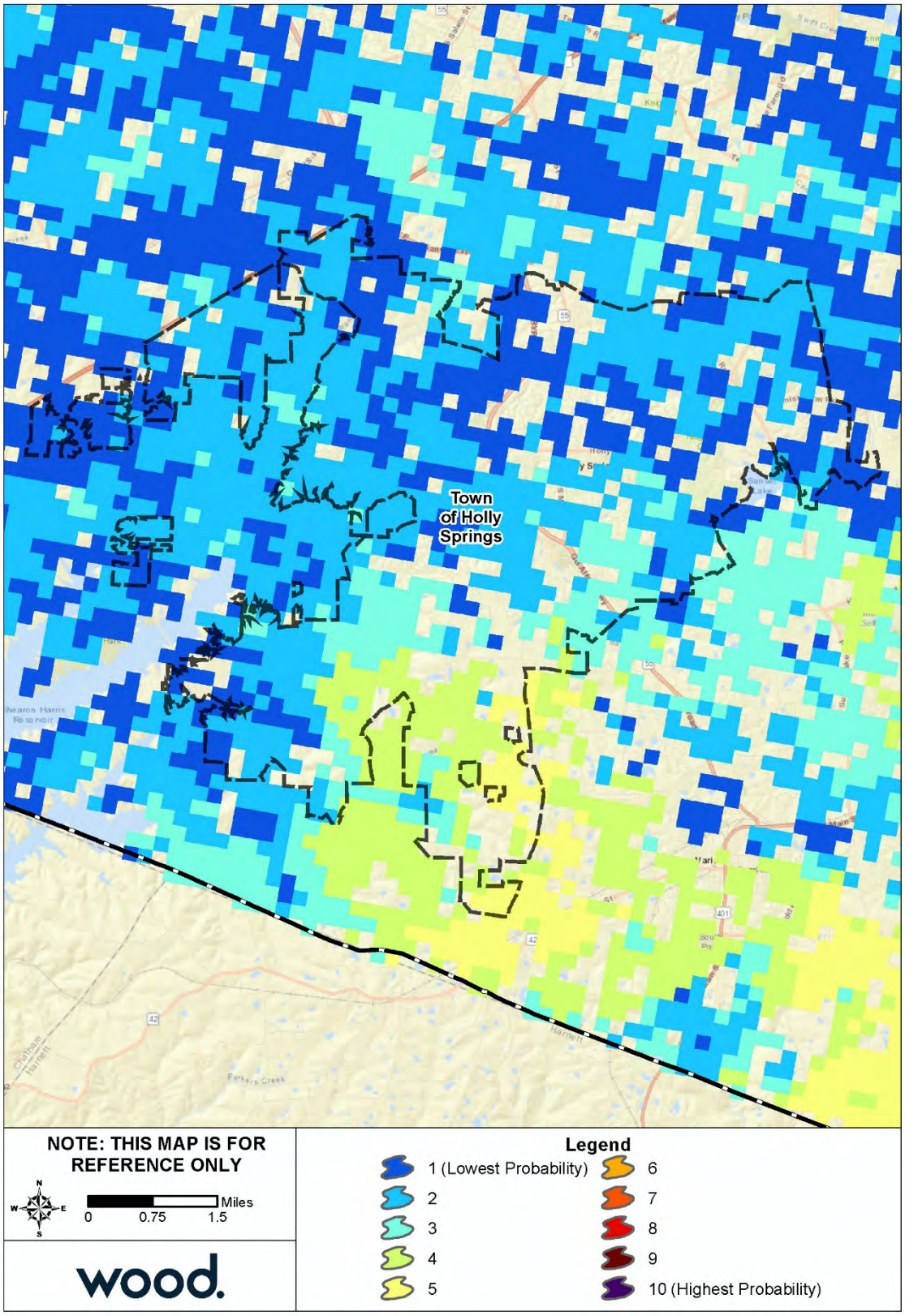
Source: Southern Wildfire Risk Assessment

Figure G.6 – Fire Intensity Scale, Town of Holly Springs



Source: Southern Wildfire Risk Assessment

Figure G.7 – Burn Probability, Town of Holly Springs



Source: Southern Wildfire Risk Assessment

G.4 CAPABILITY ASSESSMENT

G.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Holly Springs were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Holly Springs has an overall capability rating of High. The Town's Self-Assessment of key capability areas is summarized in Table G.14 below.

Table G.14 – Capability Self-Assessment, Holly Springs

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	High
Fiscal Capability	High
Education and Outreach Capability	Moderate
Mitigation Capability	Moderate
Political Capability	High
Overall Capability	High

G.4.2 Floodplain Management

The Town of Holly Springs joined the NFIP as a regular participant in December 1994. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table G.15 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	91	$35,225	$27,559,100	10	$178,624.43
2-4 Family	1	$351	$280,000	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	1	$1,660	$949,200	1	$8,969.79
Total	93	$37,236	$28,788,300	11	$187,594.22

Source: FEMA Community Information System, accessed November 2018

Table G.16 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	9	$6,785	$3,679,300	8	$134,388.63
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
B, C & X Zone					
Standard	0	$0	$0	1	$6,237.93
Preferred	84	$30,451	$25,109,000	2	$46,967.66
Total	93	$37,236	$28,788,300	11	$187,594.22

Source: FEMA Community Information System, accessed November 2018

Table G.17 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	0	$0	$0	0	$0.00
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	1	$373	$350,000	0	$0.00
Standard	0	$0	$0	0	$0.00
Preferred	1	$373	$350,000	0	$0.00
Total	1	$373	$350,000	0	$0.00

Source: FEMA Community Information System, accessed November 2018

Table G.18 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	9	$6,785	$3,679,300	8	$134,388.63
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	83	$30,078	$24,759,000	3	$53,205.59
Standard	0	$0	$0	1	$6,237.93
Preferred	83	$30,078	$24,759,000	2	$46,967.66
Total	92	$36,863	$28,438,300	11	$187,594.22

Source: FEMA Community Information System, accessed November 2018

G.5 MITIGATION STRATEGY

Town of Holly Springs											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Vision Holly Springs Comprehensive Plan - The Town has an existing Comprehensive Plan which includes Land Use, Parks and Recreation, Public Safety, Economic Development, Transportation, Public Utilities and Environment. This plan includes past and current conditions and sets goals for future needs of the Town. The Hazard Mitigation Plan will be incorporated as an additional component of the CGP at plan update.	4	2	All	Moderate	Holly Springs Planning & Zoning	To be determined	Local	1 year	In-Progress – Carry Forward	To be updated in 2019
P-2	Update Floodplain Development Regulations - The Town has an ordinance developed to minimize public and private losses due to flood conditions. The latest update of the Flood Damage Prevention Ordinance was May 2, 2006. (00-23).	4	1	Flood	High	Holly Springs Engineering	No cost	Local	3-5 Years	In-Progress – Carry Forward	Ordinance will be updated once the preliminary maps under review by FEMA/NCDEM are adopted
P-3	Implement Floodplain Development Regulations related to participating in the National Flood Insurance Program	4	1	Flood	High	Holly Springs Engineering	Staff time	Local	2-3 years	Not Started – Carry Forward	The Town restricts or prohibits uses which are dangerous to health, safety and property due to water or erosion hazards or which result in damaging increases in erosion or in flood heights or velocities. (00-23)
P-4	Floodplain Development Regulations - The Town has been a participating member of the National Flood Insurance Program since 1992, The Town evaluated the Town's potential participation in the Community Rating System (CRS) and determined that the amount of insured properties in the Town did not warrant participation in the CRS. However, staff will reevaluate this determination in the future through the implementation of the Floodplain Management Program.	4	1	Flood	High	Holly Springs Engineering	To be determined	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Re-evaluate potential for CRS participation
P-5	Water Emergency Response Plan - Develop Water Emergency Response Plan in accordance with EPA mandate with wastewater emergency plan developed voluntarily.	3	2	All	High	Holly Springs Public Utilities, Engineering	To be determined	Local	3-5 years	In-Progress – Carry Forward	Plan review and update will ensure secondary water sources available during an emergency
Property Protection											
PP-1	Building Acquisition and Clearance - The Town is willing to develop a plan designed to utilize Federal grant resources to assist private property owners in purchasing properties located in flood hazard zones.	3	2	Flood	Low	Holly Springs Code Enforcement	Staff time; acquisition costs TBD on case by case basis	Local, State, Federal	2-3 years	Not Started – Carry Forward	Target for development of plan to enable this activity is now 2019-2021
PP-2	Building Relocation - The Town is willing to develop a plan designed to utilize Federal grant resources to assist private property owners in relocating existing structures out of flood hazard zones.	3	2	Flood	Low	Holly Springs Code Enforcement	Staff time; relocation costs TBD on case by case basis	Local, State, Federal	2-3 years	Not Started – Carry Forward	Target for development of plan to enable this activity is now 2019-2021
PP-3	Building Retrofit - The Town is willing to develop a plan to utilize Federal grant resources to assist private property owners in renovating and retrofitting existing structures in flood hazard zones to reduce vulnerability to flooding damage.	3	2	Flood	Low	Holly Springs Code Enforcement	Staff time; retrofitting costs TBD on case by case basis	Local, State, Federal	2-3 years	Not Started – Carry Forward	Target for development of plan to enable this activity is now 2020-2021
PP-4	Purchase of Open Space, Parks and Greenways - The Parks and Recreation Department is asking for $500,000 for Capital Improvement Projects to purchase open space. The Town also works with Wake County and other agencies to find other funding for open space acquisition. Once funds are obtained the Town will acquire land consistent with Land Use and Master Open Space Plans.	4	2	Flood	Moderate	Holly Springs Parks and Recreation	Land Cost	County & State Agencies	More than 5 years	In-Progress – Carry Forward	Continually seeks new investments
PP-5	Backup Power to Fire and Police Stations – The Town provides backup power to all fire and police stations. Fire Station 1 – backup power provided by a grant; backup power to Fire Station 2 and Fire Station 3 and Police Station provided by local funds.	3	1	All	High	Holly Springs Public Safety	Requires new facility. Cost unknown at this time.	Local, Federal	3-5 Years	In-Progress – Carry Forward	Plans to be developed to establish backup power for Fire Station #3.

Town of Holly Springs											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
PP-6	Emergency Generator for Public Works Building	3	1	All	Moderate	Holly Springs Public Works	To be determined	Local	3-5 Years	In-Progress – Carry Forward	The Town currently has an emergency generator to provide power to the Front Office of the Public Works Building during emergencies. Future goal is to provide 100% generator power to the building.
PP-7	Install additional Generators	3	1	All	High	Holly Springs Public Utilities	To be determined	Local	1 year	In-Progress – Carry Forward	The wastewater treatment plant and sewer lift stations built after 1994 have generators. In emergency situations, the Town also has mobile generators to be used at lift stations built between 1985 – 1994 that are without permanent generators on site. Over the next ten years, the Town would like to purchase generators for lift stations that do not currently have generators.
Natural Resource Protection											
NRP-1	As part of the next phases(s) of the Town's Watershed Masterplan, a map of impervious cover will be created. This information may be used overlain to show which structures are in hazardous locations.	2	2	Flood, Dam Failure, Earthquake, Hurricane, Severe Weather, Tornado, Wildfire	High	Holly Springs Engineering	Staff time	Local	3-5 years	New	N/A
Structural Projects											
S-1	The Town is in the process of pursuing options to improve the existing spillway or create a secondary spillway. Per an agreement with NC Dam Safety, this will be completed within the next 5 years.	3	2	Flood, Dam Failure	High	Holly Springs Engineering, Parks & Recreation	Over $100,000	Local	3-5 years	New	N/A
S-2	Reservoirs/Retention/Detention Basins - The Town does not currently maintain any retention or detention basins. The Town does maintain Bass Lake Dam. The Town regularly provides maintenance of vegetation and minor erosion while providing visual inspections of the dam. If larger repairs are required the Town will find appropriate means to resolve the problem. The Town also has a few small ponds located on existing parks. The Town maintains these ponds consistent with measures taken to maintain the Bass Lake Dam.	3	1	Flood	Moderate	Holly Springs Parks & Recreation	Staff time	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Consistently and correctly maintains all ponds and dams
Emergency Services											
ES-1	Technical Rescue Capabilities - Provide and enhance technical rescue capabilities more equitably throughout the Town.	2	2	All	High	Holly Springs Public Safety	No cost	Local, Federal	3-5 Years	In-Progress – Carry Forward	All crews have basic training. Currently looking into specialty training.
ES-2	GIS Programming - Design GIS programming capable of providing real-time data to emergency managers and historic data for future emergency response planning.	2	2	All	Low	Holly Springs Public Safety	No cost	Local	3-5 Years	In-Progress – Carry Forward	Currently in the implementation phase. The new Wake County CAD will be issued on May 2019. This is a no cost to the Town.
ES-3	ECC Notifications by NOAA for possible severe weather (tornados, ice, etc.). ECC is notified by both agencies when weather alerts are issued. Information is then broadcast over police radios. This information is generated by the State and Wake County and is obtained through the use of DC message, radio, fax and Nextel.	2	1	Severe Weather, Severe Winter Storm, Tornado, Hurricane	High	Holly Springs Public Safety	No cost	Local	3-5 years	In-Progress – Carry Forward	Partially implemented. Currently use WEB EOC and the dispatch center.
ES-4	Purchase ACU 1000 Communications Unit – System should allow all agencies on ACU 1000 to communicate using own radios and frequencies.	2	1	All	High	Holly Springs Public Safety	To be determined	Local	3-5 years	In-Progress – Carry Forward	In process of purchasing, but not yet completed.
ES-5	Tabletop Exercise Program - Continue to conduct disaster tabletop exercise program with Wake County	2	2	All	High	Holly Springs Public Safety	Staff time	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	Tabletop exercises are held through public safety periodically and will continue to be done.

Town of Holly Springs											
Action #	Description	Goal	Objective	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
ES-6	Counseling – Police psychologist and Critical Incident Stress Debriefing Team training to provide debriefing sessions for personnel.	2	1	All	High	Holly Springs Police Department	Staff time	Local	5 years	In-Progress – Carry Forward	Partially implemented, under construction. Currently, we have incorporated the services of a chaplaincy program and conduct critical incident debriefs with our personnel for both internal and external incidents. In addition, we are looking at a proposal to expand our program to include peer teams, peer counselors, and incorporation of the NC Law Enforcement Assistance Program (http://www.nc-leap.org/page6.aspx) in partnership with Teia Pullen of the Cary Police Department. Our goal is to network with southern Wake County law enforcement and public safety agencies, clinicians, and other mental health professionals to provide a broad base of support services to our public safety professionals.
Public Education and Awareness											
PEA-1	Environmental Education	1	1	Flood, Drought	High	Holly Springs Engineering	Staff time and O&M costs	Local	Ongoing - Next 5 Years	In-Progress – Carry Forward	The Town currently has a program which includes environmental education for the public through Town festivals (Holly Fest), public meetings, brochures and preconstruction meetings. The Town operates the Bass Lake Retreat Center which will allow for space to hold additional environmental education activities. The Town will also expand its current education activities to meet NPDES Phase II requirements. The Town's Environmental Education focuses on flooding, drainage, the National Flood Insurance Program, NPDES Phase II, Erosion & Sedimentation Control, Habitat Preservation, etc.
PEA-2	Website - The Town maintains its own website, which is able to provide up to date information for the public. The Town is continuously updating the site with additional resources.	1	1	All	High	Holly Springs Governing Body	Staff time	Local	2017	In-Progress – Carry Forward	The Communications Department provides the community with news and information via the Town's website, the Town's government access television channel HSTV-11, news releases, The Source newsletter, email and text message subscriptions, and social media on a daily basis.

Annex H Town of Knightdale

H.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Knightdale.

Table H.1 – HMPC Members

Agency	Representative	Position or Title
Development Services Department	Jason Brown	Senior Planner – Long Range
Development Services Department	Chris Hills	Development Services Director
N/A	Ben McDonald	Citizen Stakeholder

H.2 COMMUNITY PROFILE

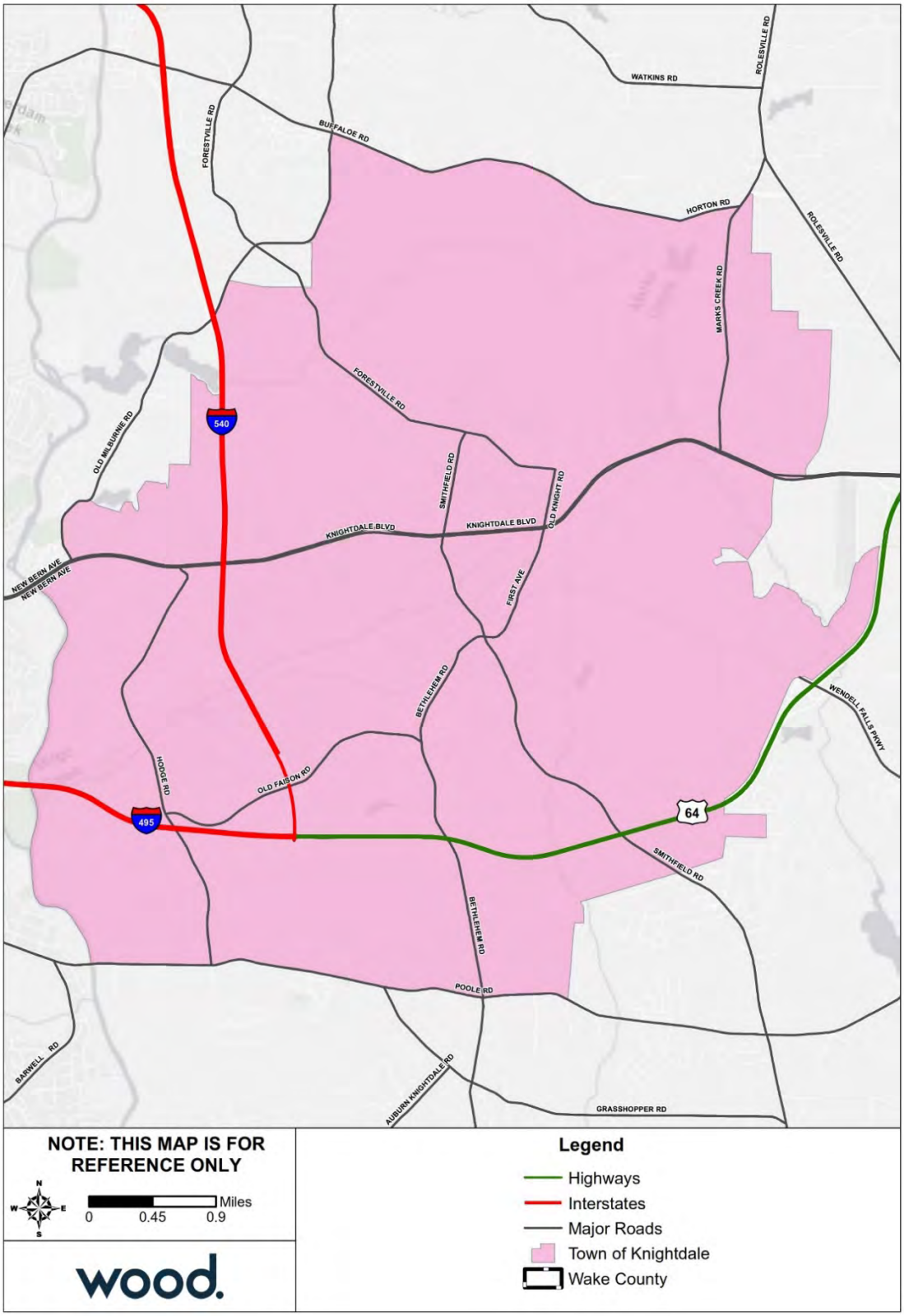
Geography

The Town of Knightdale is located in eastern Wake County. It is neighbored by Raleigh to the west and Wendell to the east. The Town is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Fuquay-Varina comprises a total land area of 6.2 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 2,626 acres of wetlands in Knightdale.

Figure H.1 shows a base map of major transportation routes in the Town of Knightdale.

Figure H.1 – Major Transportation Routes – Town of Knightdale



Source: Wake County GIS Open Data

Population and Demographics

Table H.2 provides population counts and growth estimates for the Town of Knightdale as compared to the County overall. Table H.3 provides demographic information for Knightdale as compared to the whole County.

Table H.2 – Population Counts, Knightdale, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Knightdale	5,958	11,401	14,363	2,962	26.0%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates

Table H.3 – Racial Demographics, Knightdale, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Knightdale	49.8%	35.9%	4.1%	6.0%	4.1%	15.4%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates

*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Knightdale in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure H.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table H.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Knightdale	68	10	0	120	0	64	0	46	8	0	0	0	0	12	1	5	0	0	**334**

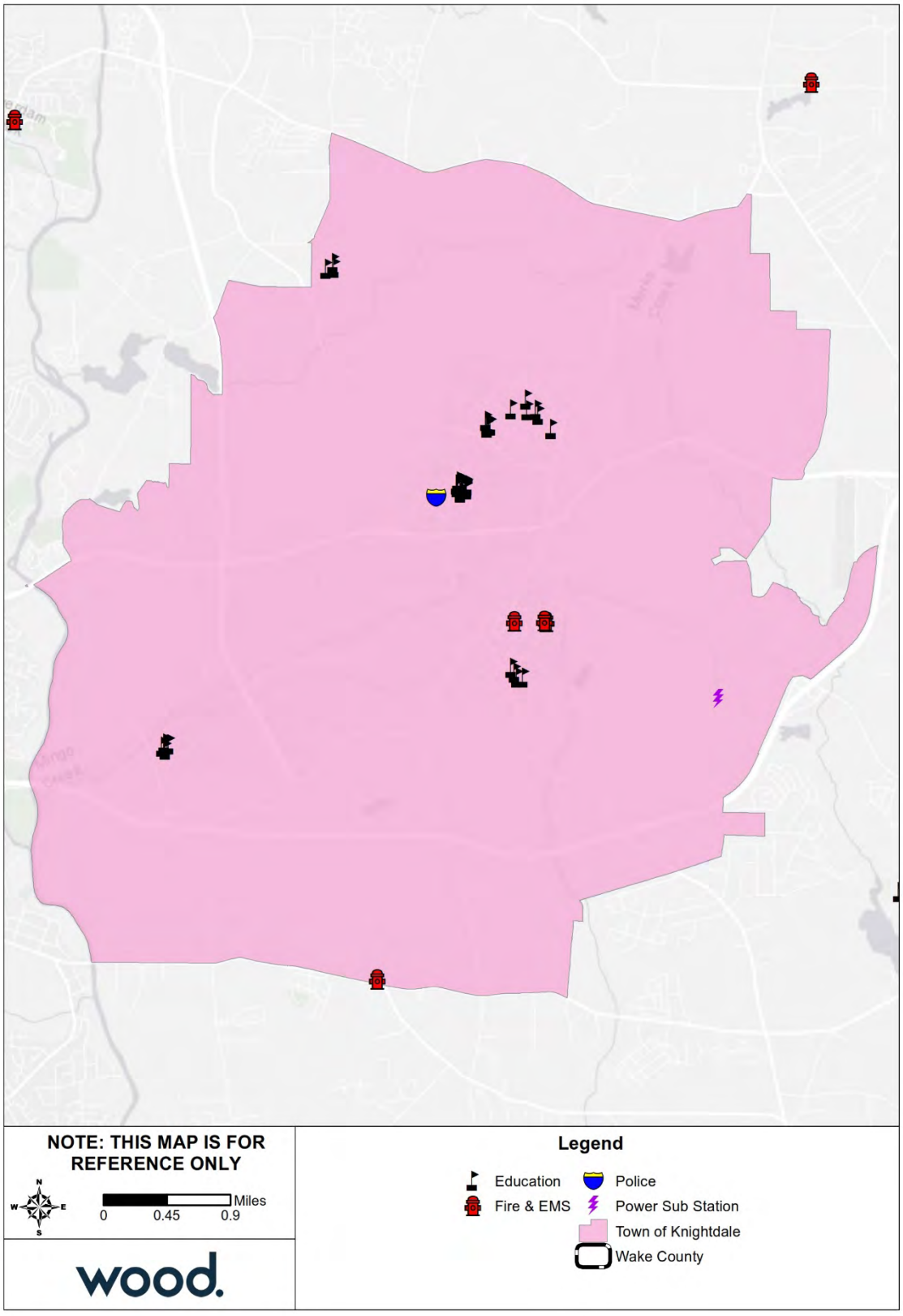
Source: NCEM Risk Management Tool

Table H.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Knightdale	40	37	4	19	0	8	1	0	**109**

Source: NCEM Risk Management Tool

Figure H.2 – Critical Facilities, Town of Knightdale



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Knightdale, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table H.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table H.6 – Parcels Developed 2011 or Later, Town of Knightdale

Land Class	Number of Parcels	Sum of Building Value
Apartment	4	$30,753,734
Commercial	7	$14,434,438
EXEMPT	2	$21,156,065
HOA	3	-
Industrial	4	$19,237,886
Part Exempt	5	$359,864
Residential Less Than 10 Acres	1,473	$292,901,920
Vacant	1	-
Grand Total	**1,499**	**$378,843,907**

Source: Wake County Open Data; retrieved April 8, 2019

There are five listings on the National Register of Historic Places for the Town of Knightdale, including two historic districts. These sites are listed in the table below.

Table H.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
86001631	Walnut Hill Cotton Gin	8/14/1986	Building	Knightdale
86003529	Beaver Dam	1/6/1987	Building	Knightdale
87002234	Knight, Henry H. and Bettie S., Farm	1/12/1988	District	Knightdale
00001183	Walnut Hill Historic District	10/6/2000	District	Knightdale
07000543	Midway Plantation House and Outbuildings	6/15/2007	Building	Knightdale

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The table below details key housing statistics for Knightdale as compared to the County overall.

Table H.8 – Housing Statistics, Knightdale, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Knightdale	4,723	5,559	17.7%	64.6%	4.4%	$176,600

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Knightdale as compared to the County overall.

Table H.9 – Employment Statistics, Knightdale, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Knightdale	8,274	70.8	3.4	25.7	4.5

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table H.10 – Percent of Employed Population by Occupation, Knightdale, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Knightdale	49.6	15.6	22.4	6.7	5.8

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

H.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Knightdale than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

H.3.1 Flood

Table H.11 details the acreage of the Town of Knightdale by flood zone on the effective DFIRM. Per this assessment, over 5 percent of the Town of Knightdale falls within the mapped 1%-annual-chance floodplains.

Table H.11 – FEMA Flood Hazard Areas, Town of Knightdale

Flood Zone	Acreage	Percent of Total (%)
Zone A	12.96	0.08
Zone AE	840.1	5.21
Zone X (500-year)	108.12	0.67
Zone X Unshaded	15,160.18	94.04
Total	**16,121.36**	--

Source: FEMA Effective DFIRM; Wake County GIS

Figure H.3 reflects the effective mapped flood hazard zones for the Town of Knightdale, and Figure H.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in PLACE, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed

property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

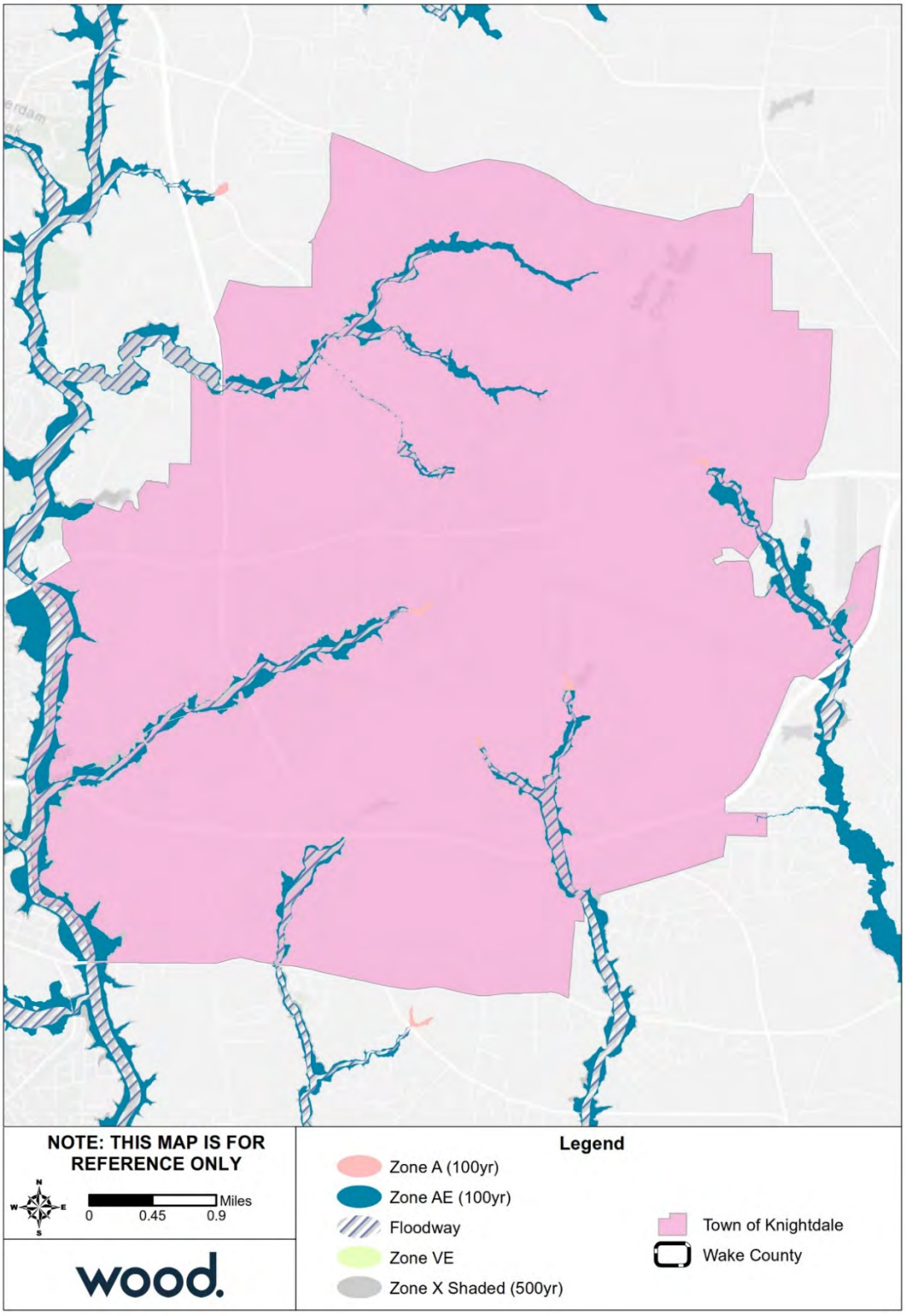
Table H.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table H.12 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain, Town of Knightdale

Land Class	Number of Parcels	Sum of Building Value
Residential Less Than 10 Acres	18	$3,551,754
Grand Total	**18**	**$3,551,754**

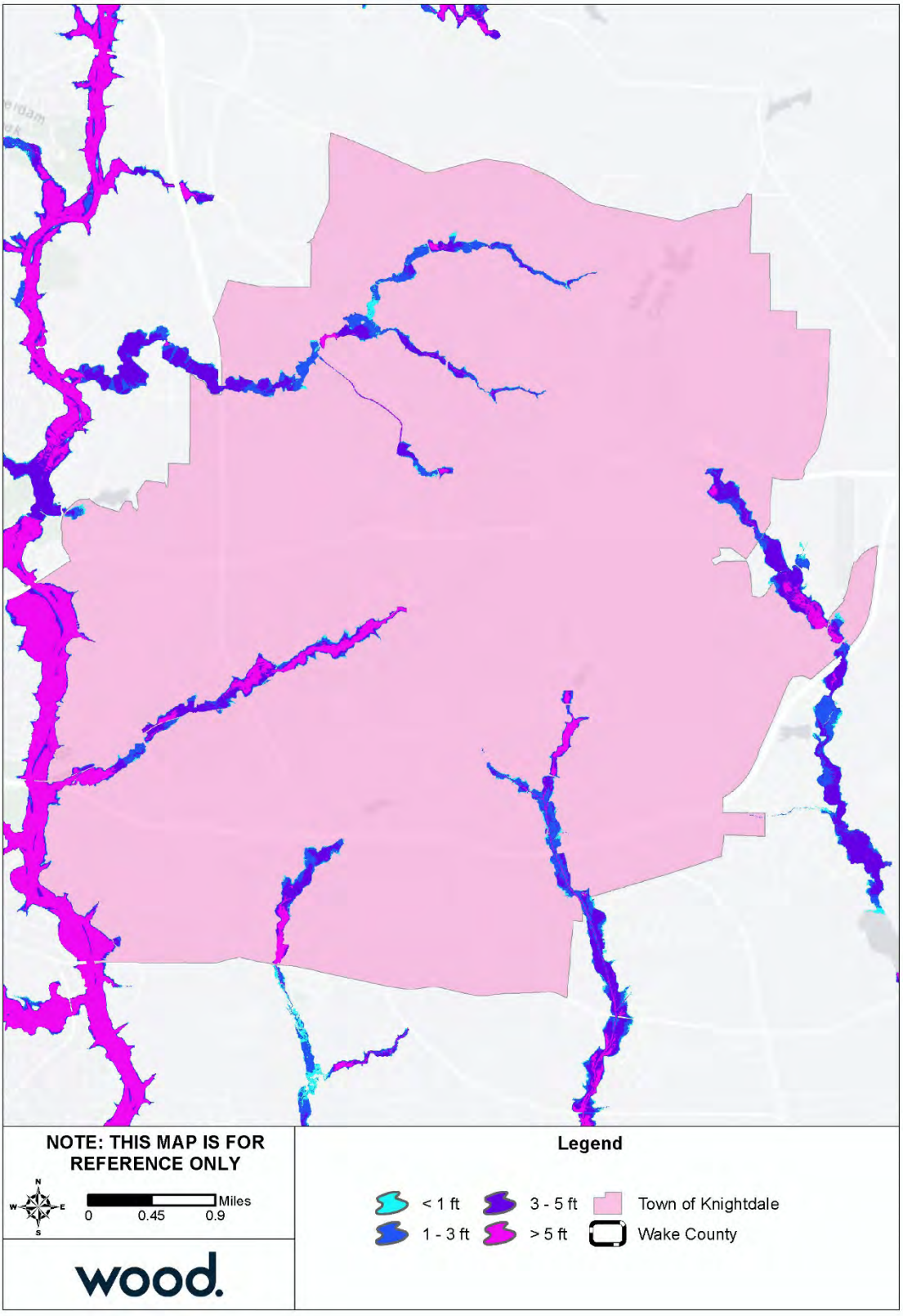
Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Figure H.3 – FEMA Flood Hazard Areas, Town of Knightdale



Source: FEMA Effective DFIRM

Figure H.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Knightdale



Source: FEMA Effective DFIRM

H.3.2 Wildfire

Table H.13 summarizes the acreage in the Town of Knightdale that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 15 percent of the Town of Knightdale is not included in the WUI.

Table H.13 – Wildland Urban Interface Acreage, Town of Knightdale

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*2,530.8*	*15.7%*
	LT 1hs/40ac	1,571.2	9.7%
	1hs/40ac to 1hs/20ac	1,192.3	7.4%
	1hs/20ac to 1hs/10ac	1,632.5	10.1%
	1hs/10ac to 1hs/5ac	2,040.3	12.7%
	1hs/5ac to 1hs/2ac	2,872.7	17.8%
	1hs/2ac to 3hs/1ac	3,919.5	24.3%
	GT 3hs/1ac	362.1	2.2%
	Total	16,121.4	

Source: Southern Wildfire Risk Assessment

Figure H.5 depicts the WUI for the Town of Knightdale. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure H.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure H.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

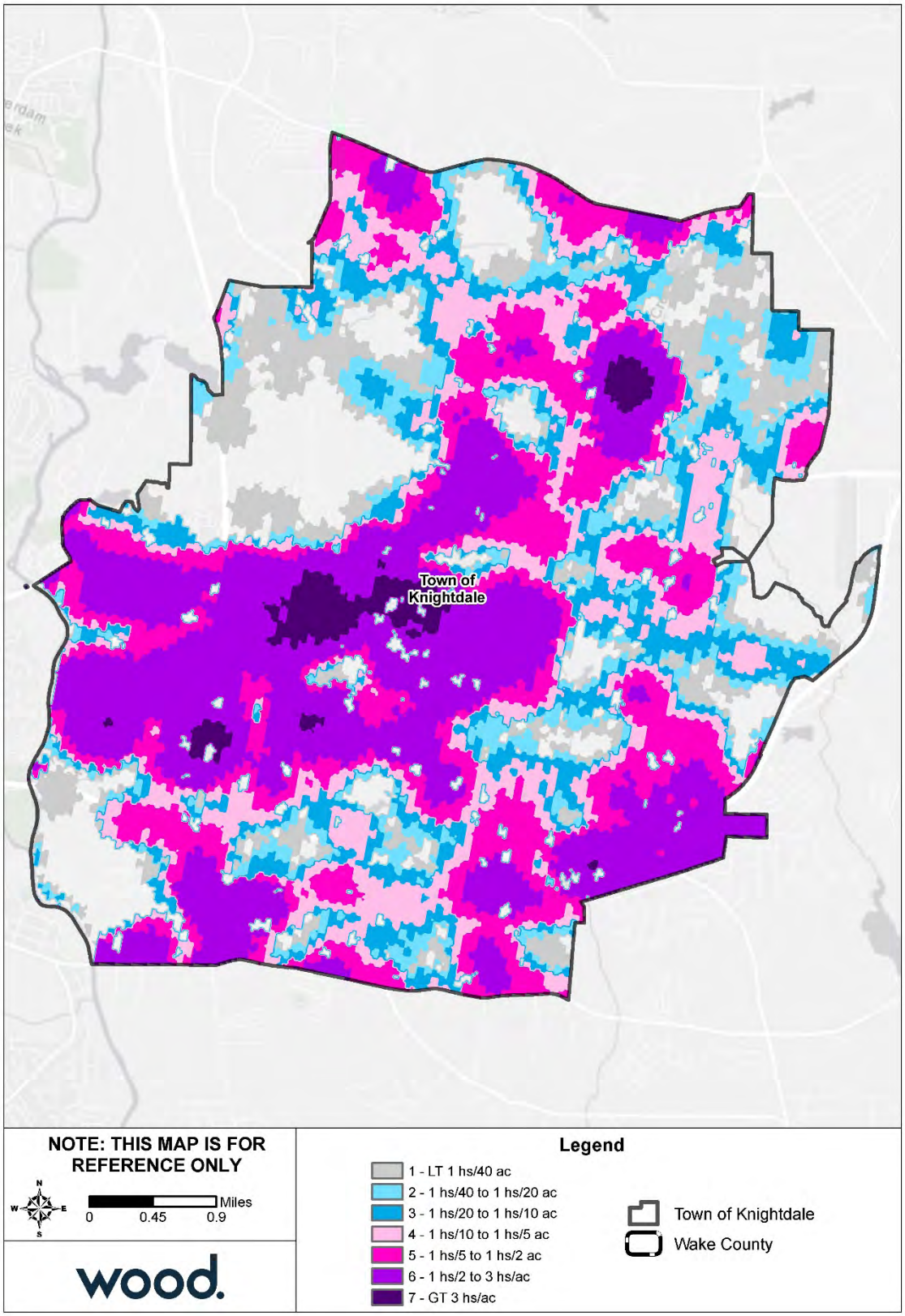
Areas of high potential fire intensity are scattered throughout Knightdale and overlap with areas of the WUI in the southern and northeaster portions of the town. However, burn probability is low throughout the town, meaning development in these areas is at low to no risk.

Table H.14 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector at risk to wildfire hazard.

Table H.14 – Critical Facilities Exposed to Wildfire, Town of Knightdale

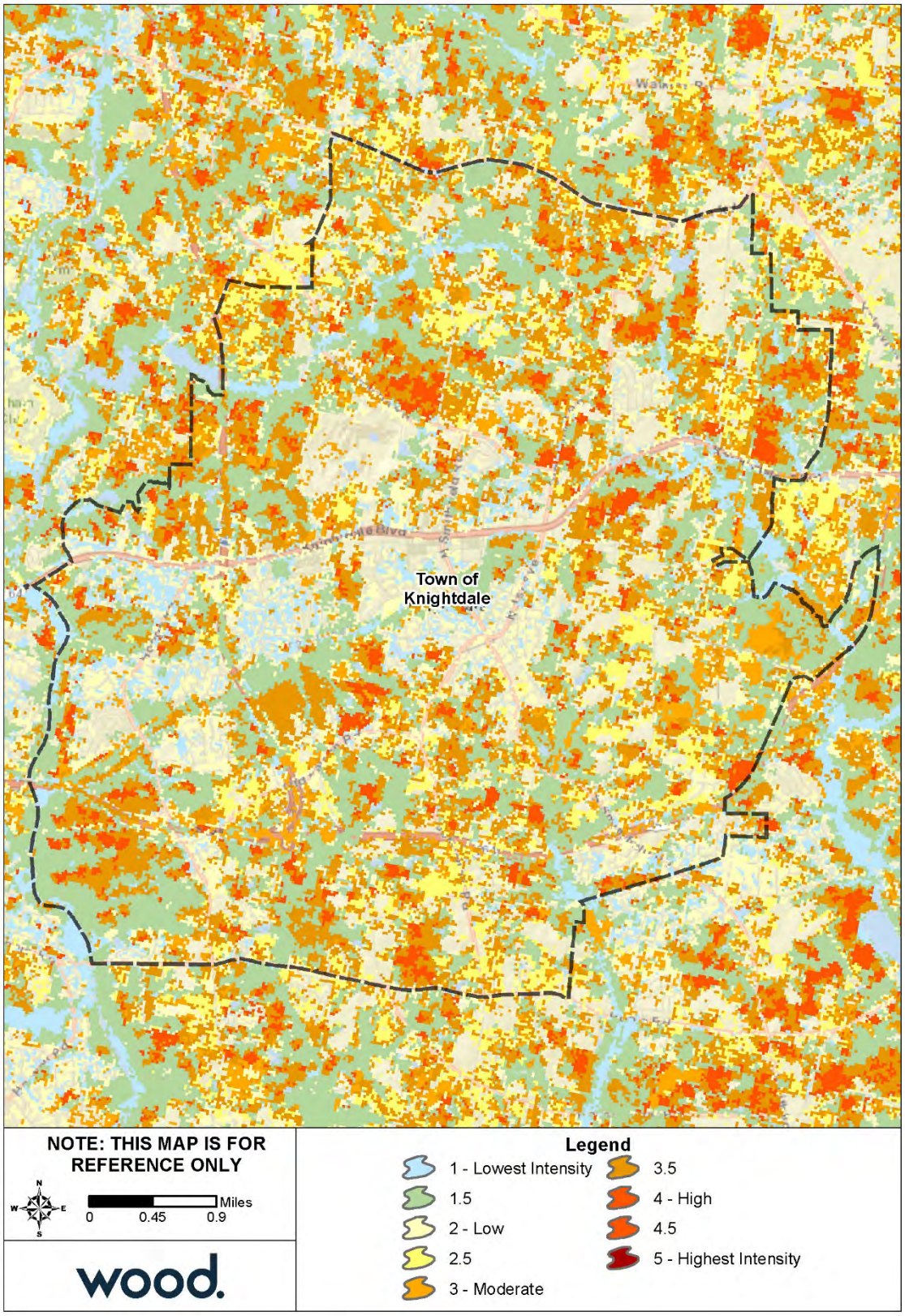
Sector	Event	Number of Buildings at Risk	Estimated Damages
Food and Agriculture	Wildfire Hazard	3	$157,144
All Categories	**Wildfire Hazard**	**3**	**$157,144**

Figure H.5 – Wildland Urban Interface, Town of Knightdale



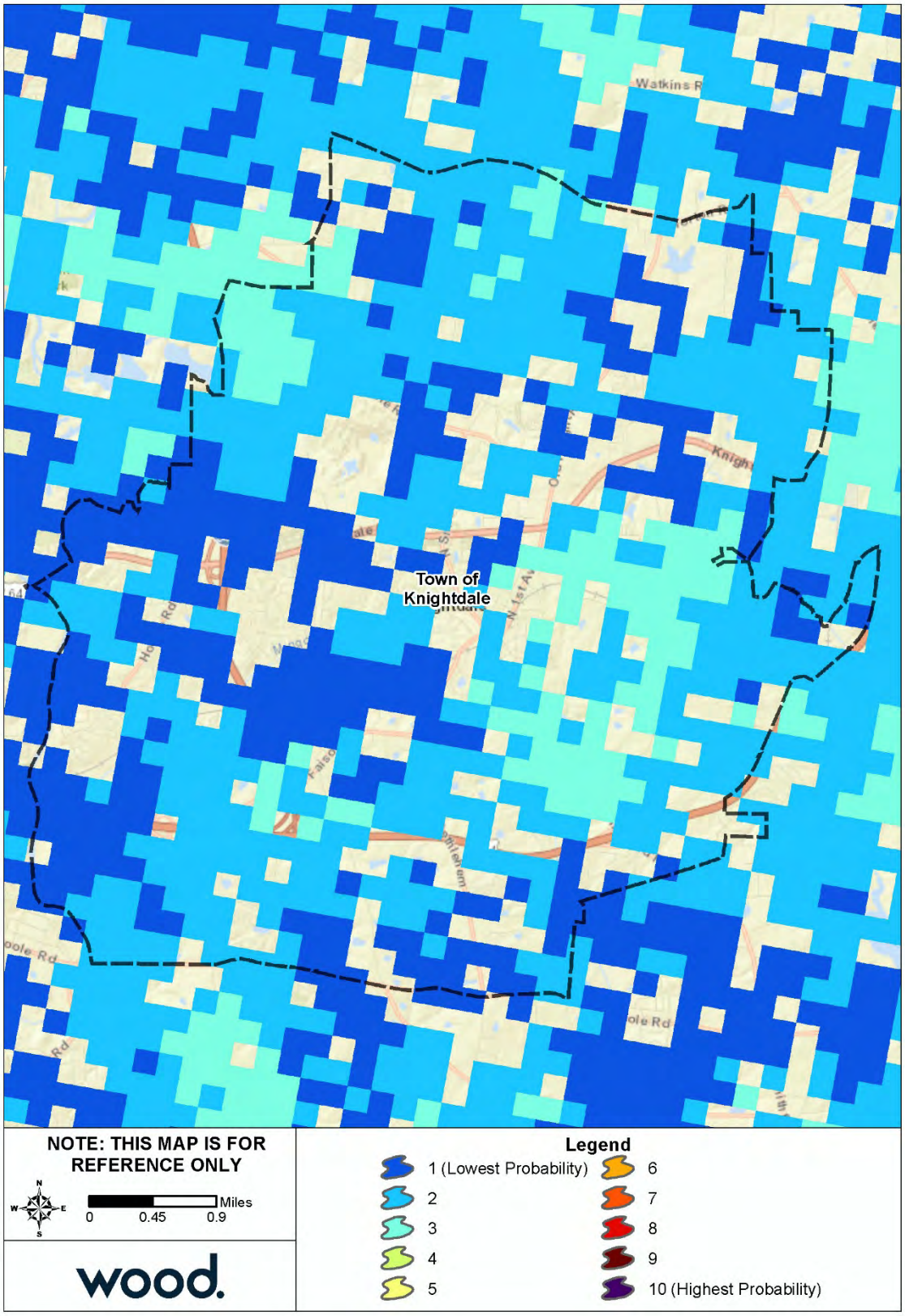
Source: Southern Wildfire Risk Assessment

Figure H.6 – Fire Intensity Scale, Town of Knightdale



Source: Southern Wildfire Risk Assessment

Figure H.7 – Burn Probability, Town of Knightdale



Source: Southern Wildfire Risk Assessment

H.4 CAPABILITY ASSESSMENT

H.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Knightdale were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Knightdale has an overall capability rating of Moderate. The Town's Self-Assessment of key capability areas is summarized in Table H.15 below.

Table H.15 – Capability Self-Assessment, Knightdale

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	Moderate
Fiscal Capability	Limited
Education and Outreach Capability	Limited
Mitigation Capability	Limited
Political Capability	Moderate
Overall Capability	Moderate

H.4.2 Floodplain Management

The Town of Knightdale joined the NFIP through emergency entry in July 1975 and has been a regular participant since August 1978. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table H.16 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	43	$17,551	$11,787,800	3	$31,363.63
2-4 Family	0	$0	$0	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	2	$3,700	$1,100,000	0	$0.00
Total	45	$21,251	$12,887,800	3	$31,363.63

Source: FEMA Community Information System, accessed November 2018

Table H.17 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	12	$6,874	$3,142,800	1	$14,002.27
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
B, C & X Zone					
Standard	0	$0	$0	0	$0.00
Preferred	33	$14,377	$9,745,000	2	$17,361.36
Total	45	$21,251	$12,887,800	3	$31,363.63

Source: FEMA Community Information System, accessed November 2018

Table H.18 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	0	$0	$0	0	$0.00
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	1	$351	$280,000	0	$0.00
Standard	0	$0	$0	0	$0.00
Preferred	1	$351	$280,000	0	$0.00
Total	1	$351	$280,000	0	$0.00

Source: FEMA Community Information System, accessed November 2018

Table H.19 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	12	$6,874	$3,142,800	1	$14,002.27
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	32	$14,026	$9,465,000	2	$17,361.36
Standard	0	$0	$0	0	$0.00
Preferred	32	$14,026	$9,465,000	2	$17,361.36
Total	44	$20,900	$12,607,800	3	$31,363.63

Source: FEMA Community Information System, accessed November 2018

H.5 MITIGATION STRATEGY

Town of Knightdale											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Pursue Grants to Acquire, Elevate and or Relocate Flood Prone Structures and Property.	3	1	Flood, Dam Failure, Hurricane & Tropical Storm	High	Knightdale Planning	Over $1m	Internal	Ongoing - Next 5 Years	Not Started – Carry Forward	This has not been necessary since there have been no affected structures and/or property. The Town will evaluate opportunities to purchase property for future events.
P-2	Establish post-disaster clean-up procedures.	2	1	All	High	Knightdale Public Works	$250,000	Internal	Ongoing - Next 5 Years	In-Progress – Carry Forward	The Town will continuously evaluate post-disaster clean-up procedures.
P-3	Prepare debris removal and disposal plan.	2	1	Dam Failure, Earthquake, Hurricane & Tropical Storm, Landslide, Severe Weather, Severe Winter Storm, Tornado	Moderate	Knightdale Public Works	Over $1m	Internal, FEMA, NCEM	Ongoing - Next 5 Years	In-Progress – Carry Forward	The Town will continuously evaluate debris removal and disposal plan
P-4	Protect and Obtain Land for the Little River Reservoir.	3	1	Drought	Moderate	City of Raleigh Public Utilities	Over $1m	Internal, City of Raleigh	Ongoing - Next 5 Years	In-Progress – Carry Forward	City of Raleigh is responsible for implementation
Structural Projects											
SP-1	Dredging, new riser and plunge pool for pond restoration at Environmental Park	3	2	Flood, Hurricane	Moderate	Knightdale Administration, Knightdale Public Works	$500,000	Grants, bonds, Knightdale Administration, Knightdale Fire	3-5 years	New	N/A
Public Education and Awareness											
PEA-1	Develop a policy for the installation of warning signs concerning lightning, hail and thunderstorms at outdoor public facilities and begin retro-fitting existing spaces.	1	2	Severe Weather, Tornado	Moderate	Knightdale Parks & Recreation	Over $1m	Internal	2-3 years	Not Started – Carry Forward	Due to staff turnover and lack of funding this project has not been completed. This project is still a valuable tool that will be studied for future implementation
PEA-2	Expand the Town's existing fire/smoke alarm program for retro-fitting older structures to include CO alarms.	1	2	Earthquake, Severe Weather, Tornado, Hazardous Materials Incident	Low	Knightdale Fire	about $200,000	Internal, Grants	2-3 years	In-Progress – Carry Forward	The Knightdale Fire Department routinely visits residents to ensure smoke detectors are working property.
PEA-3	Have a Town staff member that is a Certified Floodplain Manager.	2	1	Flood, Dam Failure, Hurricane & Tropical Storm	Moderate	Knightdale Engineering/Public Works	$40,000	Internal	2-3 years	In-Progress – Carry Forward	Due to recent turnover the Town lost its only Certified Floodplain Manager
PEA-4	Issue an annual local proclamation for Severe Weather Awareness Week and conduct associated promotional activities.	1	1	All	Moderate	Knightdale Fire	$200,000	Internal	Ongoing - Next 5 years	Not Started – Carry Forward	Due to staff turnover this item has not been started.
PEA-5	Incentivize the use of cool roofing products through the Town's Water Allocation Policy point system.	4	1	Extreme Heat	Low	Knightdale Planning	less than $100,000	Internal	3-5 years	Not Started – Carry Forward	Due to changes in development patterns other updates to the Town's Water Allocation Policy were deemed more timely. This will be evaluated for future inclusion.

Annex I Town of Morrisville

I.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Morrisville.

Table I.1 – HMPC Members

Agency	Representative	Position or Title
Planning Department	Brad West	Planner
Planning Department	Dylan Bruchhaus	Planner
N/A	Steve Botha	Citizen Stakeholder

I.2 COMMUNITY PROFILE

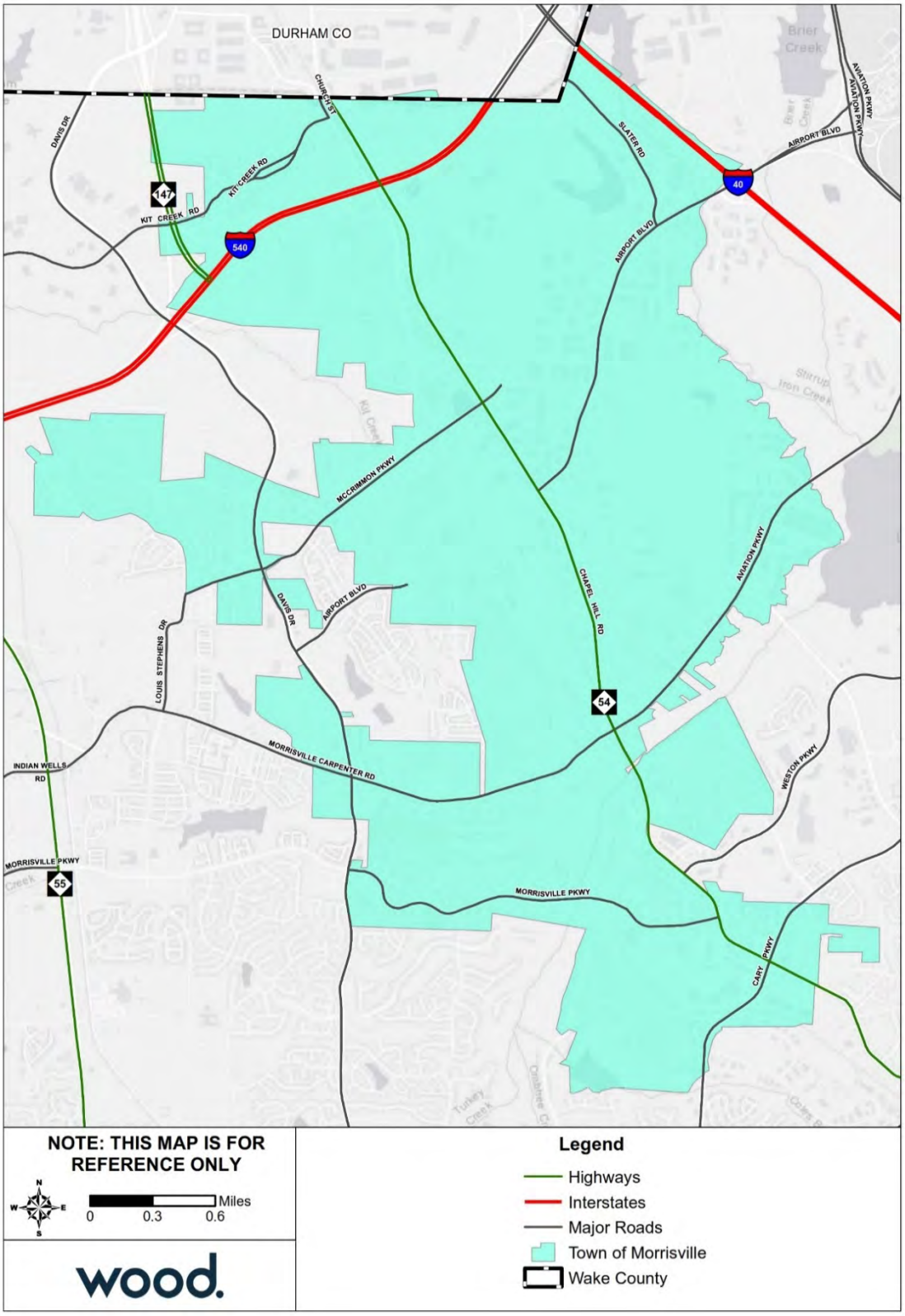
Geography

The Town of Morrisville is located in western Wake County. A small portion of the Town extends west into Durham County. All statistics summarized in this section are for the entirety of the Town of Morrisville. It is surrounded by Cary on its eastern, southern, and southwestern sides and by RTP to the northwest and Durham County to the north. The Town is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Morrisville comprises a total land area of 8.3 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 1,002 acres of wetlands in Morrisville.

Figure I.1 shows a base map of major transportation routes in the Town of Morrisville.

Figure I.1 – Major Transportation Routes – Town of Morrisville



Source: Wake County GIS Open Data

Population and Demographics

Table I.2 provides population counts and growth estimates for Morrisville as compared to the County overall. Table I.3 provides demographic information for Morrisville as compared to the whole County.

Table I.2 – Population Counts, Morrisville, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Morrisville	5,208	18,576	23,873	5,297	28.5%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates

Table I.3 – Racial Demographics, Morrisville, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Morrisville	44.3%	12.1%	37.0%	1.2%	4.8%	4.5%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates
*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Morrisville in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure I.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table I.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Morrisville	2	5	0	162	1	142	1	31	2	0	0	0	0	40	0	2	0	0	**388**

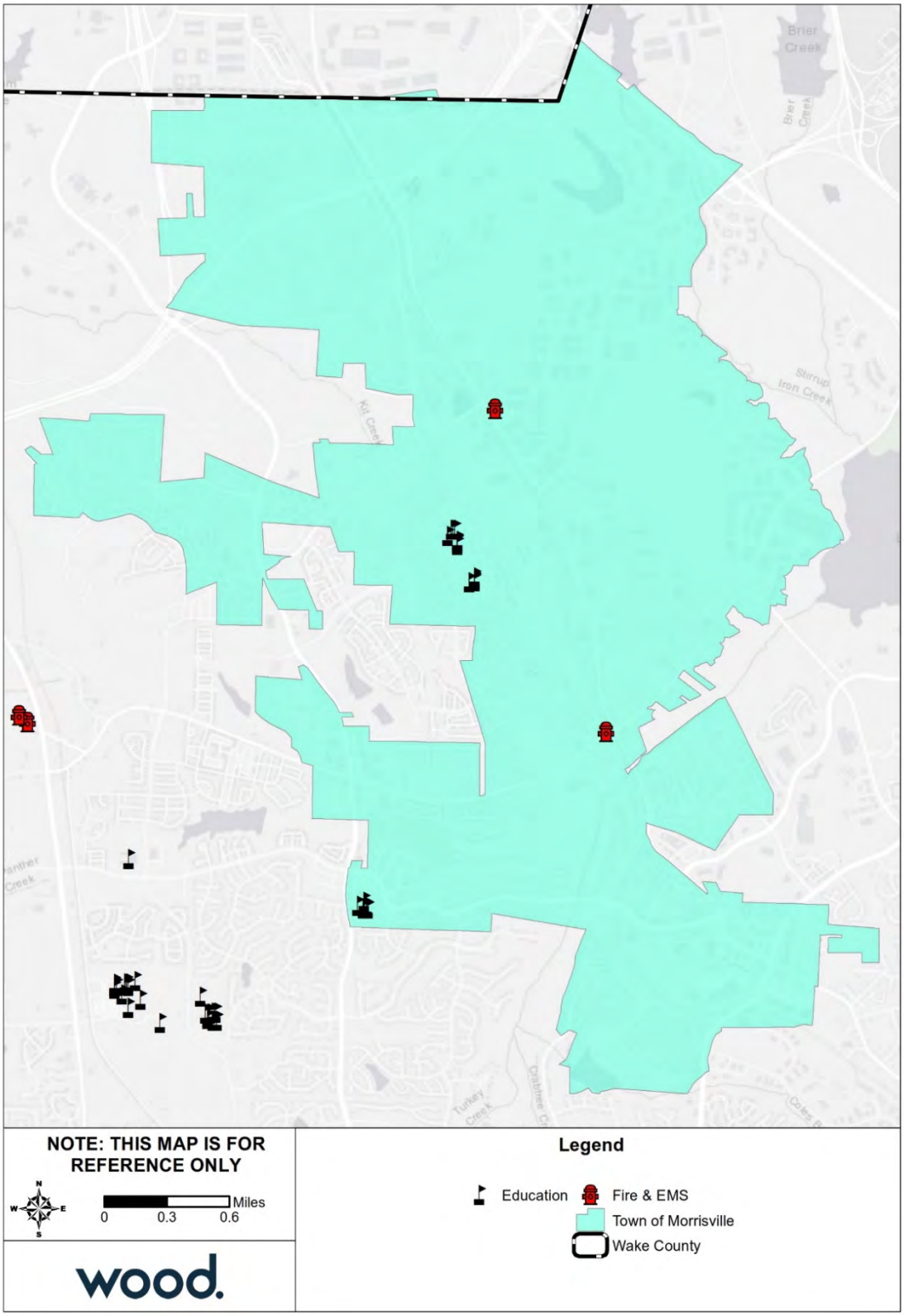
Source: NCEM Risk Management Tool

Table I.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Morrisville	148	100	59	10	0	7	0	0	**324**

Source: NCEM Risk Management Tool

Figure I.2 – Critical Facilities, Town of Morrisville



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Morrisville, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table I.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table I.6 – Parcels Developed 2011 or Later, Town of Morrisville

Land Class	Number of Parcels	Sum of Building Value
Apartment	3	$68,721,018
Commercial	30	$289,612,514
Condo Complex	3	-
EXEMPT	6	$24,423,462
HOA	3	$522,814
Residential Less Than 10 Acres	1,640	$396,594,033
Grand Total	**1,685**	**$779,873,841**

Source: Wake County Open Data; retrieved April 8, 2019

There are three listings on the National Register of Historic Places for the Town of Morrisville. These sites are listed in the table below.

Table I.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
12000218	Page, Williamson, House	4/16/2012	Building	Morrisville
12000913	Morrisville Christian Church	11/6/2012	Building	Morrisville
14000334	Pugh House	6/19/2014	Building	Morrisville

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The following table details key housing statistics for Morrisville as compared to the County overall.

Table I.8 – Housing Statistics, Morrisville, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Morrisville	8,357	9,365	12.1%	45.8%	6.0%	$304,500

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Morrisville as compared to the County overall.

Table I.9 – Employment Statistics, Morrisville, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Morrisville	13,403	73.9	3.0	23.0	3.9

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table I.10 – Percent of Employed Population by Occupation, Morrisville, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Morrisville	65.5	8.1	17.6	3.0	5.8

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

I.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Morrisville than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

I.3.1 Flood

Table I.11 details the acreage of the Town of Morrisville by flood zone on the effective DFIRM. Per this assessment, over 6 percent of Morrisville falls within the mapped 1%-annual-chance floodplains.

Table I.11 – Flood Zone Acreage, Town of Morrisville

Flood Zone	Acreage	Percent of Total (%)
Zone A	72.83	0.13
Zone AE	3,629.18	6.43
Zone X (500-year)	402.17	0.71
Zone X Unshaded	52,339.67	92.73
Total	**56,443.85**	**--**

Source: FEMA Effective DFIRM; Wake County GIS

Figure I.3 reflects the effective mapped flood hazard zones for Town of Morrisville, and Figure I.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in the Town of Morrisville, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table I.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table I.12 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain, Town of Morrisville

Land Class	Number of Parcels	Sum of Building Value
Apartment	1	$20,141,513
Commercial	8	$184,625,269
Residential Less Than 10 Acres	3	$1,302,487
Grand Total	**12**	**$206,069,269**

Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Table I.13 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector and flood event in the Town of Morrisville. Table B.14 provides counts and estimated damages for High Potential Loss Properties in the Town of Morrisville.

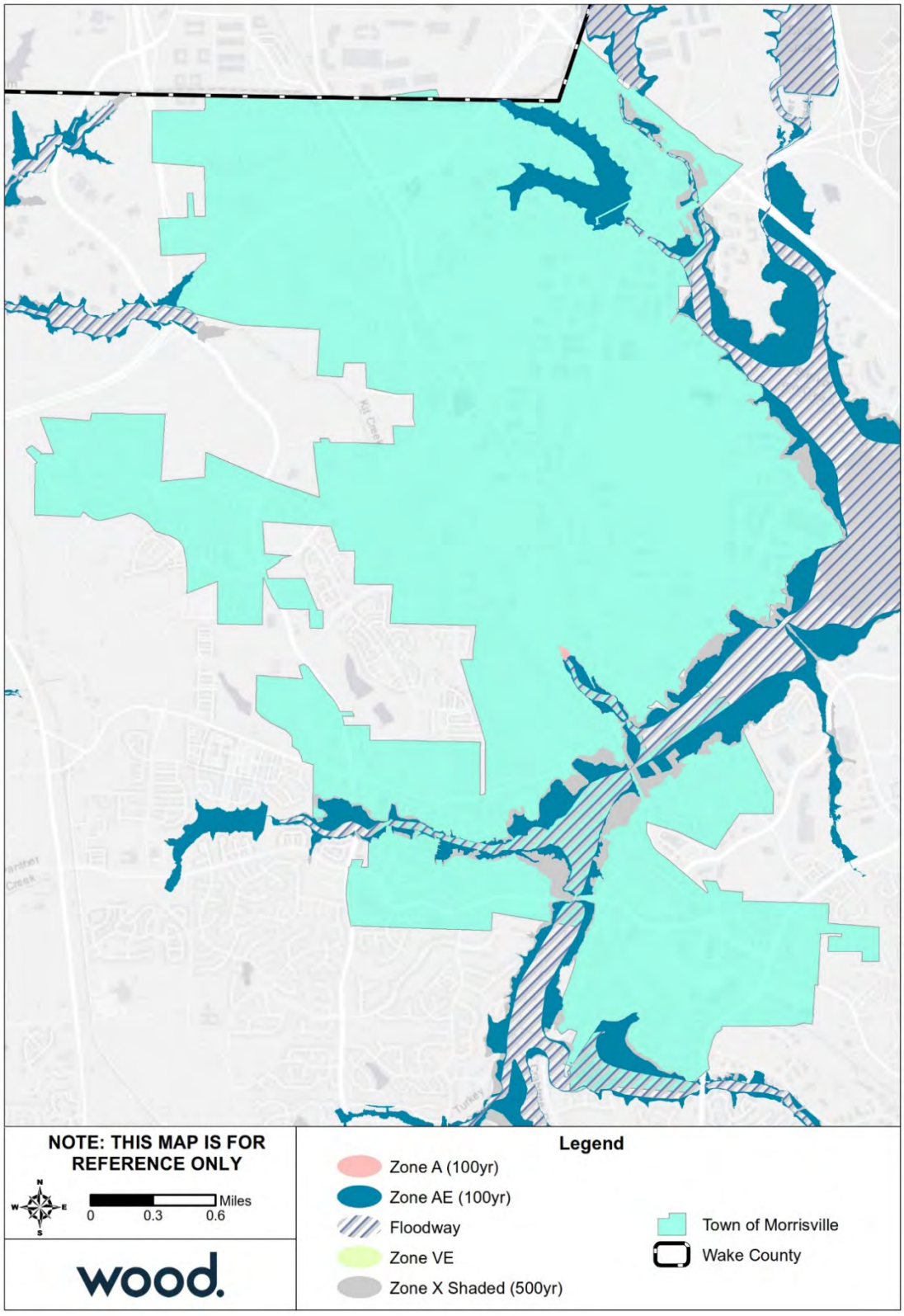
Table I.13 – Critical Facilities Exposed to Flooding, Town of Morrisville

Sector	Event	Number of Buildings at Risk	Estimated Damages
Commercial Facilities	100 Year	1	$199
All Categories	**100 Year**	**1**	**$199**

Table I.14 – High Potential Loss Properties Exposed to Flooding, Town of Morrisville

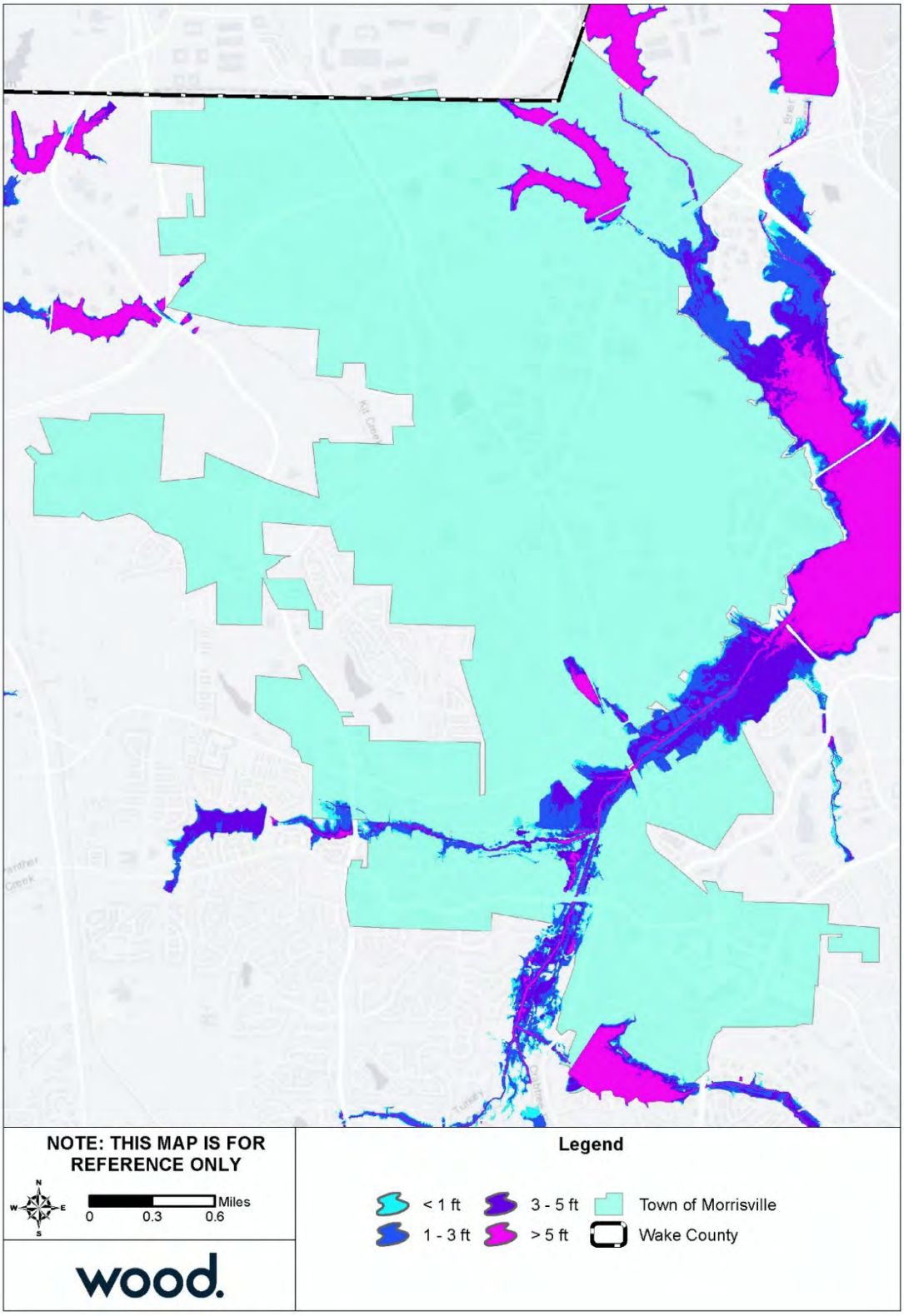
Category	Event	Number of Buildings at Risk	Estimated Damages
Residential	100 Year	1	$115,869
All Categories	**100 Year**	**1**	**$115,869**

Figure I.3 – FEMA Flood Hazard Areas, Town of Morrisville



Source: FEMA Effective DFIRM

Figure I.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Morrisville



Source: FEMA Effective DFIRM

I.3.2 Wildfire

Table I.15 summarizes the acreage in the Town of Morrisville that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 14% percent of the Town of Morrisville is not included in the WUI.

Table I.15 – Wildland Urban Interface Acreage, Town of Morrisville

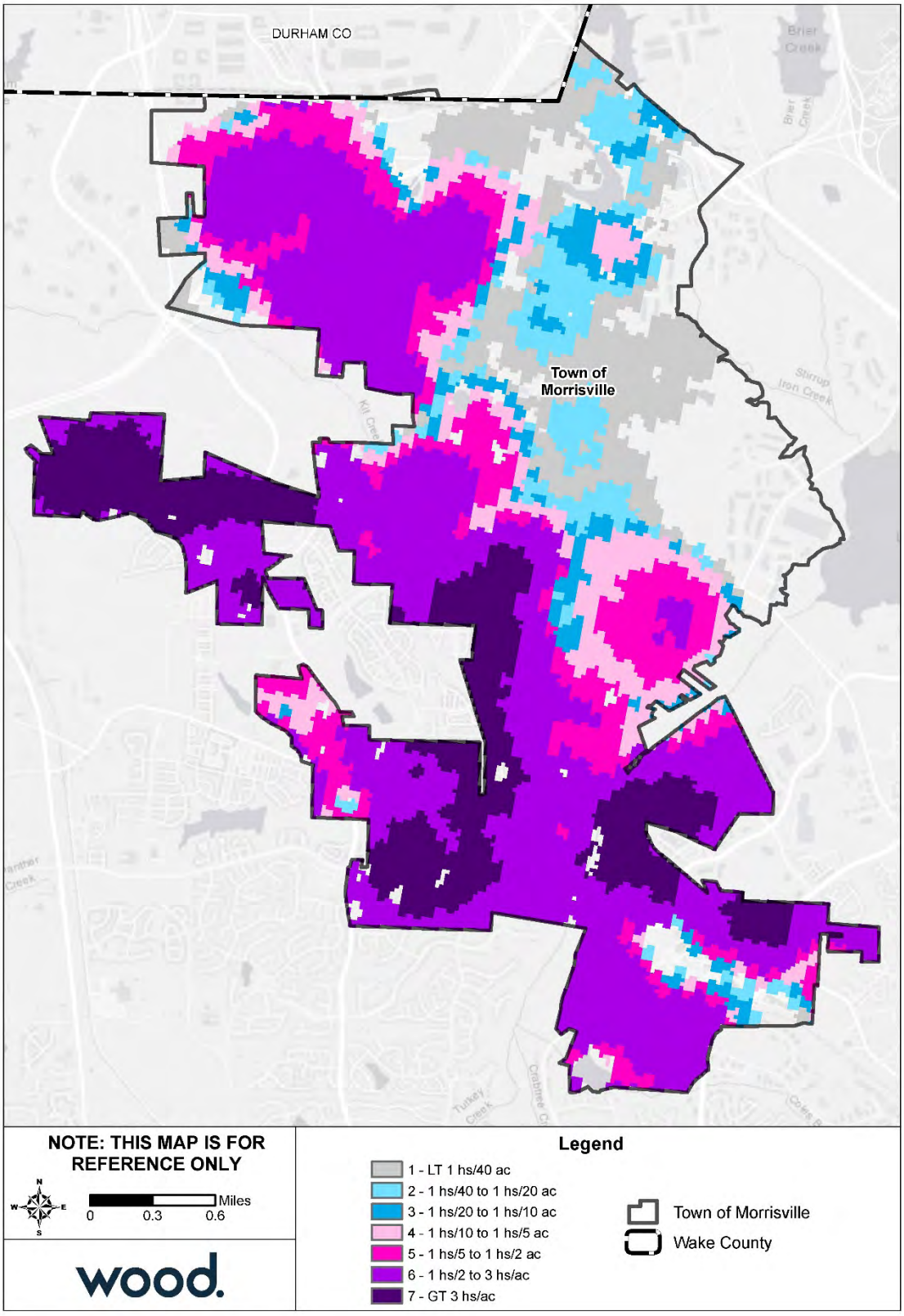
	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*896.8*	*14.6%*
	LT 1hs/40ac	607.9	9.9%
	1hs/40ac to 1hs/20ac	359.4	5.8%
	1hs/20ac to 1hs/10ac	256.6	4.2%
	1hs/10ac to 1hs/5ac	450.7	7.3%
	1hs/5ac to 1hs/2ac	655.5	10.6%
	1hs/2ac to 3hs/1ac	2,104.9	34.2%
	GT 3hs/1ac	826.6	13.4%
	Total	6,158.4	

Source: Southern Wildfire Risk Assessment

Figure I.5 depicts the WUI for the Town of Morrisville. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure I.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure I.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

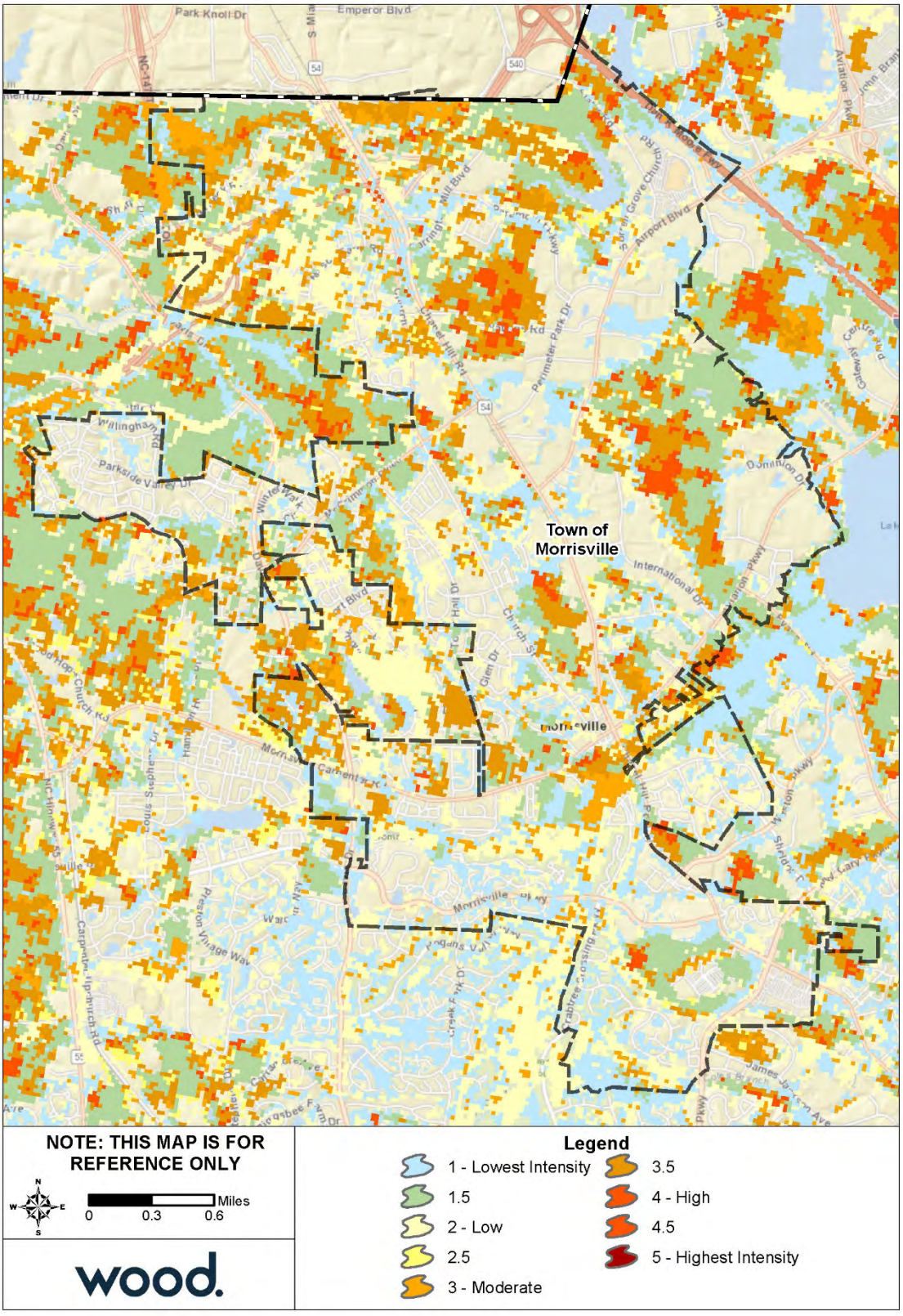
North and east Morrisville have the highest potential fire intensity in two concentrated pockets. These pockets, however, are largely outside of the WUI. The town has a relatively low burn probability, as well.

Figure I.5 – Wildland Urban Interface, Town of Morrisville



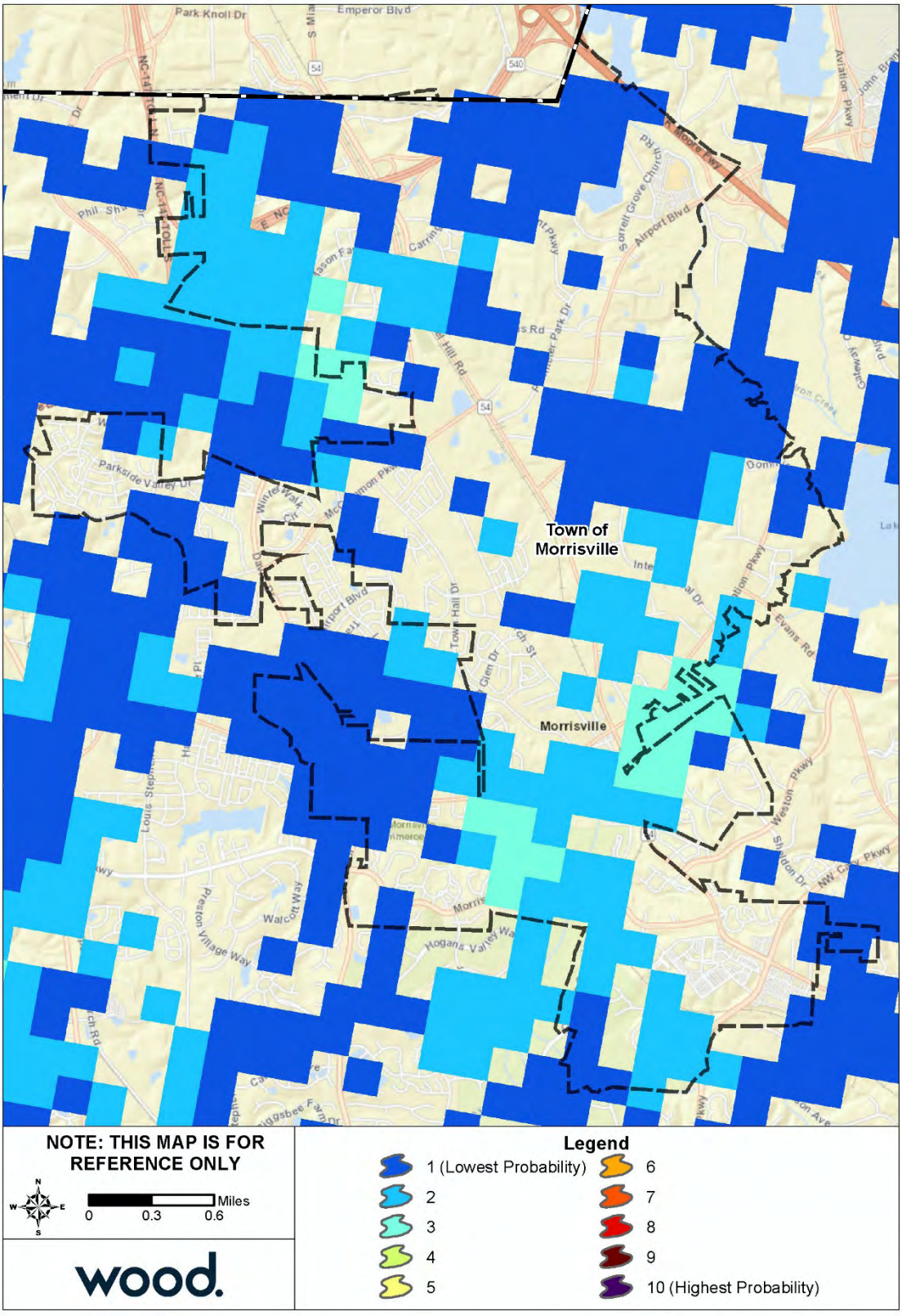
Source: Southern Wildfire Risk Assessment

Figure I.6 – Fire Intensity Scale, Town of Morrisville



Source: Southern Wildfire Risk Assessment

Figure I.7 – Burn Probability, Town of Morrisville



Source: Southern Wildfire Risk Assessment

I.4 CAPABILITY ASSESSMENT

I.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Morrisville were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Morrisville has an overall capability rating of Moderate. The Town's Self-Assessment of key capability areas is summarized in Table I.17 below.

Table I.16 – Capability Self-Assessment, Morrisville

Capability Area	Rating
Plans, Ordinances, Codes and Programs	Moderate
Administrative and Technical Capability	Moderate
Fiscal Capability	Moderate
Education and Outreach Capability	Moderate
Mitigation Capability	Moderate
Political Capability	Moderate
Overall Capability	Moderate

I.4.2 Floodplain Management

The Town of Morrisville joined the NFIP through emergency entry in December 1977 and has been a regular participant since November 1978. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table I.17 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	50	$18,445	$14,422,300	4	$92,752.15
2-4 Family	1	$256	$77,000	0	$0.00
All Other Residential	29	$9,689	$8,185,300	0	$0.00
Non-Residential	8	$8,836	$4,341,300	0	$0.00
Total	88	$37,226	$27,025,900	4	$92,752.15

Source: FEMA Community Information System, accessed November 2018

Table I.18 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	35	$15,077	$9,214,900	1	$52,860.61
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
B, C & X Zone					
Standard	1	$2,410	$500,000	0	$0.00
Preferred	52	$19,739	$17,311,000	3	$39,891.54
Total	88	$37,226	$27,025,900	4	$92,752.15

Source: FEMA Community Information System, accessed November 2018

Table I.19 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	0	$0	$0	0	$0.00
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	0	$0	$0	1	$695.95
Standard	0	$0	$0	0	$0.00
Preferred	0	$0	$0	1	$695.95
Total	0	$0	$0	1	$695.95

Source: FEMA Community Information System, accessed November 2018

Table I.20 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	35	$15,077	$9,214,900	1	$52,860.61
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	53	$22,149	$17,811,000	2	$39,195.59
Standard	1	$2,410	$500,000	0	$0.00
Preferred	52	$19,739	$17,311,000	2	$39,195.59
Total	88	$37,226	$27,025,900	3	$92,056.20

Source: FEMA Community Information System, accessed November 2018

I.5 MITIGATION STRATEGY

Town of Morrisville											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Reduce vulnerability of cyber attack by transitioning Town staff to encrypted laptops.	3	1	Terrorism	Moderate	Town of Morrisville	$9,000 annually	Town of Morrisville	Ongoing - Next 5 years	New	N/A
P-2	Establish a Municipal Service District (MSD) in order to convert private roads in Carpenter Park neighborhood to public roads with a higher design, safety, and maintenance standard.	3	2	All	Moderate	Town of Morrisville	$460,000	Town of Morrisville	1 year	New	N/A
P-3	Coordinate with Duke Power to draft Electric Utility Master Plan, which seeks to identify areas feasible for utility line burial.	4	1	Tornado, Severe Winter Storm, Severe Weather, Hurricane	High	Town of Morrisville	$20,000	Town of Morrisville	2-3 years	New	N/A
P-4	Update Land Use Plan to ensure protection of natural resources, strengthen existing development to resist hazards, and guide future development away from hazard prone areas.	4	2	Flood, Wildfire, Landslide, Dam Failure, Hurricane, Hazardous Materials Incident, Radiological Emergency	Moderate	Town of Morrisville	$275,000	Town of Morrisville	2-3 years	New	N/A
P-5	Obtain frequently updated, high-resolution aerial photography to assist with land use decisions, emergency response planning, and code enforcement.	2	2	Flood, Landslide, Severe Winter Storm, Severe Weather, Dam Failure, Hurricane, Hazards Materials Incident, Radiological Emergency, Terrorism	Moderate	Town of Morrisville	$7,000 annually	Town of Morrisville	Ongoing - Next 5 years	New	N/A
P-6	Working through the Triangle Water Supply Partnership, update the Water Resources Plan to ensure water supply is sufficient for Town's future needs.	4	2	Drought, Dam Failure, Extreme Heat	High	Triangle Water Supply Partnership	$250,000	Triangle Water Supply Partnership, Town of Morrisville	3-5 years	New	N/A
P-7	Working through the Triangle Water Supply Partnership, draft a Drought Management Plan to ensure water resources are properly managed during drought conditions.	4	1	Drought, Extreme Heat	High	Triangle Water Supply Partnership	$150,000	Triangle Water Supply Partnership, Town of Morrisville	3-5 years	New	N/A
P-8	Working through the Triangle Water Supply Partnership, draft an Emergency Spill Response and Mitigation Plan to protect watersheds and other water resources from hazardous spills.	3	2	Flood, Drought, Dam Failure, Extreme Heat, Hazardous Materials Incident, Radiological Emergency	High	Triangle Water Supply Partnership	$150,000	Triangle Water Supply Partnership, Town of Morrisville	3-5 years	New	N/A
P-9	Transition Wake County's sedimentation and erosion control permitting and monitoring to Town of Morrisville for better increased processing efficiency and faster incident response.	2	2	Flood, Landslide, Dam Failure, Hurricane, Hazardous Materials Incident	Moderate	Town of Morrisville	Unknown	Town of Morrisville	2-3 years	New	N/A
P-10	Conduct a complete review and update to the Town's stormwater management program, which helps mitigate effects of stormwater runoff and flooding.	4	1	Flood, Landslide, Dam Failure, Hurricane, Hazardous Materials Incident	High	Town of Morrisville	$100,000	Town of Morrisville	2-3 years	New	N/A
Property Protection											
PP-1	Reduce vulnerability of important data by transitioning IT Department's routine data backup to cloud storage.	3	1	Tornado, Earthquake, Severe Winter Storm, Severe Weather, Hurricane, Terrorism	High	Town of Morrisville	$42,000 annually	Town of Morrisville	Ongoing - Next 5 years	New	N/A
PP-2	Seek Federal, State, and County funding opportunities to purchase property located completely or partially in FEMA designated floodplains in order to mitigate potential property damage and protect natural resources.	3	2	Flood, Hurricane, Dam Failure	Low	Morrisville Director of Community Services, Director of Development Services	$5,000,000	Flood Mitigation Assistance Grant Program	More than 5 years	Not Started – Carry Forward	Town has purchased flood-prone properties using Town funds. Town has not sought any outside funding for floodplain property purchase.
Structural Projects											
SP-1	Construct Green Drive and Fairview Road Flood Reduction Drainage Project to mitigate potential flood hazards.	3	2	Flood, Dam Failure, Hurricane	High	Town of Morrisville	$450,000	Town of Morrisville	2-3 years	New	N/A
SP-2	Construct new public works facility, which will increase Town's capacity to respond to hazards and other safety concerns.	2	1	All	Moderate	Town of Morrisville	$8,500,000	Town of Morrisville	3-5 years	New	N/A

Town of Morrisville											
Action #	Description	Goal	Objective	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
Emergency Services											
ES-1	Monitor the status of backup generators, communications and vehicles for all Morrisville owned critical public facilities.	2	1	All	Low	Town of Morrisville	$5,500 annually	Town of Morrisville	Ongoing - Next 5 years	In-Progress – Carry Forward	The Town has a contract with a private vendor to monitor the status and condition of critical emergency response equipment such as backup generators, communications, and vehicles.
ES-2	Install new generators for Town Hall and Police Station to ensure continuity of critical operations during a power outage.	3	1	All	High	Town of Morrisville	$150,000	Town of Morrisville	1 year	New	N/A
ES-3	Construct new fire station in Morrisville in order to improve fire protection coverage and emergency response times.	2	1	All	Moderate	Town of Morrisville	$4,500,000	Town of Morrisville	3-5 years	New	N/A
ES-4	Update Town's Emergency Operations Plan to ensure best processes and procedures for the most likely and applicable emergency scenarios.	2	2	All	Moderate	Town of Morrisville	$150,000	Town of Morrisville	3-5 years	New	N/A
Public Education and Awareness											
PEA-1	Implement Wake County's Everbridge text alert system to notify citizens and Town staff of potential safety hazards or concerns.	1	1	All	High	Wake County	$0	Wake County	1 year	New	N/A
PEA-2	Purchase and implement new online civic engagement platform to be used in part to inform citizens on disaster preparation, emergency response training opportunities, and evacuation information.	1	1	All	Moderate	Town of Morrisville	$10,000	Town of Morrisville	1 year	New	N/A
PEA-3	Utilize volunteer citizen committees, such as CERT or Public Safety Committee, to educate residents in preparing for natural hazards.	1	1	All	Low	Town of Morrisville	$2,000/year	Town of Morrisville	Ongoing - Next 5 Years	In-Progress – Carry Forward	The Community Emergency Response Team is a group of dedicated volunteers that meet monthly for emergency response training.

Annex J Town of Rolesville

J.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Rolesville.

Table J.1 – HMPC Members

Agency	Representative	Position or Title
Planning Department	Danny Johnson	Planning Director
Town of Rolesville	Kelly Arnold	Town Manager

J.2 COMMUNITY PROFILE

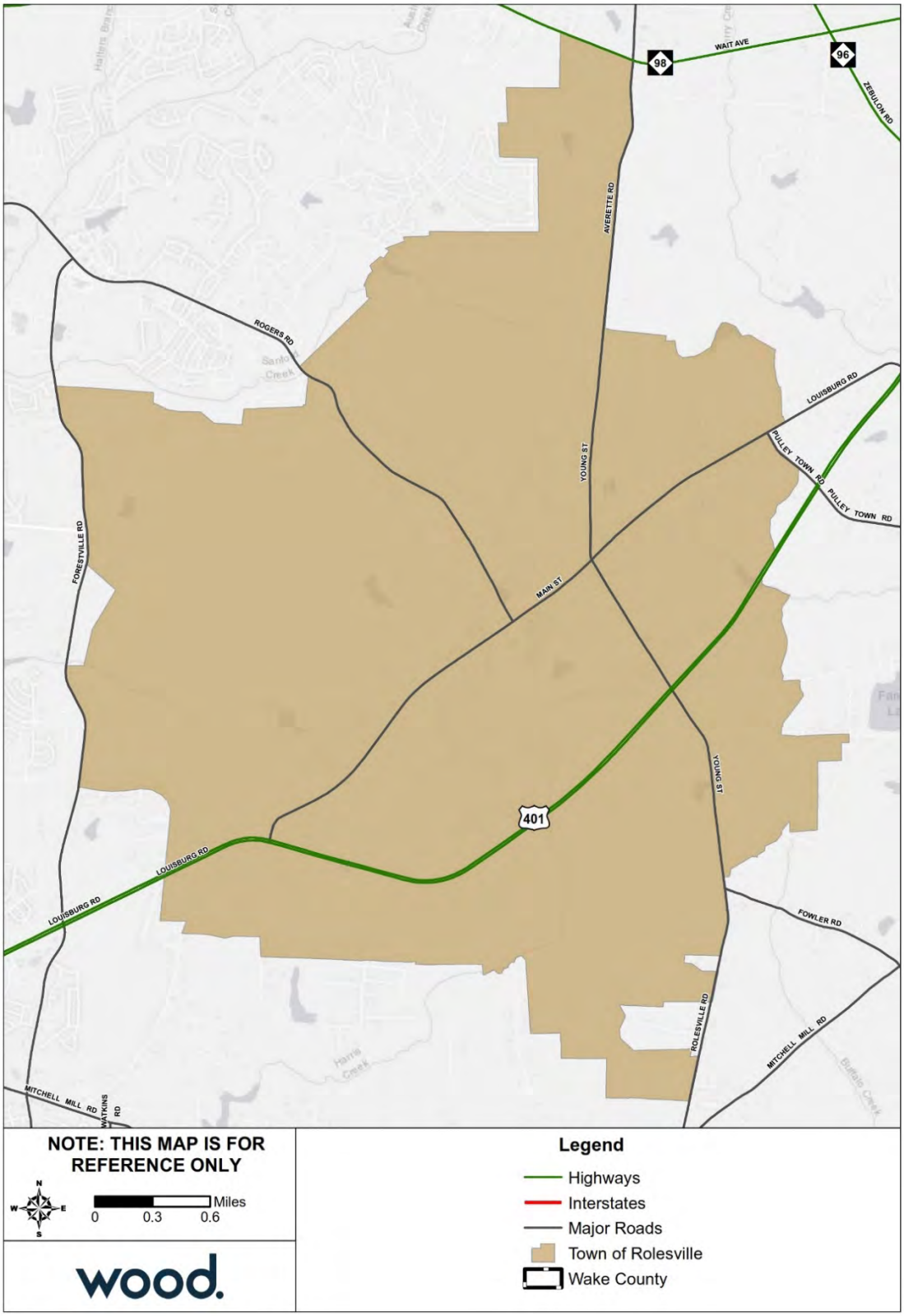
Geography

The Town of Rolesville is located in northeastern Wake County. It is neighbored by Wake Forest to the west and northwest, and Raleigh to the southwest. The Town is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Rolesville comprises a total land area of 3.9 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 359.5 acres of wetlands in Rolesville.

Figure J.1 shows a base map of the major transportation routes in the Town of Rolesville.

Figure J.1 – Major Transportation Routes – Town of Rolesville



Source: Wake County GIS Open Data

Population and Demographics

Table J.2 provides population counts and growth estimates for the Town of Rolesville as compared to the County overall. Table J.3 provides demographic information for Rolesville as compared to the whole County.

Table J.2 – Population Counts, Rolesville, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Rolesville	907	3,786	6,308	2,522	40.0%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates

Table J.3 – Racial Demographics, Rolesville, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Rolesville	66.2%	27.1%	3.2%	1.2%	2.4%	3.0%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates

*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Rolesville in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure J.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table J.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Rolesville	43	1	0	37	0	11	0	20	2	0	0	0	0	4	0	2	0	0	**120**

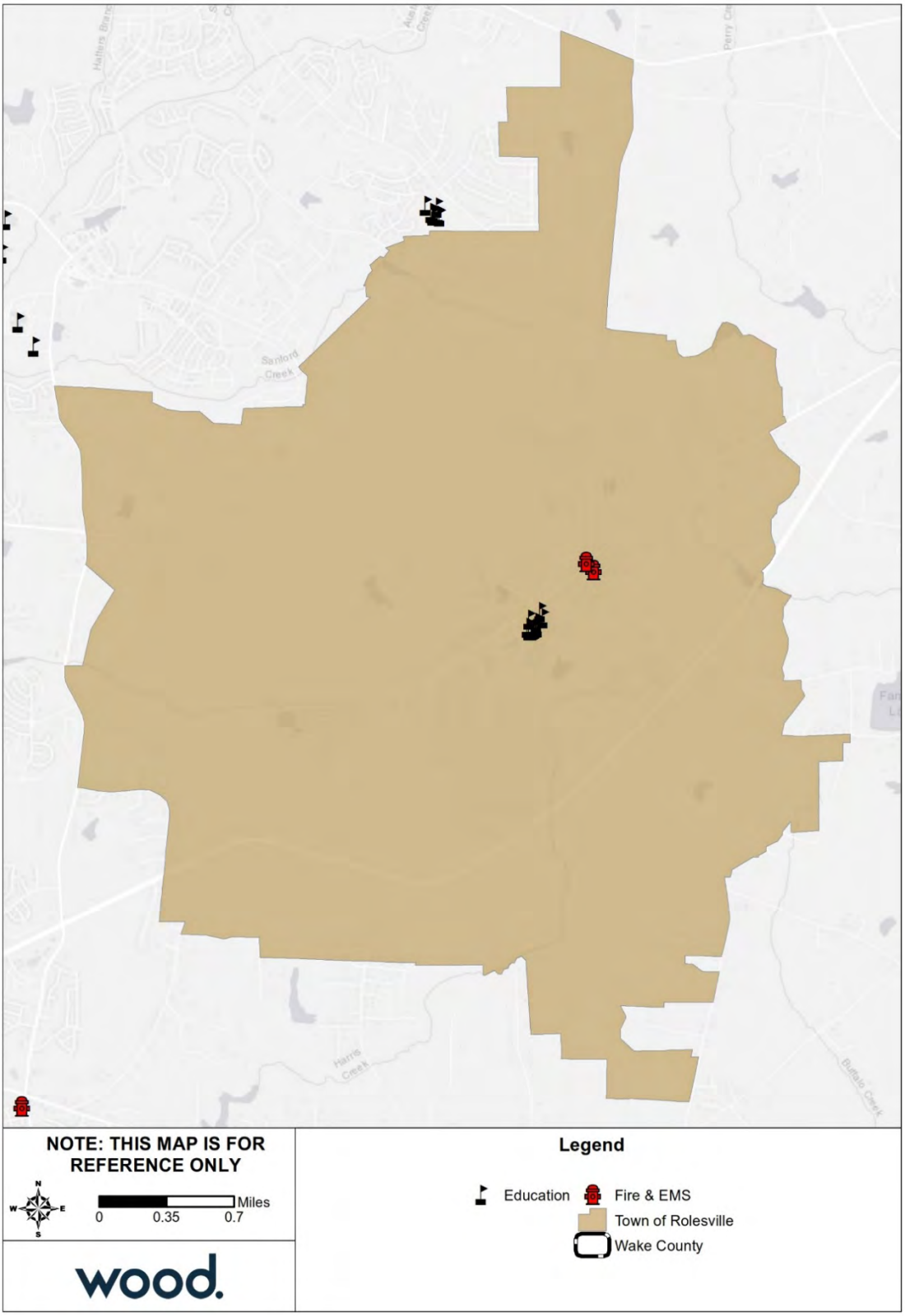
Source: NCEM Risk Management Tool

Table J.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Rolesville	4	8	1	4	0	1	0	0	**18**

Source: NCEM Risk Management Tool

Figure J.2 – Critical Facilities, Town of Rolesville



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Rolesville, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table J.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table J.6 – Parcels Developed 2011 or Later, Town of Rolesville

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	1	$233,814
Apartment	2	$6,309,870
Commercial	3	$7,641,736
EXEMPT	4	$95,496,995
HOA	3	-
Part Exempt	2	$369,123
Residential Less Than 10 Acres	1,340	$393,252,705
Grand Total	**1,355**	**$503,304,243**

Source: Wake County Open Data; retrieved April 8, 2019

There are three listings on the National Register of Historic Places for the Town of Rolesville. These sites are listed in the table below.

Table J.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
89002158	Green--Hartsfield House	12/21/1989	Building	Rolesville
02001728	Heartsfield--Perry Farm	1/23/2003	Building	Rolesville
03000966	Young, Dr. Lawrence Branch, House	9/25/2003	Building	Rolesville

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The following table details key housing statistics for Rolesville as compared to the County overall.

Table J.8 – Housing Statistics, Rolesville, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Rolesville	1,341	2,355	75.6%	73.1%	12.6%	$273,900

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Rolesville as compared to the County overall.

Table J.9 – Employment Statistics, Rolesville, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Rolesville	3,334	67.3	8.0	24.7	10.6

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table J.10 – Percent of Employed Population by Occupation, Rolesville, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Rolesville	54.0	15.8	22.8	1.6	5.8

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

J.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Rolesville than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

J.3.1 Flood

Table J.11 details the acreage of the Town of Rolesville by flood zone on the effective DFIRM. Per this assessment, just over 1 percent of the Town of Rolesville falls within the mapped 1%-annual-chance floodplains.

Table J.11 – Flood Zone Acreage in the Town of Rolesville

Flood Zone	Acreage	Percent of Total (%)
Zone A	30.83	0.39
Zone AE	74.64	0.93
Zone X (500-year)	15.21	0.19
Zone X Unshaded	7,865.05	98.49
Total	**7,985.73**	--

Source: FEMA Effective DFIRM; Wake County GIS

Figure J.3 reflects the effective mapped flood hazard zones for the Town of Rolesville, and Figure J.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in PLACE, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

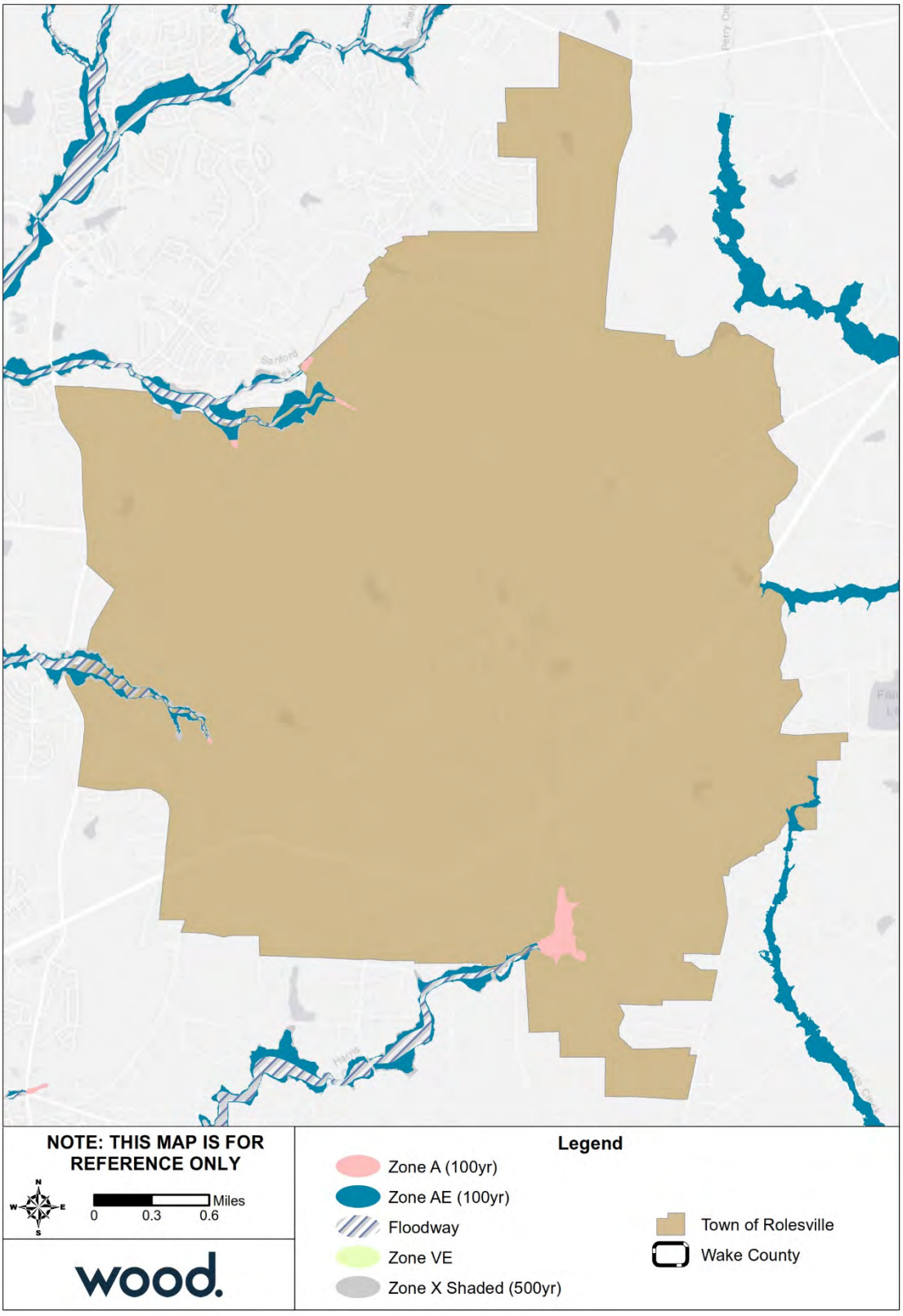
Table J.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table J.12 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain, Town of Rolesville

Land Class	Number of Parcels	Sum of Building Value
EXEMPT	1	$56,241,696
Residential Less Than 10 Acres	11	$3,075,165
Grand Total	**12**	**$59,316,861**

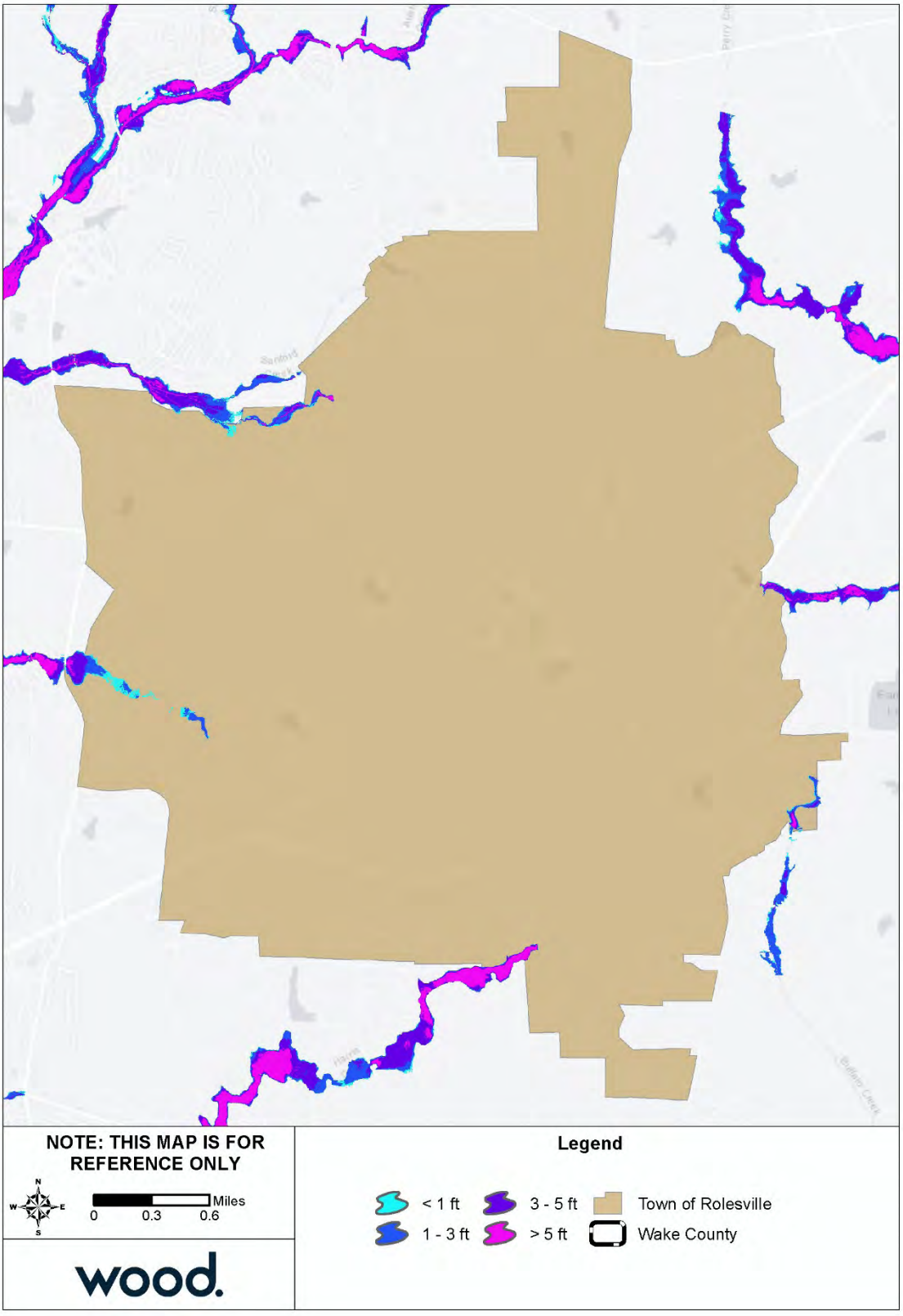
Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Figure J.3 – Flood Zone Acreage in the Town of Rolesville



Source: FEMA Effective DFIRM

Figure J.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Rolesville



Source: FEMA Effective DFIRM

J.3.2 Wildfire

Table J.13 summarizes the acreage in the Town of Rolesville that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 15 percent of the Town of Rolesville is not included in the WUI.

Table J.13 – Wildland Urban Interface Acreage, Town of Rolesville

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*1,246.2*	*15.6%*
	LT 1hs/40ac	1,035.0	13.0%
	1hs/40ac to 1hs/20ac	964.4	12.1%
	1hs/20ac to 1hs/10ac	1,038.5	13.0%
	1hs/10ac to 1hs/5ac	1,072.0	13.4%
	1hs/5ac to 1hs/2ac	1,180.4	14.8%
	1hs/2ac to 3hs/1ac	1,445.6	18.1%
	GT 3hs/1ac	3.7	0.0%
	Total	7,985.7	

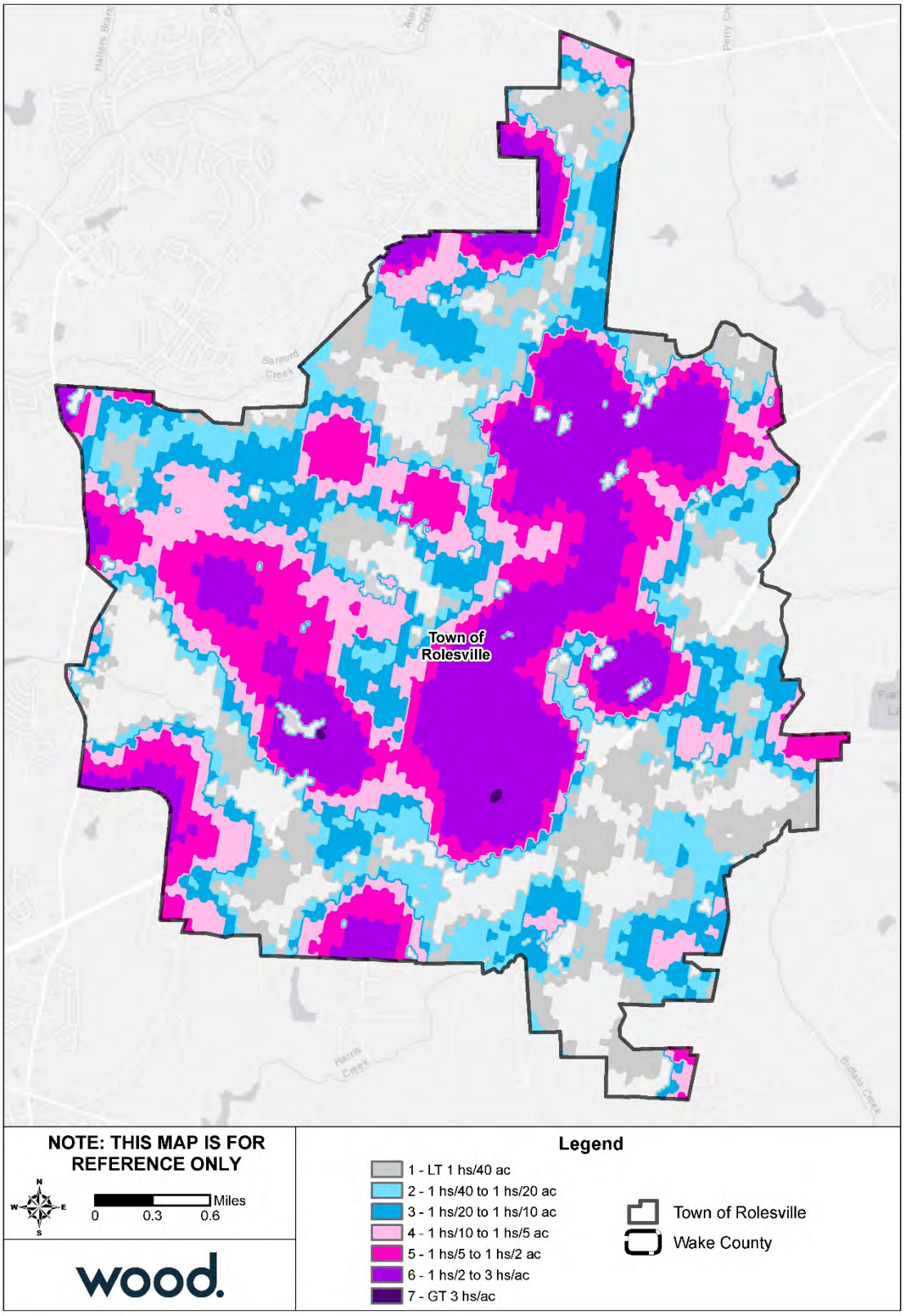
Source: Southern Wildfire Risk Assessment

Potential fire intensity is highest in west, south, and northwest Rolesville. These areas, however, are largely outside of the WUI. Additionally, the town has a whole has a low burn probability.

Figure J.5 depicts the WUI for the Town of Rolesville. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure J.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure J.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

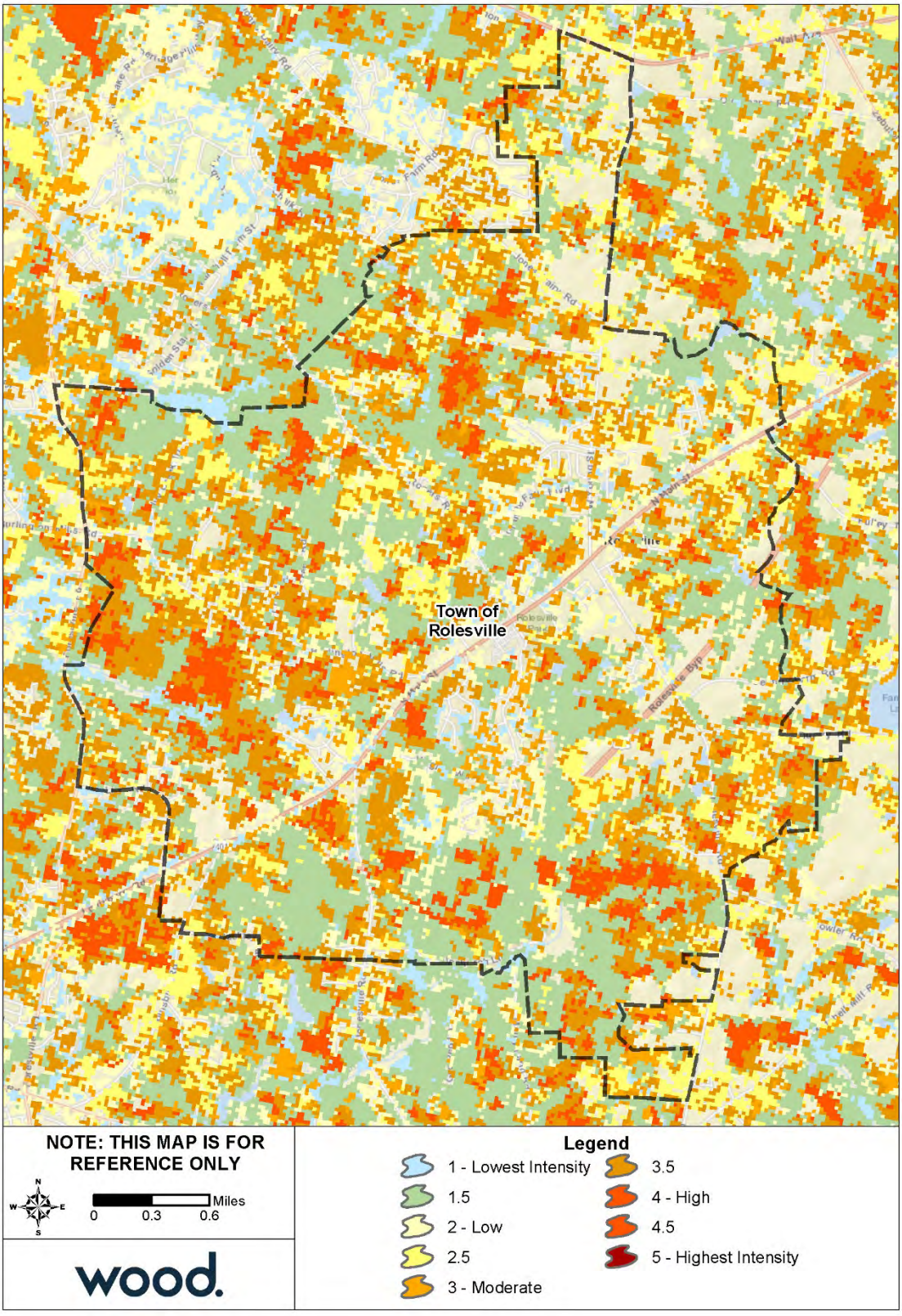
Potential fire intensity is highest in west, south, and northwest Rolesville. These areas, however, are largely outside of the WUI. Additionally, the town has a whole has a low burn probability.

Figure J.5 – Wildland Urban Interface, Town of Rolesville



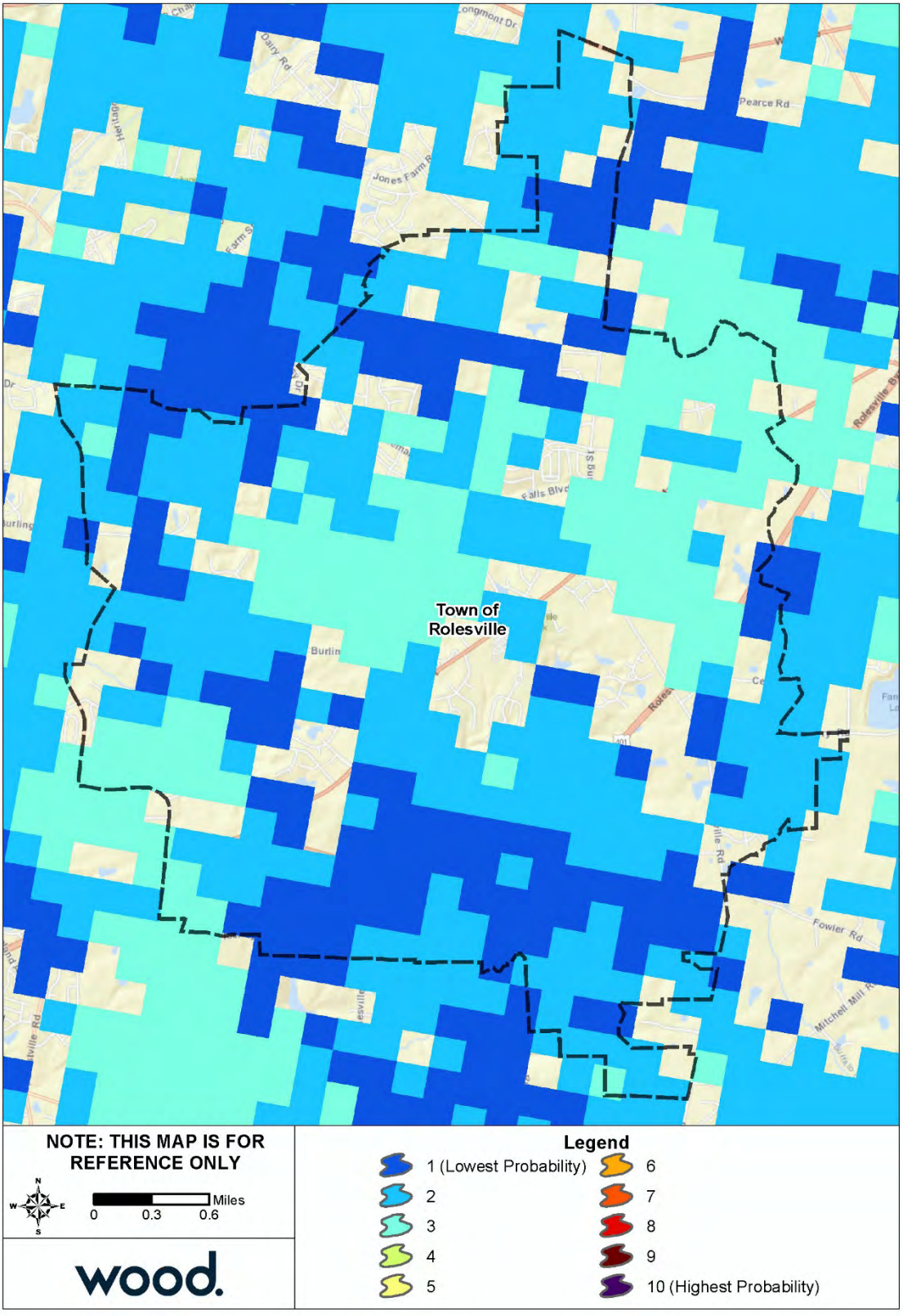
Source: Southern Wildfire Risk Assessment

Figure J.6 – Fire Intensity Scale, Town of Rolesville



Source: Southern Wildfire Risk Assessment

Figure J.7 – Burn Probability, Town of Rolesville



Source: Southern Wildfire Risk Assessment

J.4 CAPABILITY ASSESSMENT

J.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Rolesville were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Rolesville has an overall capability rating of Moderate. The Town's Self-Assessment of key capability areas is summarized in Table J.14 below.

Table J.14 – Capability Self-Assessment, Rolesville

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	High
Fiscal Capability	Moderate
Education and Outreach Capability	Moderate
Mitigation Capability	Moderate
Political Capability	Moderate
Overall Capability	Moderate

J.4.2 Floodplain Management

The Town of Rolesville joined the NFIP as a regular participant in July 2001. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table J.15 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	15	$5,495	$4,417,000		
2-4 Family	0	$0	$0		
All Other Residential	0	$0	$0		
Non-Residential	0	$0	$0		
Total	15	$5,495	$4,417,000	0	$0.00

Source: FEMA Community Information System, accessed November 2018

Table J.16 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	0	$0	$0		
A Zones	0	$0	$0		
AO Zones	0	$0	$0		
AH Zones	0	$0	$0		
AR Zones	0	$0	$0		
A99 Zones	0	$0	$0		
V01-30 & VE Zones	0	$0	$0		
V Zones	0	$0	$0		
D Zones	0	$0	$0		
B, C & X Zone					

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Standard	0	$0	$0		
Preferred	15	$5,495	$4,417,000		
Total	15	$5,495	$4,417,000	0	$0.00

Source: FEMA Community Information System, accessed November 2018

Table J.17 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	0	$0	$0		
A Zones	0	$0	$0		
AO Zones	0	$0	$0		
AH Zones	0	$0	$0		
AR Zones	0	$0	$0		
A99 Zones	0	$0	$0		
V01-30 & VE Zones	0	$0	$0		
V Zones	0	$0	$0		
D Zones	0	$0	$0		
B, C & X Zone	2	$724	$630,000		
Standard	0	$0	$0		
Preferred	2	$724	$630,000		
Total	2	$724	$630,000	0	$0.00

Source: FEMA Community Information System, accessed November 2018

Table J.18 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	0	$0	$0		
A Zones	0	$0	$0		
AO Zones	0	$0	$0		
AH Zones	0	$0	$0		
AR Zones	0	$0	$0		
A99 Zones	0	$0	$0		
V01-30 & VE Zones	0	$0	$0		
V Zones	0	$0	$0		
D Zones	0	$0	$0		
B, C & X Zone	13	$4,771	$3,787,000		
Standard	0	$0	$0		
Preferred	13	$4,771	$3,787,000		
Total	13	$4,771	$3,787,000	0	$0.00

Source: FEMA Community Information System, accessed November 2018

J.5 MITIGATION STRATEGY

Town of Rolesville											
Action #	Description	Goal	Objective	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
Prevention											
P-1	Provide backup power for all critical public facilities (wastewater treatment plant, sewer pump stations, Public Works and Utilities building, etc.) to ensure continued utility service during power loss.	3	1	All	Moderate	City of Raleigh	Cost varies by facility	Local	1 year	In-Progress – Carry Forward	City of Raleigh has updated sewer pump stations with backup power, no upgrade of Town buildings but intended for future budgets.
P-2	Transportation Plan – Continue to address disaster preparedness (evacuation) through road interconnectivity, paved roads, and widening of roads.	3	2	All	Moderate	Rolesville Planning	Staff Time	Local	1 year	In-Progress – Carry Forward	Town has policy for new development connectivity and is implemented with each new development. New Transportation Plan targeted in mid-year 2019.
P-3	Update Rolesville Stormwater Management Plan for operation/implementation and program effectiveness and study the possible changes	4	1	Flood	Moderate	Rolesville Administration	Staff Time	Local	2-3 years	New	N/A
Structural Projects											
SP-1	Install emergency power backup generator for Town Hall and Police Station to ensure continued operation of government during power loss.	3	2	All	High	Rolesville Administration	Over $100,000	Local	2 years	New	N/A
Emergency Services											
ES-1	Implement Wake County Everbridge text alert system to notify citizens in real time of an event of local interest with instructions.	1	2	All	High	Rolesville Administration	Staff Time	Local	1 year	New	N/A
Public Education and Awareness											
PEA-1	Town website - develop hazard mitigation section covering such items as public access, evacuation routes, emergency contact numbers, and detailed weather reports in case of emergency,	1	1	All	Moderate	Rolesville Administration	Staff Time	Local	1 year	In-Progress – Carry Forward	Town is in the process of new Town's Website development and development of a hazard mitigation section will be included by Spring of 2019.

Annex K Town of Wake Forest

K.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Wake Forest.

Table K.1 – HMPC Members

Agency	Representative	Position or Title
Town of Wake Forest	Patrick Reidy	Senior Planner – Development Services
N/A	Grif Bond	Citizen Stakeholder

K.2 COMMUNITY PROFILE

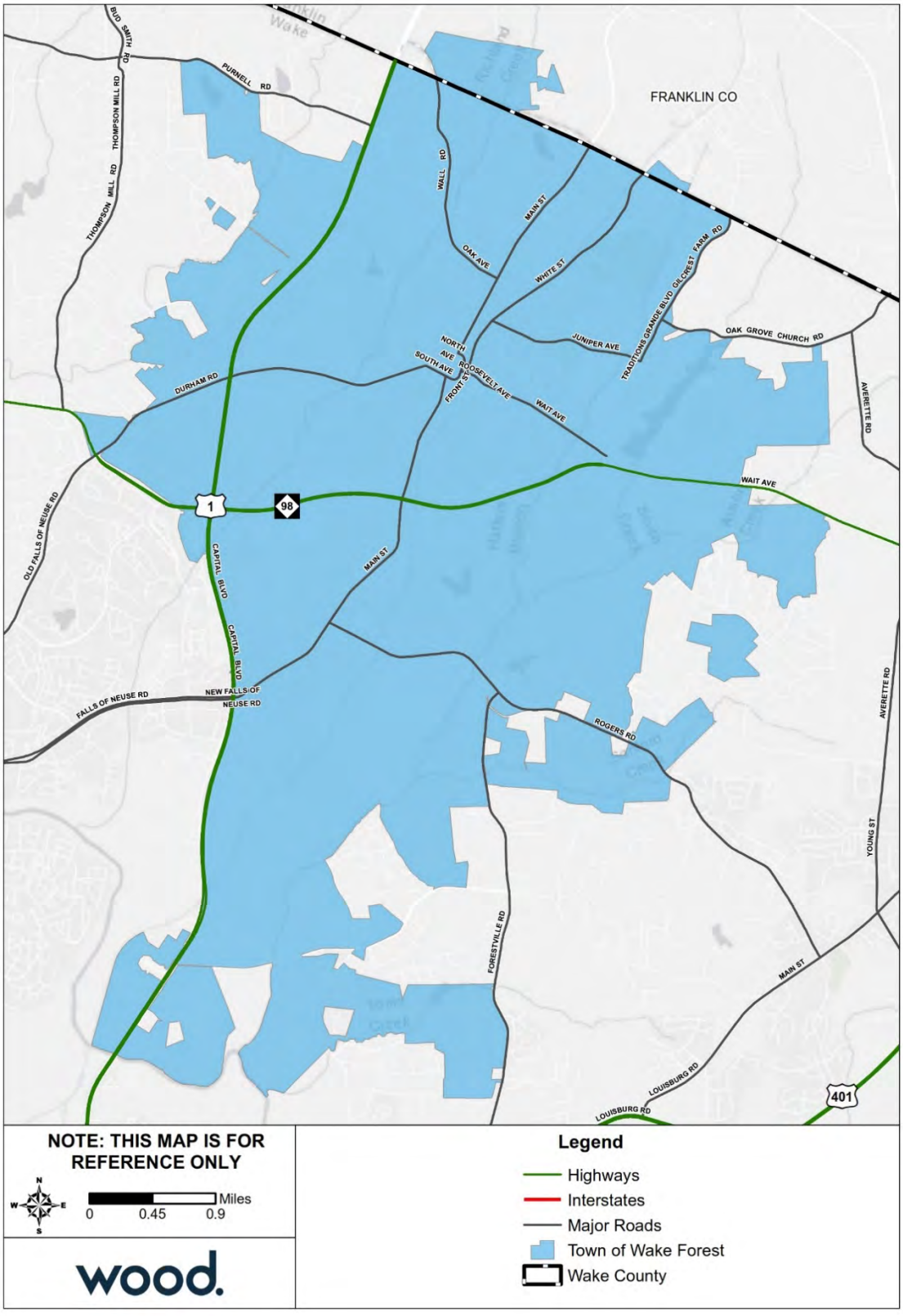
Geography

The Town of Wake Forest is located in northern Wake County. A small portion of the Town extends north into Franklin County. All statistics summarized in this section are for the entirety of the Town of Wake Forest. It is neighbored by Raleigh to the southwest and Rolesville to the southeast. The Town is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Wake Forest comprises a total land area of 15.1 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 1,456 acres of wetlands in Wake Forest.

Figure K.1 shows a base map of the major transportation routes in the Town of Wake Forest.

Figure K.1 – Major Transportation Routes – Town of Wake Forest



Source: Wake County GIS Open Data

Population and Demographics

Table K.2 provides population counts and growth estimates for the Town of Wake Forest as compared to the County overall. Table K.3 provides demographic information for Wake Forest as compared to the whole County.

Table K.2 – Population Counts, Wake Forest, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Wake Forest	12,588	30,117	38,473	8,356	27.7%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates
Note: The total population of Wake Forest includes population residing in adjacent county.

Table K.3 – Racial Demographics, Wake Forest, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Wake Forest	78.9%	14.5%	1.5%	0.9%	4.1%	4.8%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates
*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Wake Forest in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure K.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table K.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Wake Forest	8	12	0	315	0	199	0	93	23	0	0	0	0	36	0	4	3	0	**693**

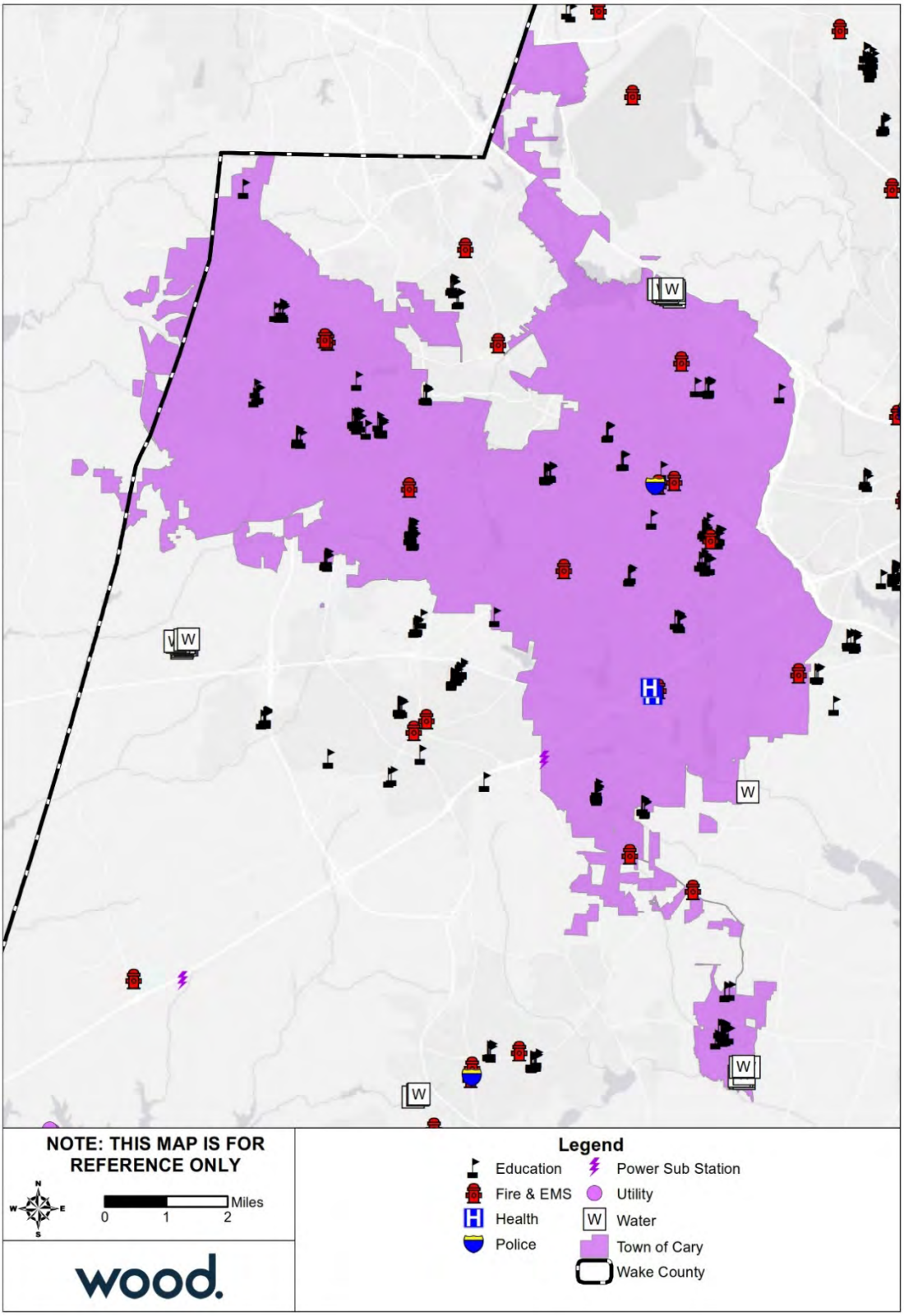
Source: NCEM Risk Management Tool

Table K.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Wake Forest	44	70	21	21	0	15	3	0	**174**

Source: NCEM Risk Management Tool

Figure K.2 – Critical Facilities, Town of Wake Forest



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Wake Forest, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table K.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table K.6 – Parcels Developed 2011 or Later, Town of Wake Forest

Land Class	Number of Parcels	Sum of Building Value
Apartment	5	$108,787,706
Commercial	52	$96,539,284
Condo Complex	4	-
EXEMPT	9	$42,148,445
HOA	2	$326,705
Industrial	4	$2,815,251
Part Exempt	21	$6,572,261
Residential Less Than 10 Acres	3,409	$895,793,767
Retirement Home	1	$4,712,912
Grand Total	**3,507**	**$1,157,696,331**

Source: Wake County Open Data; retrieved April 8, 2019

There are 18 listings on the National Register of Historic Places for the Town of Wake, including 6 historic districts. These sites are listed in the table below.

Table K.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
74001381	Powell House	10/15/1974	Building	Wake Forest
74001378	Wakefields	10/16/1974	Building	Wake Forest
75001298	Lea Laboratory	5/29/1975	Building	Wake Forest
88000238	Purefoy--Dunn Plantation	3/24/1988	District	Wake Forest
91001504	Royall Cotton Mill Commissary	10/16/1991	Building	Wake Forest
93000998	DuBois, W. E. B., School	10/5/1993	Building	Wake Forest
97000788	Purefoy--Dunn Plantation (Boundary Decrease)	7/25/1997	District	Wake Forest
98000689	Oakforest	6/11/1998	Building	Wake Forest
99001046	Glen Royall Mill Village Historic District	8/27/1999	District	Wake Forest
02000059	Downtown Wake Forest Historic District	2/20/2002	District	Wake Forest
02001719	Wakefield Dairy Complex	1/15/2003	Building	Wake Forest
03001301	Wake Forest Historic District	12/18/2003	District	Wake Forest
05001030	Thompson House	9/15/2005	Building	Wake Forest
07000879	Rock Cliff Farm	8/29/2007	District	Wake Forest
08001016	Purefoy-Chappell House and Outbuildings	10/22/2008	Building	Wake Forest
10001097	Bailey--Estes House	12/28/2010	Building	Wake Forest
14000265	South Brick House	5/27/2014	Building	Wake Forest
16000880	Jones, Dr. Calvin, House	12/22/2016	Building	Wake Forest

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The table below details key housing statistics for Wake Forest as compared to the County overall.

Table K.8 – Housing Statistics, Wake Forest, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Wake Forest	11,370	13,888	22.1%	67.2%	4.7%	$278,600

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Wake Forest as compared to the County overall.

Table K.9 – Employment Statistics, Wake Forest, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Wake Forest	19,229	65.6	3.8	30.5	5.4

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates
Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table K.10 – Percent of Employed Population by Occupation, Wake Forest, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Wake Forest	53.4	13.2	25.0	4.0	4.4

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

K.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Wake Forest than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

K.3.1 Flood

Table K.11 Details the acreage of the Town of Wake Forest by flood zone on the effective DFIRM. Per this assessment, over 9 percent of the Town of Wake Forest falls within the mapped 1%-annual-chance floodplains.

Table K.11 – Flood Zone Acreage in the Town of Wake Forest

Flood Zone	Acreage	Percent of Total (%)
Zone A	3.94	0.03
Zone AE	1,253.05	9.02

Flood Zone	Acreage	Percent of Total (%)
Zone X (500-year)	113.01	0.81
Zone X Unshaded	12,516.72	90.13
Total	**13,886.72**	--

Source: FEMA Effective DFIRM; Wake County GIS

Figure K.3 reflects the effective mapped flood hazard zones for the Town of Wake Forest, and Figure K.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in the Town of Wake Forest, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table K.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table K.12– Parcels Developed 2011 or Later and Located in 100-Year Floodplain

Land Class	Number of Parcels	Sum of Building Value
Commercial	1	$6,625,596
Residential Less Than 10 Acres	26	$8,943,999
Grand Total	**27**	**$15,569,595**

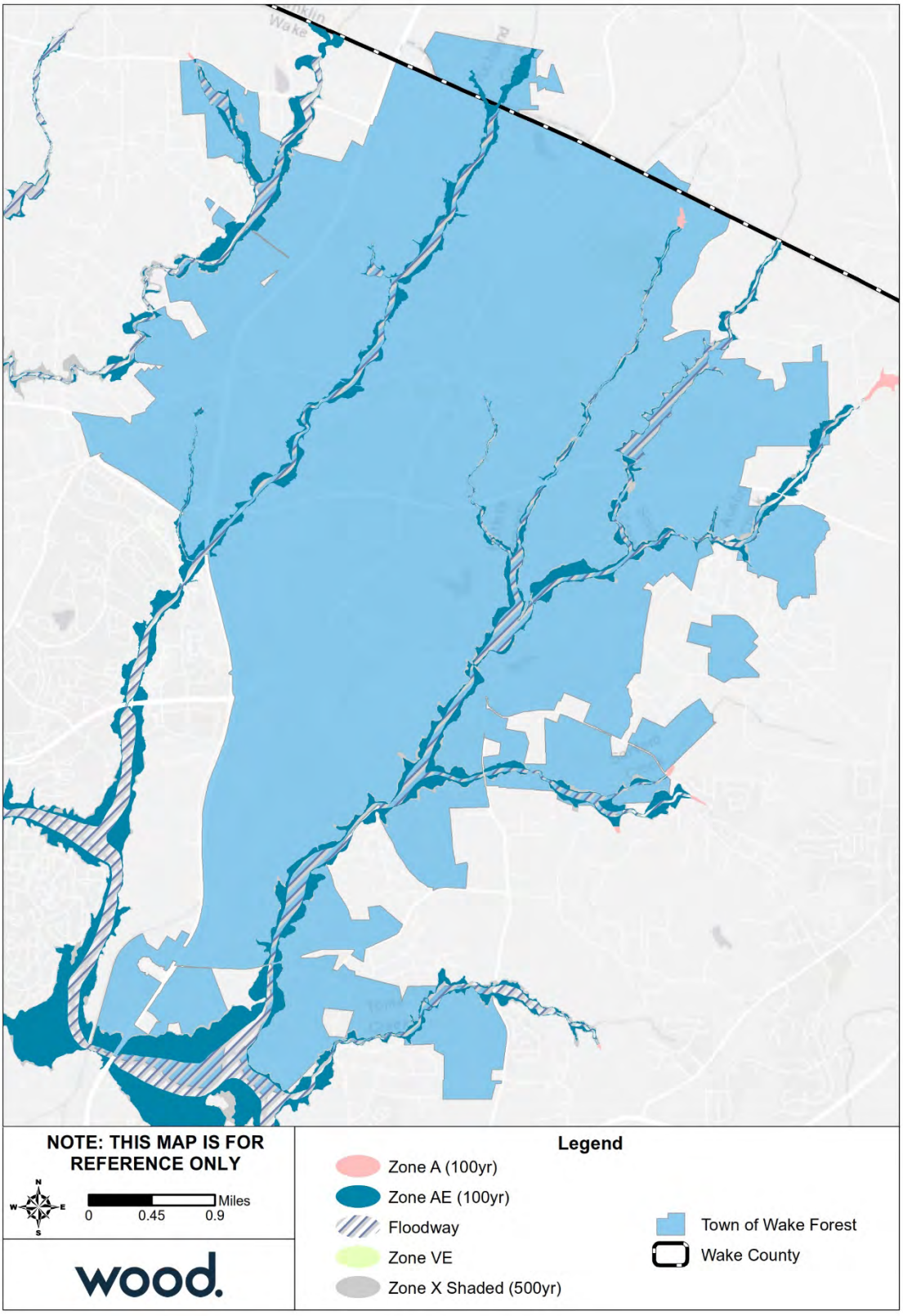
Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Table K.13 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector and flood event in the Town of Wake Forest.

Table K.13 – Critical Facilities Exposed to Flooding, Town of Wake Forest

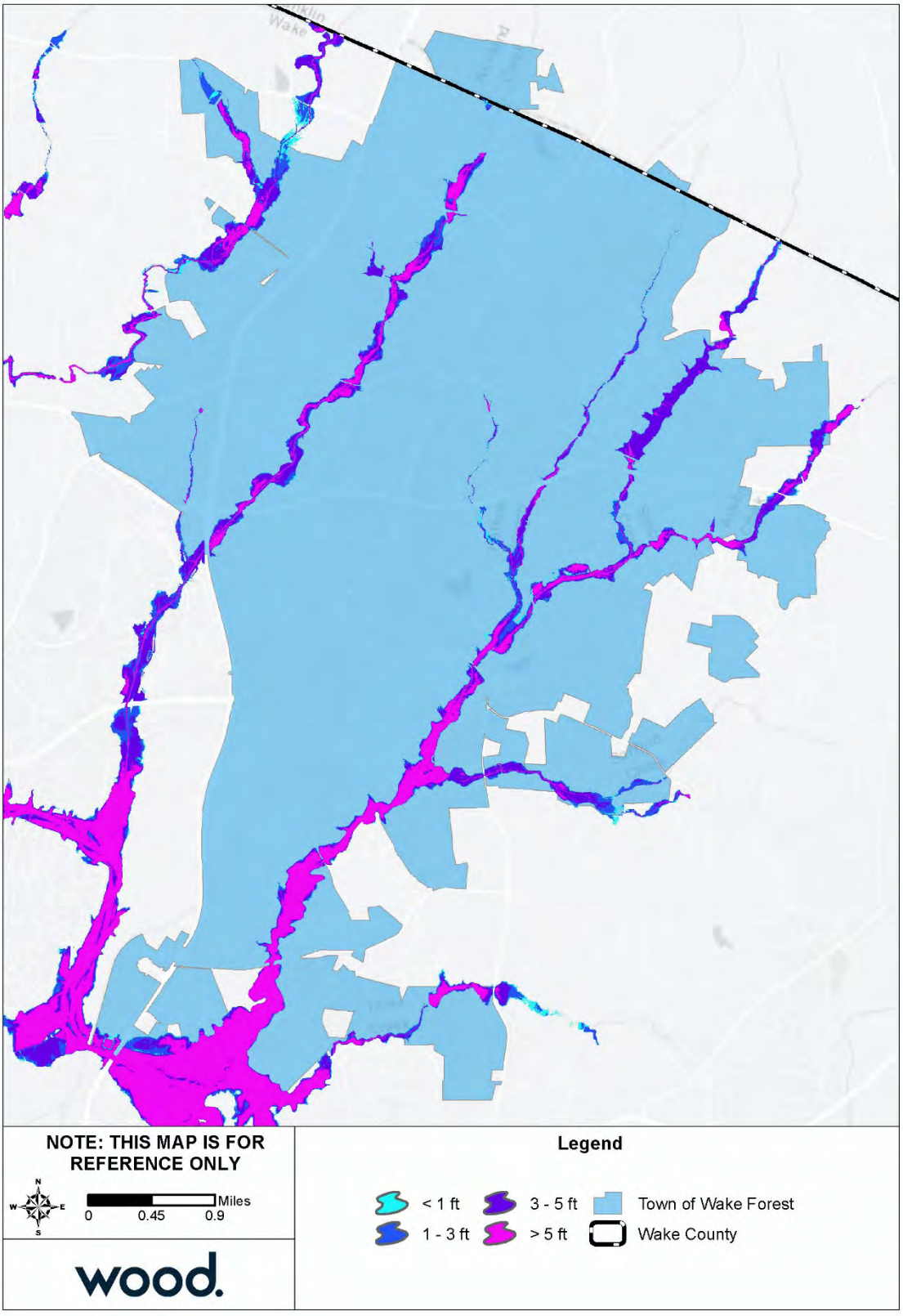
Sector	Event	Number of Buildings at Risk	Estimated Damages
Commercial Facilities	100 Year	1	$25,973
All Categories	**100 Year**	**1**	**$25,973**

Figure K.3 – FEMA Flood Hazard Areas, Town of Wake Forest



Source: FEMA Effective DFIRM

Figure K.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Wake Forest



Source: FEMA Effective DFIRM

K.3.2 Wildfire

Table K.14 summarizes the acreage in the Town of Wake Forest that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 10 percent of the Town of Wake Forest is not included in the WUI.

Table K.14 – Wildland Urban Interface Acreage, Town of Wake Forest

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*1,408.5*	*10.3%*
	LT 1hs/40ac	698.0	5.1%
	1hs/40ac to 1hs/20ac	645.8	4.7%
	1hs/20ac to 1hs/10ac	676.2	4.9%
	1hs/10ac to 1hs/5ac	968.5	7.1%
	1hs/5ac to 1hs/2ac	1,848.4	13.5%
	1hs/2ac to 3hs/1ac	7,033.4	51.5%
	GT 3hs/1ac	387.4	2.8%
	Total	13,666.3	

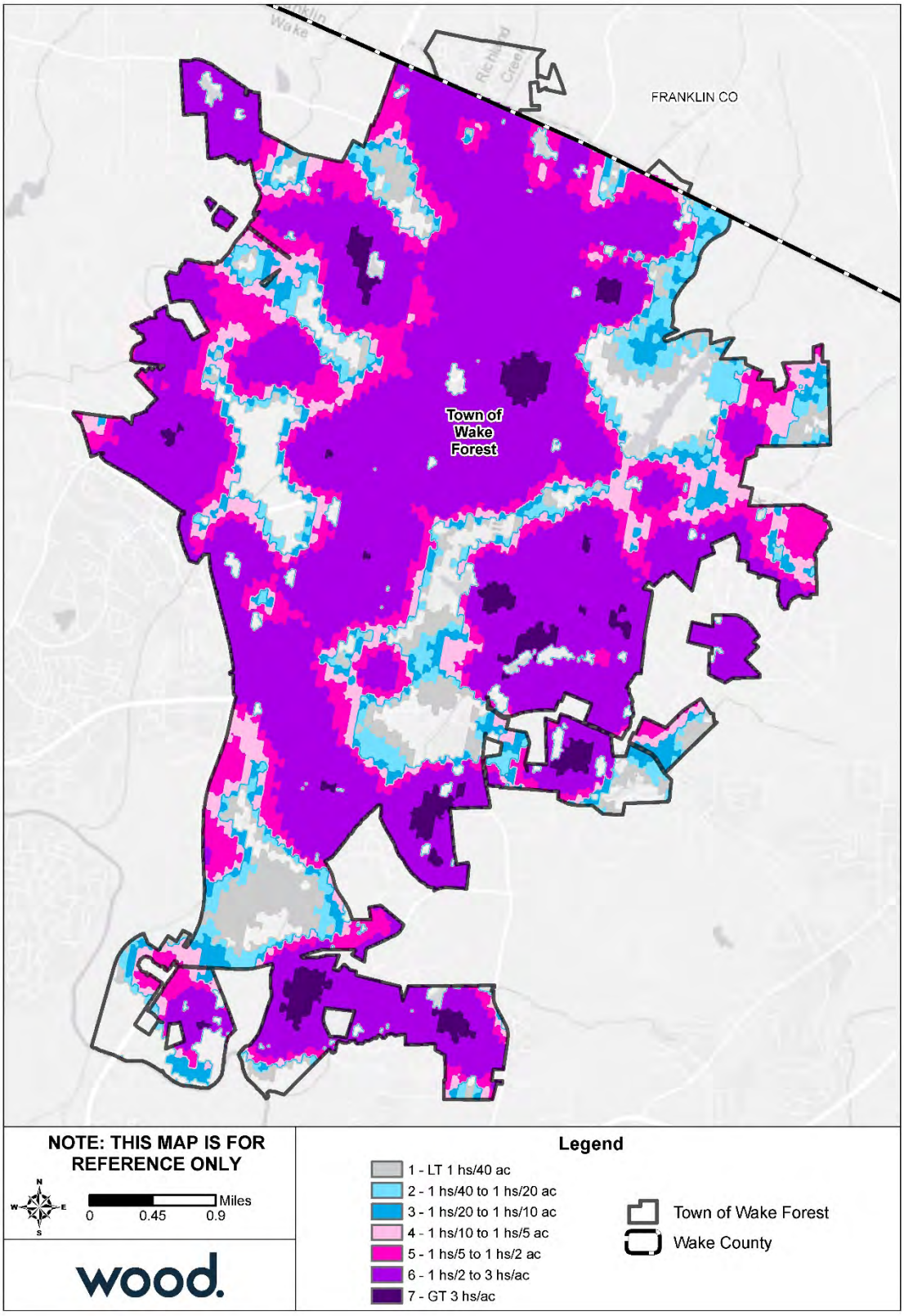
Source: Southern Wildfire Risk Assessment

Potential fire intensity is highest in central and west Wake Forest. These areas are in the WUI, but they do not have a high burn probability. Overall, the Town of Wake Forest does not have a high burn probability.

Figure K.5 depicts the WUI for the Town of Wake Forest. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure K.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure K.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

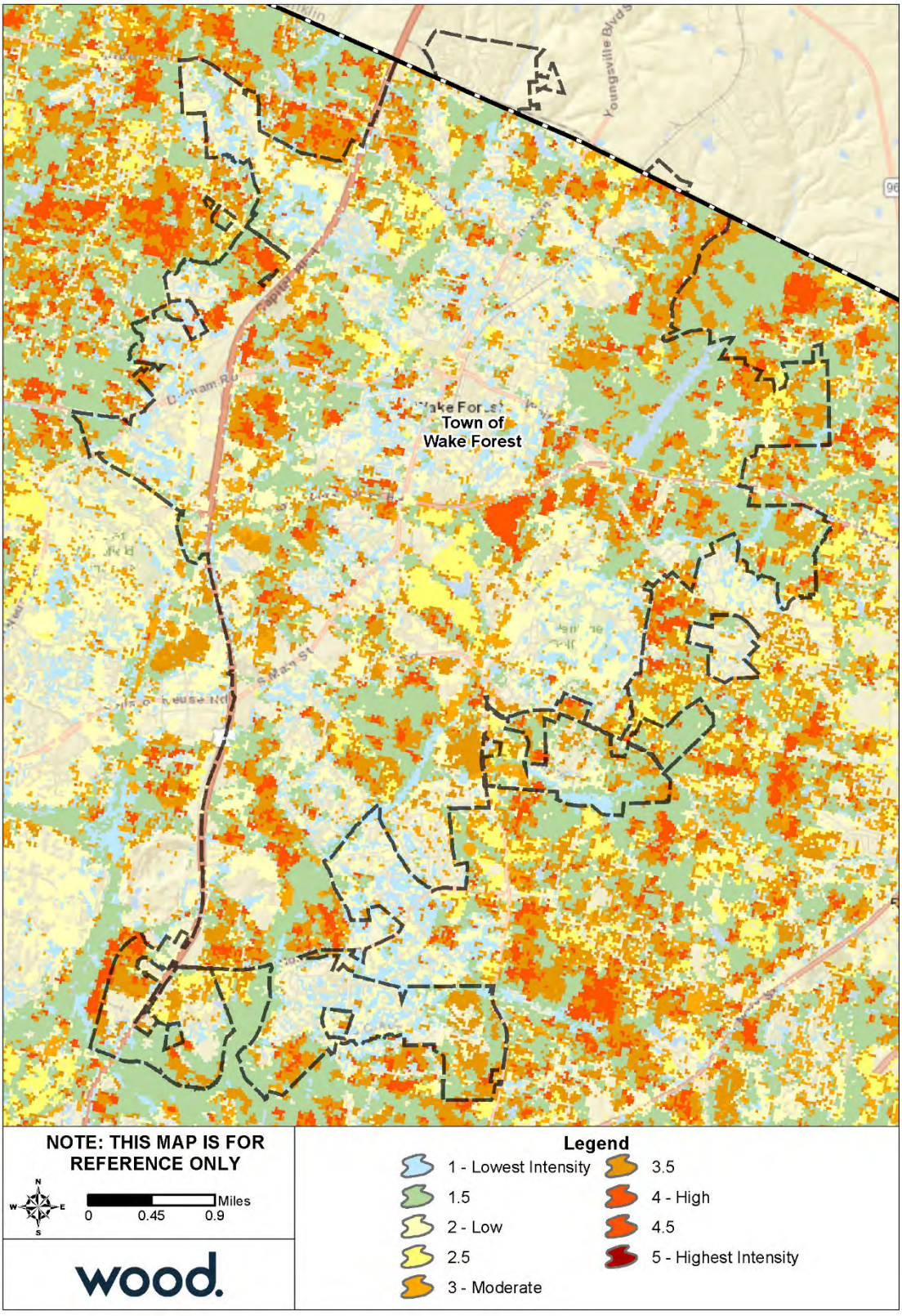
Potential fire intensity is highest in central and west Wake Forest. These areas are in the WUI, but they do not have a high burn probability. Overall, the Town of Wake Forest does not have a high burn probability.

Figure K.5 – Wildland Urban Interface, Town of Wake Forest



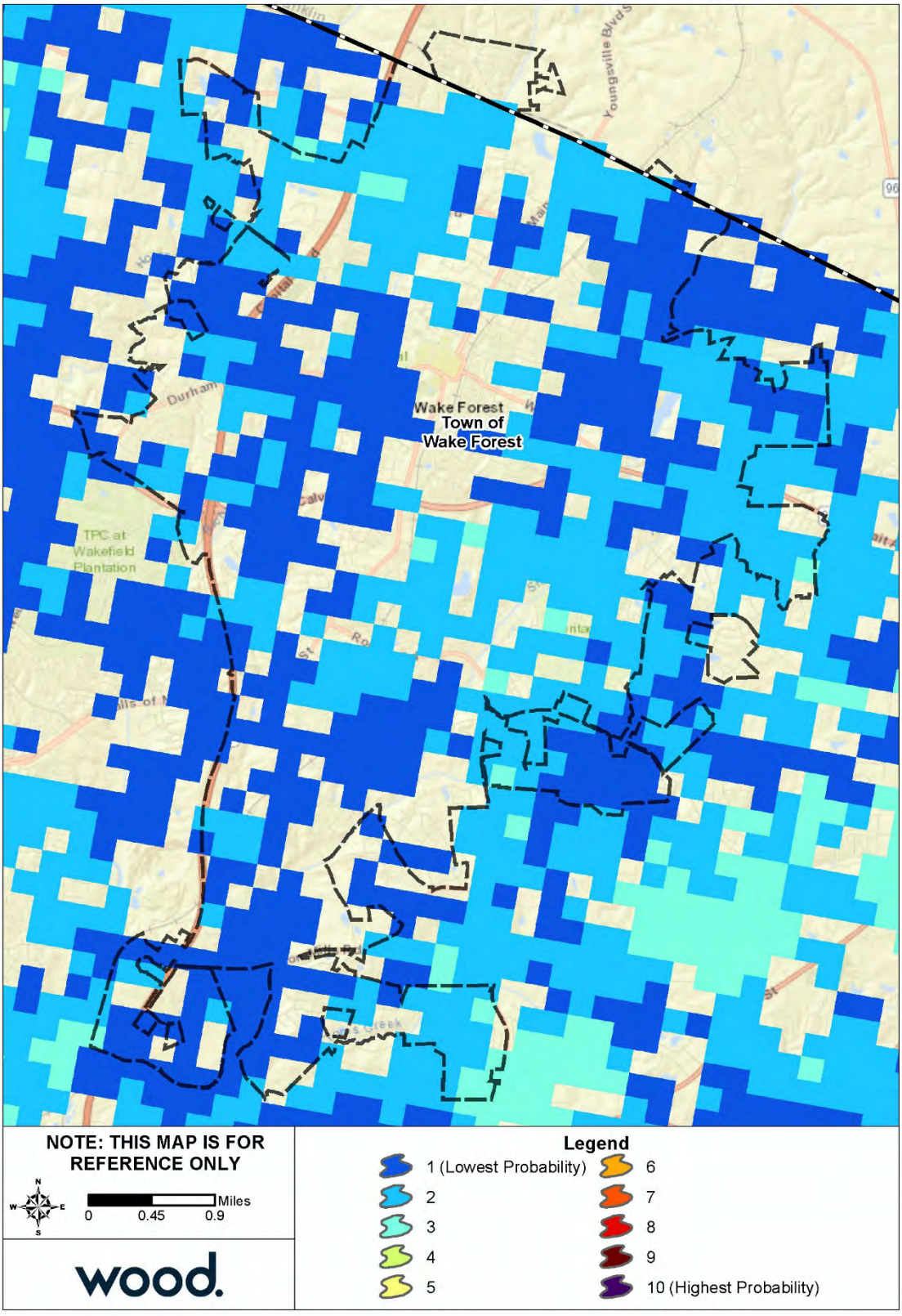
Source: Southern Wildfire Risk Assessment

Figure K.6 – Fire Intensity Scale, Town of Wake Forest



Source: Southern Wildfire Risk Assessment

Figure K.7 – Burn Probability, Town of Wake Forest



Source: Southern Wildfire Risk Assessment

K.4 CAPABILITY ASSESSMENT

K.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Wake Forest were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Wake Forest has an overall capability rating of High. The Town's Self-Assessment of key capability areas is summarized in Table K.15 below.

Table K.15 – Capability Self-Assessment, Wake Forest

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	High
Fiscal Capability	High
Education and Outreach Capability	Moderate
Mitigation Capability	Limited
Political Capability	High
Overall Capability	High

K.4.2 Floodplain Management

The Town of Wake Forest joined the NFIP through emergency entry in March 1974 and has been a regular participant since July 1978. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table K.16 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	142	$56,421	$42,541,700		
2-4 Family	2	$501	$260,000		
All Other Residential	1	$298	$258,000		
Non-Residential	4	$3,219	$850,000		
Total	149	$60,439	$43,909,700	0	$0.00

Source: FEMA Community Information System, accessed November 2018

Table K.17 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	27	$12,963	$8,050,200		
A Zones	0	$0	$0		
AO Zones	0	$0	$0		
AH Zones	0	$0	$0		
AR Zones	0	$0	$0		
A99 Zones	0	$0	$0		
V01-30 & VE Zones	0	$0	$0		
V Zones	0	$0	$0		

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
D Zones	0	$0	$0		
B, C & X Zone					
Standard	6	$4,083	$1,877,500		
Preferred	116	$43,393	$33,982,000		
Total	149	$60,439	$43,909,700	0	$0.00

Source: FEMA Community Information System, accessed November 2018

Table K.18 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	0	$0	$0		
A Zones	0	$0	$0		
AO Zones	0	$0	$0		
AH Zones	0	$0	$0		
AR Zones	0	$0	$0		
A99 Zones	0	$0	$0		
V01-30 & VE Zones	0	$0	$0		
V Zones	0	$0	$0		
D Zones	0	$0	$0		
B, C & X Zone	4	$1,366	$1,085,000		
Standard	0	$0	$0		
Preferred	4	$1,366	$1,085,000		
Total	4	$1,366	$1,085,000	0	$0.00

Source: FEMA Community Information System, accessed November 2018

Table K.19 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	27	$12,963	$8,050,200		
A Zones	0	$0	$0		
AO Zones	0	$0	$0		
AH Zones	0	$0	$0		
AR Zones	0	$0	$0		
A99 Zones	0	$0	$0		
V01-30 & VE Zones	0	$0	$0		
V Zones	0	$0	$0		
D Zones	0	$0	$0		
B, C & X Zone	118	$46,110	$34,774,500		
Standard	6	$4,083	$1,877,500		
Preferred	112	$42,027	$32,897,000		
Total	145	$59,073	$42,824,700	0	$0.00

Source: FEMA Community Information System, accessed November 2018

K.5 MITIGATION STRATEGY

Town of Wake Forest											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Prepare a Storm Drainage Master Plan to include all storm drainage, infrastructure, and capacity analysis.	2	2	Flood	High	Wake Forest Engineering	$400,000	General Fund	2019	In-Progress – Carry Forward	75% complete, completion scheduled June 2019
P-2	Put electric distribution lines underground.	3	1	Hurricane, Severe Weather, Severe Winter Storm, Tornado, Wildfire	Low	Wake Forest Power	$10,000,000	Electric Fund, General Fund, and Bonds	2024	In-Progress – Carry Forward	Where feasible, electric lines have been put underground. However, there are still some lines that could be buried and the town will look into carrying that out going forward.
P-3	Become a CRS community	2	2	Flood	Low	Wake Forest Public Works	$100,000	General Fund	2022	New	Work towards becoming a CRS community
P-4	Explore the use of Stormwater Utility Fees	3	1	Flood	Moderate	Wake Forest Administration	$100,000	General Fund that would become a User Fee if implemented	2020	New	As subdivisions age, their covenants could expire after 20 years leaving the town with maintaining additional stormwater control measures. These fees could help offset necessary maintenance.
P-5	Maintain a GIS database of building footprints and use it to regularly update a map of critical facilities and vulnerable buildings.	2	2	All	Moderate	Wake Forest GIS	Staff time	General Fund	Ongoing Annually	New	Updated data will be used to identify properties that should be prioritized for mitigation.
Property Protection											
PP-1	Document each historic structure in Wake Forest town limits and ETJ	3	1	Hurricane, Severe Weather, Severe Winter Storm, Tornado, Wildfire, Flood	Moderate	Wake Forest Planning	$75,000	General Fund	2020	New	Photographs and taken every other year in the local historic district. A baseline photographic inventory of all historic structures in the town limits and ETJ will be taken and repeated every 5 years. If damage occurred due to a natural disaster, it would be easier to secure funding to replace/repair back to its historical integrity.
PP-2	Provide for primary or mobile generators to shelter sites.	2	1	All	Moderate	Wake County Emergency Management	$500,000	General Fund	2024	In-Progress – Carry Forward	Heritage High School has generators. Town is constructing Joyner Park with intention to be used as a shelter site if needed. Generator is being included with the building.
PP-3	Assess facilities for the need for emergency generation, giving consideration to alternate facility sites.	2	1	All	High	Wake Forest Power	$250,000	General Fund	2023	In-Progress – Carry Forward	The town has assessed facilities for the need for emergency generation and many facilities have been fitted with generators. However, additional facilities with emergency generation would be useful.
Natural Resource Protection											
NRP-1	Manage the Wake Forest Reservoir for hazard mitigation	2	1	Drought, Flood, Dam Failure	Moderate	Wake Forest Public Works	$300,000	General Fund	2021	New	The City of Raleigh is in the process of transferring the Wake Forest Reservoir to the town. Staff is investigating all details associated with the reservoir ownership from a hazard mitigation standpoint, such as flooding/breaching potential.
NRP-2	Expansion of our greenway trail network	3	2	Flood, Hurricane, Extreme Heat	Moderate	Wake Forest Planning	$16,100,000	General Fund and Bonds	2024	New	The Town has multiple greenway extensions and new routes planned. By installing greenways along our waterways, it gives the Town a better opportunity to remove fallen debris and trash that helps alleviate possible flooding.
Structural Projects											
SP-1	Conduct stream mitigation projects on Old Mill Stream, Richland Creek, and others subject to flooding or erosion.	3	2	Flood	Moderate	Wake Forest Engineering	$2,350,000	General Fund, Clean Water Management Trust Fund, Ecosystem Enhancement Program	2024	In-Progress – Carry Forward	Some mitigation projects have been conducted on these water bodies, but there is significant effort that is still needed to reduce potential erosion. Current projects include: Old Mill Stream and Richland Creek - construction plans @ 90%. Ailey Young Dam - completion June 2019; Smith Creek - quote has been requested for work to be done. Stream erosion throughout town continues to be an ongoing process as needed
Emergency Services											

Town of Wake Forest											
Action #	Description	Goal	Objective	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
ES-1	Investigate methods of encouraging gas stations to acquire backup generators.	1	1	All	High	Wake Forest Public Works and Inspections	$50,000	General Fund	2022	In-Progress – Carry Forward	Grocery stores and gas stations are encouraged to have back up generators. Wal-Mart added a generator with the help of the town. Wegmans which will be constructed in the next two years will have a generator on site. These sites will help provide necessary food and supplies to residents.
ES-2	See that all nursing homes and assisted living facilities have backup generators.	1	1	All	High	Property owners	$150,000	Property owners	2023	In-Progress – Carry Forward	New facilities are being encouraged to include generators. Existing facilities without generators are financially constrained and have little ability to add generators.
ES-3	Require, in the contract, that fuel suppliers have backup generators.	3	1	All	High	Wake Forest Administration, Finance, and Public Works	$25,000	General Fund	2024	In-Progress – Carry Forward	This is the Town's current policy and we continue to monitor new contracts for compliance.
ES-4	Adopt and Implement an Emergency Operations Plan	3	2	All	High	Wake Forest Administration	$100,000	General Fund	2021	New	A draft EOP has been created; adoption expected in 2019
ES-5	Adopt a SARA Title III Plan	4	2	All	Moderate	Wake Forest Fire Department	$150,000	General Fund	2023	New	Investigate the ability to create a SARA Title III Plan to have clearer knowledge and how to better handle chemical releases from facilities that could impact the town.
Public Education and Awareness											
PEA-1	Develop a policy and advise the public that all outside above ground LP or propane gas tanks be cut off during a major event.	1	1	All	Moderate	Wake Forest Communications	$10,000	General Fund	2020	In-Progress – Carry Forward	Past communications have included information advising the public of turning off propane tanks during a storm, but better outreach is needed to ensure this occurs. A policy should be put in place to ensure it is regularly communicated. Perhaps it can be included as part of the EOP.

Annex L Town of Wendell

L.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Wendell.

Table L.1 – HMPC Members

Agency	Representative	Position or Title
Planning Department	David Bergmark	Planning Director
Planning Department	Mackenzie Day	Planner
N/A	Jon Olson	Citizen Stakeholder

L.2 COMMUNITY PROFILE

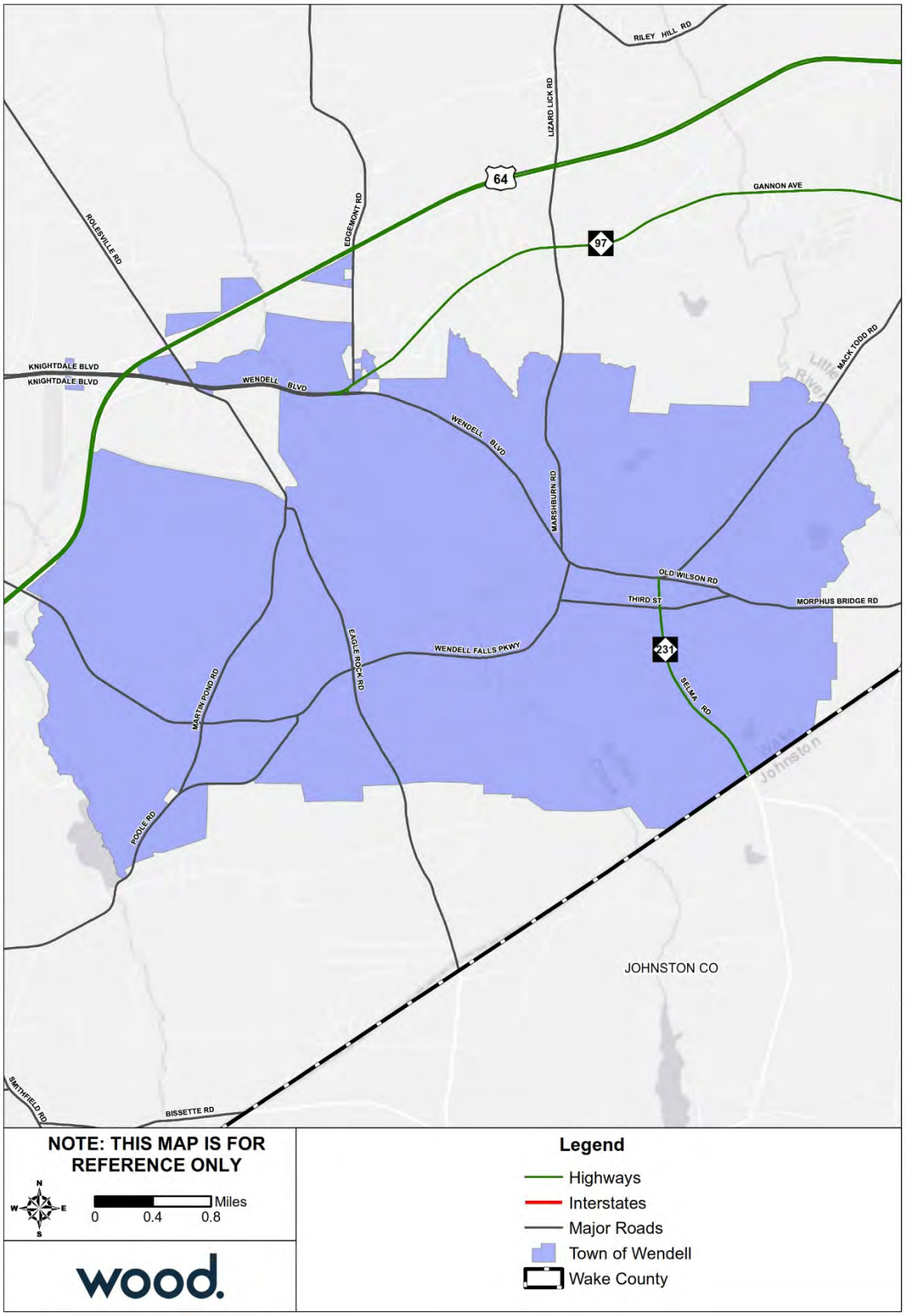
Geography

The Town of Wendell is located in eastern Wake County. It is neighbored by Knightdale to the west, Zebulon to the northeast, and Johnston County to the southeast. The Town is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Wendell comprises a total land area of 5.2 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 1,549 acres of wetlands in Wendell.

Figure L.1 shows a base map of major transportation routes in the Town of Wendell.

Figure L.1 – Major Transportation Routes – Town of Wendell



Source: Wake County GIS Open Data

Population and Demographics

Table L.2 provides population counts and growth estimates for the Town of Wendell as compared to the County overall. Table L.3 provides demographic information for Wendell as compared to the whole County.

Table L.2 – Population Counts, Wendell, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Wendell	4,247	5,845	6,516	671	11.5%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates

Table L.3 – Racial Demographics, Wendell, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Wendell	67.8%	19.4%	1.0%	3.6%	4.3%	12.9%

Source: US Census Bureau, American Community Survey 2013-2017 5-Year Estimates

*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Wendell in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure L.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table L.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Wendell	72	4	0	132	0	75	0	37	6	0	0	0	0	22	0	2	0	0	**350**

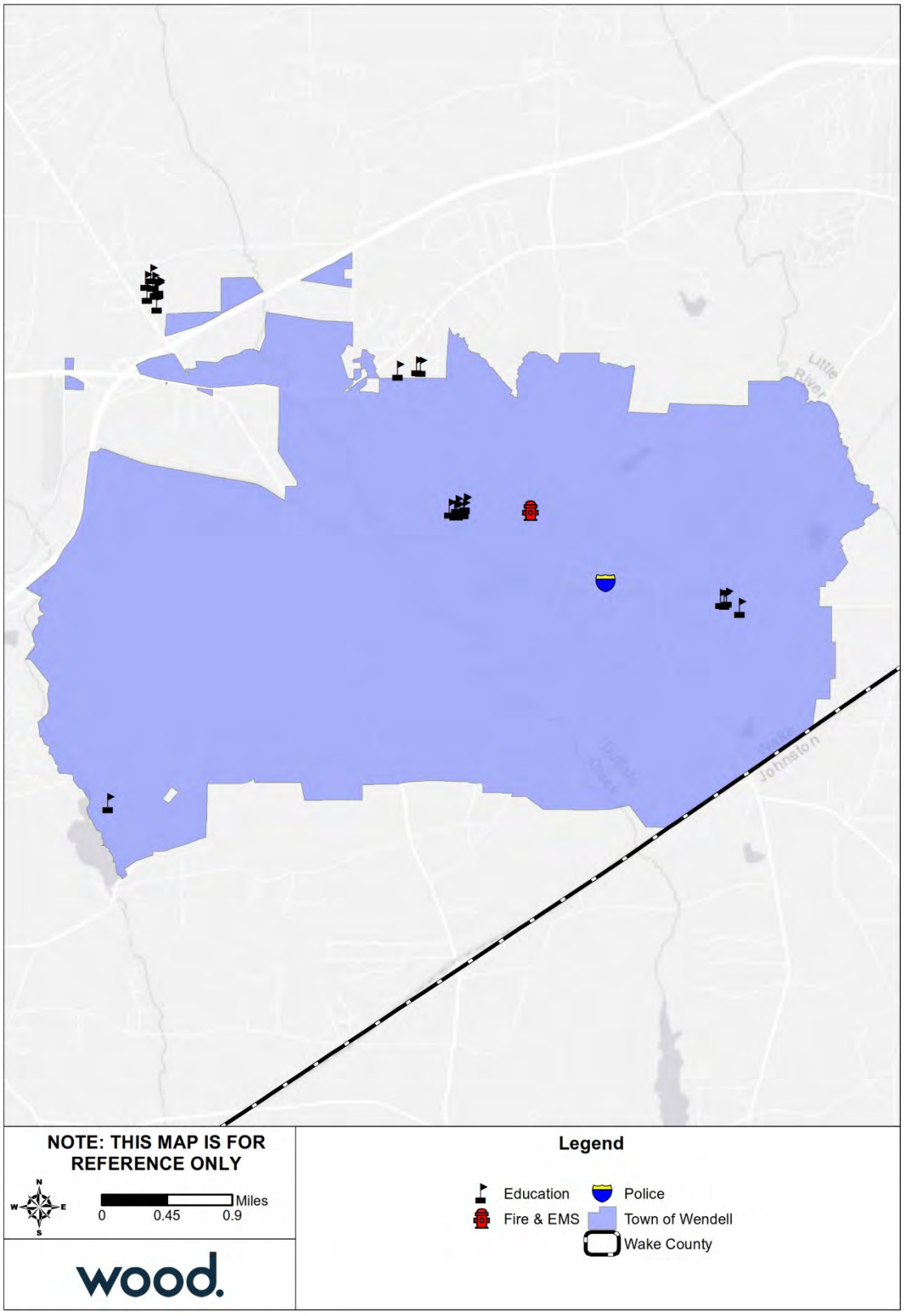
Source: NCEM Risk Management Tool

Table L.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Wendell	2	13	3	6	0	10	0	0	**34**

Source: NCEM Risk Management Tool

Figure L.2 – Critical Facilities, Town of Wendell



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Wendell, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table L.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table L.6 – Parcels Developed 2011 or Later, Town of Wendell

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	2	$664,790
Agriculture	2	$181,123
Commercial	4	$5,349,812
EXEMPT	3	$1,864,053
HOA	1	-
Industrial	1	$923,086
Part Exempt	2	$632,131
Residential Less Than 10 Acres	729	$144,524,273
Grand Total	**744**	**$154,139,268**

Source: Wake County Open Data; retrieved April 8, 2019

There are six listings on the National Register of Historic Places for the Town of Fuquay-Varina, including two historic districts. These sites are listed in the table below.

Table L.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
98000947	Wendell Commercial Historic District	7/31/1998	District	Wendell
01000415	Riley Hill School	4/25/2001	Building	Wendell
01001113	Sunnyside	10/15/2001	Building	Wendell
03000928	Avera, Dr. Thomas H., House	9/11/2003	Building	Wendell
07001504	Harmony Plantation	1/29/2008	Building	Wendell
09000382	Wendell Boulevard Historic District	6/3/2009	District	Wendell

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The table below details key housing statistics for Wendell as compared to the County overall.

Table L.8 – Housing Statistics, Wendell, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Wendell	2,430	2,691	10.7%	64.8%	8.8%	$145,900

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Wendell as compared to the County overall.

Table L.9 – Employment Statistics, Wendell, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Wendell	2,939	60.5	1.7	37.9	2.7

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table L.10 – Percent of Employed Population by Occupation, Wendell, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Wendell	39.5	10.7	35.0	4.6	10.3

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

L.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Wendell than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

L.3.1 Flood

Table L.11 details the acreage of the Town of Wendell by flood zone on the effective DFIRM. Per this assessment, over 8 percent of the Town of Wendell falls within the mapped 1%-annual-chance floodplains.

Table L.11 – Flood Zone Acreage in the Town of Wendell

Flood Zone	Acreage	Percent of Total (%)
Zone A	19.15	0.20
Zone AE	814.47	8.39
Zone X (500-year)	102.78	1.06
Zone X Unshaded	8,774.84	90.36
Total	**9,711.24**	**--**

Source: FEMA Effective DFIRM; Wake County GIS

Figure L.3 reflects the effective mapped flood hazard zones for the Town of Wendell, and Figure L.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in Town of Wendell, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

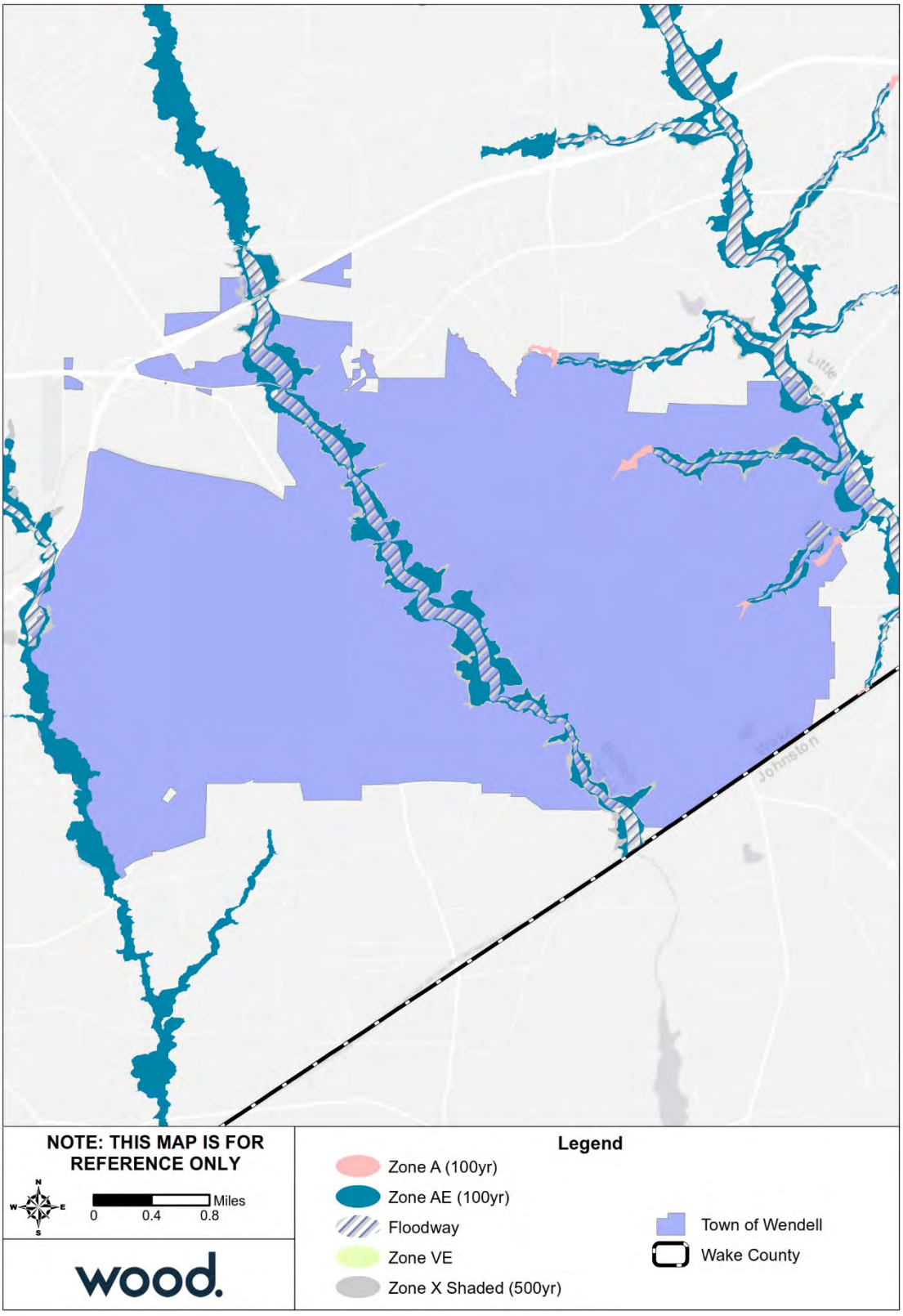
Table L.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table L.12 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain, Town of Wendell

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	1	$229,734
Residential Less Than 10 Acres	22	$3,718,097
Grand Total	**23**	**$3,947,831**

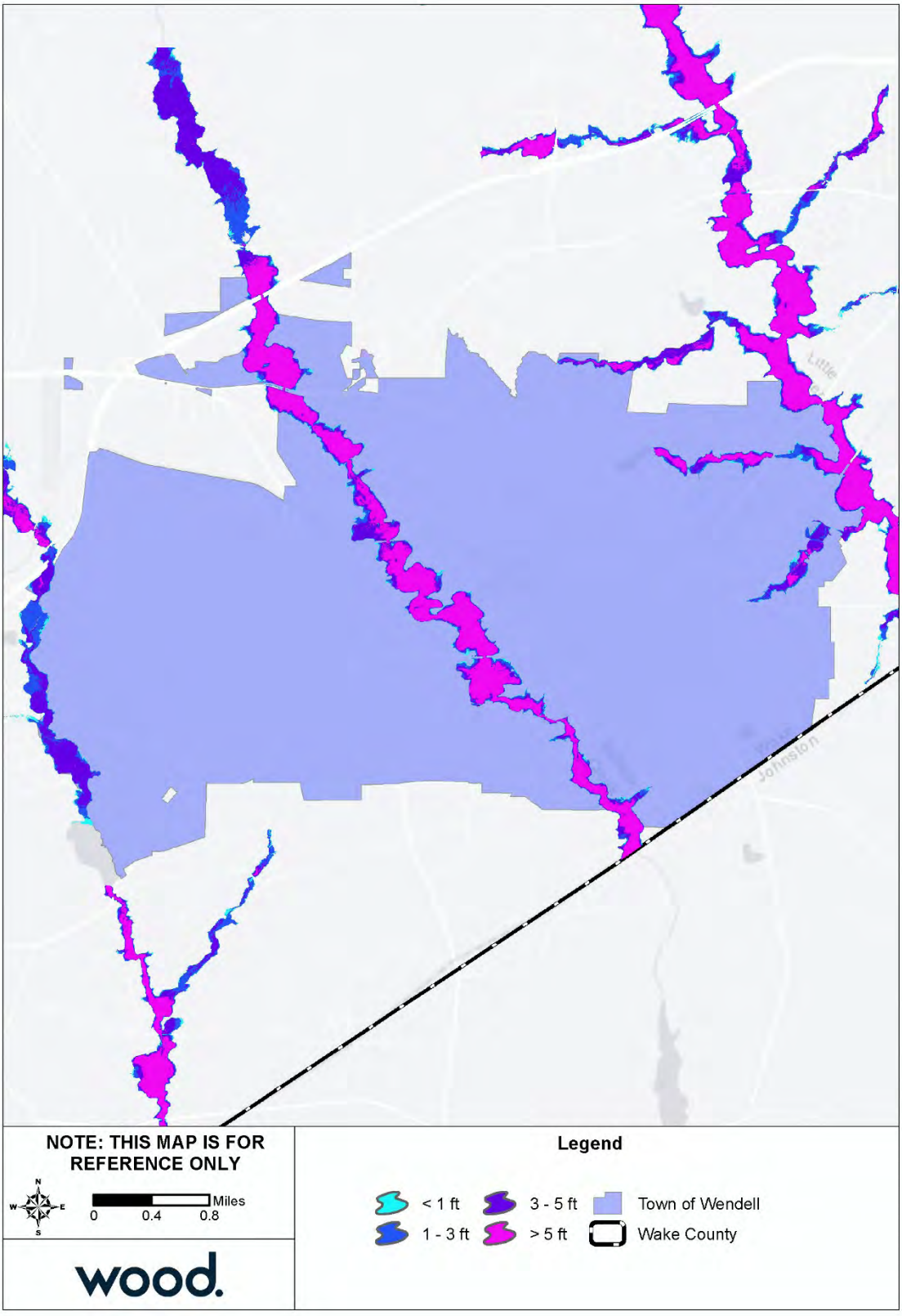
Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Figure L.3 – FEMA Flood Hazard Areas, Town of Wendell



Source: FEMA Effective DFIRM

Figure L.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Wendell



Source: FEMA Effective DFIRM

L.3.2 Wildfire

Table L.13 summarizes the acreage in the Town of Wendell that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 20 percent of the Town of Wendell is not included in the WUI.

Table L.13 – Wildland Urban Interface Acreage, Town of Wendell

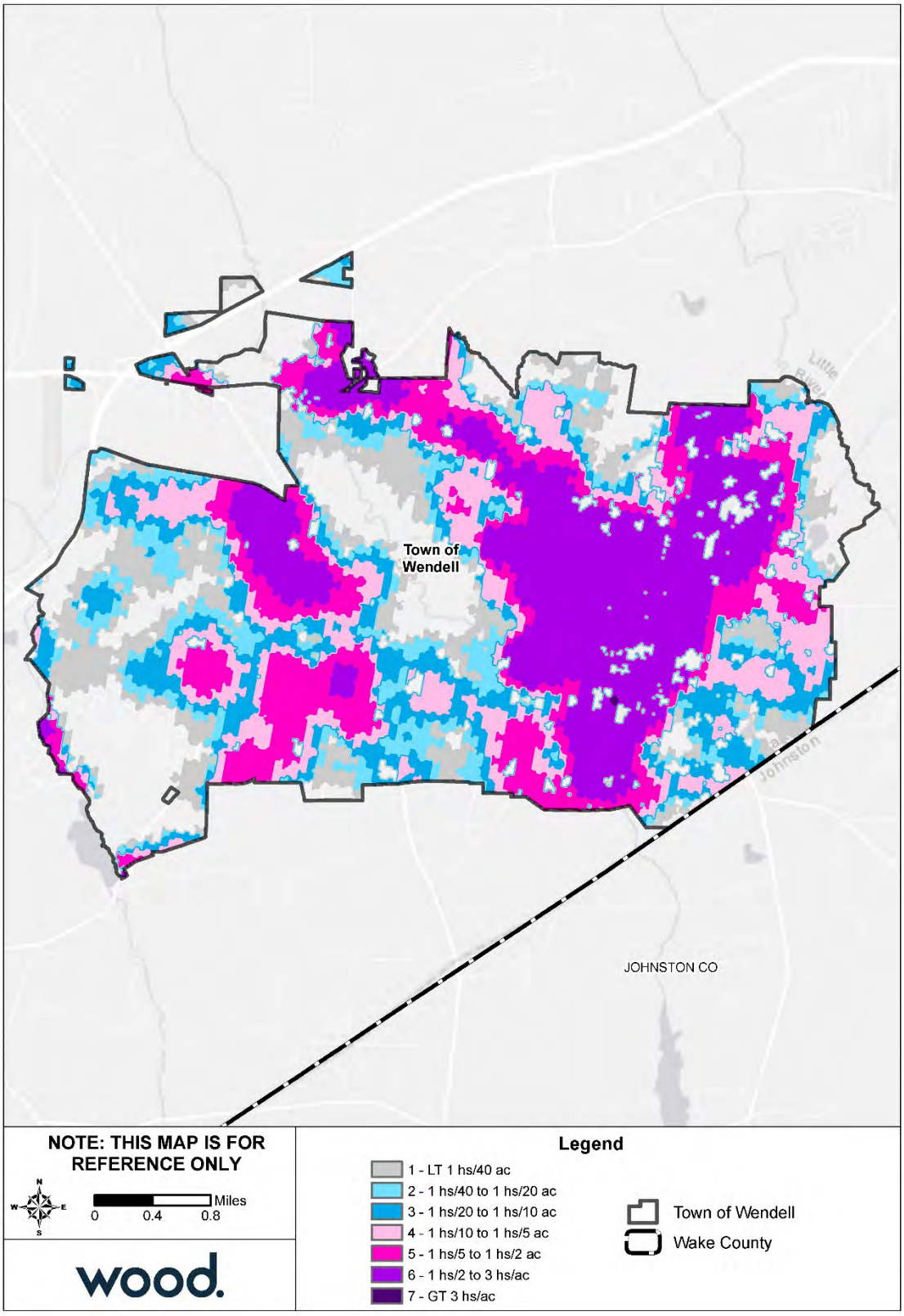
	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*1,973.0*	*20.3%*
	LT 1hs/40ac	1,130.3	11.6%
	1hs/40ac to 1hs/20ac	774.1	8.0%
	1hs/20ac to 1hs/10ac	1,124.0	11.6%
	1hs/10ac to 1hs/5ac	1,265.8	13.0%
	1hs/5ac to 1hs/2ac	1,366.6	14.1%
	1hs/2ac to 3hs/1ac	2,070.3	21.3%
	GT 3hs/1ac	1.7	0.0%
	Total	115,066.8	

Source: Southern Wildfire Risk Assessment

Figure L.5 depicts the WUI for the Town of Wendell. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure L.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure L.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

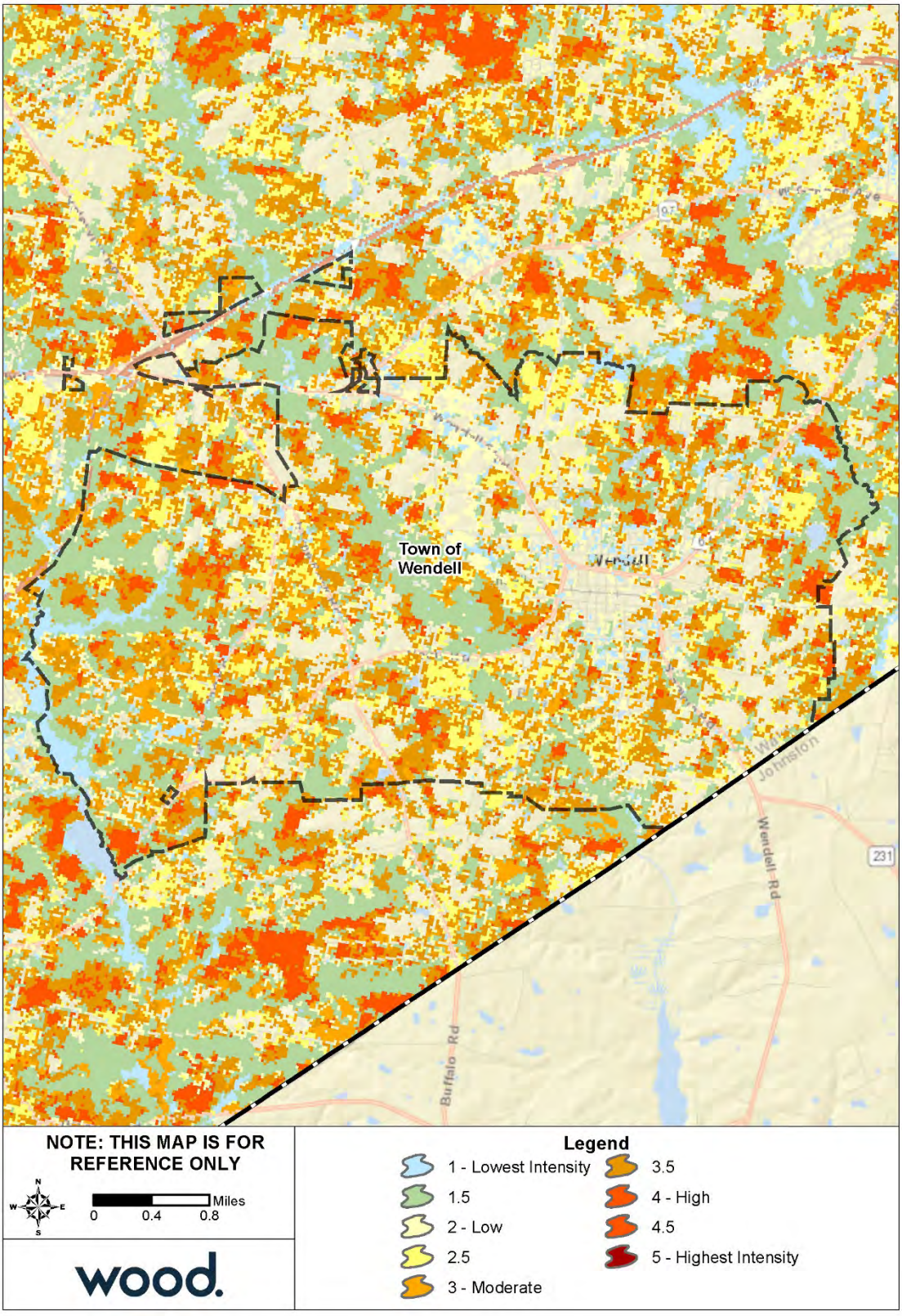
There are pockets of higher potential fire intensity throughout the Town of Wendell, none of which are too large. While some of these areas do fall within the WUI, the entirely of the Town has a relatively low burn probability.

Figure L.5 – Wildland Urban Interface, Town of Wendell



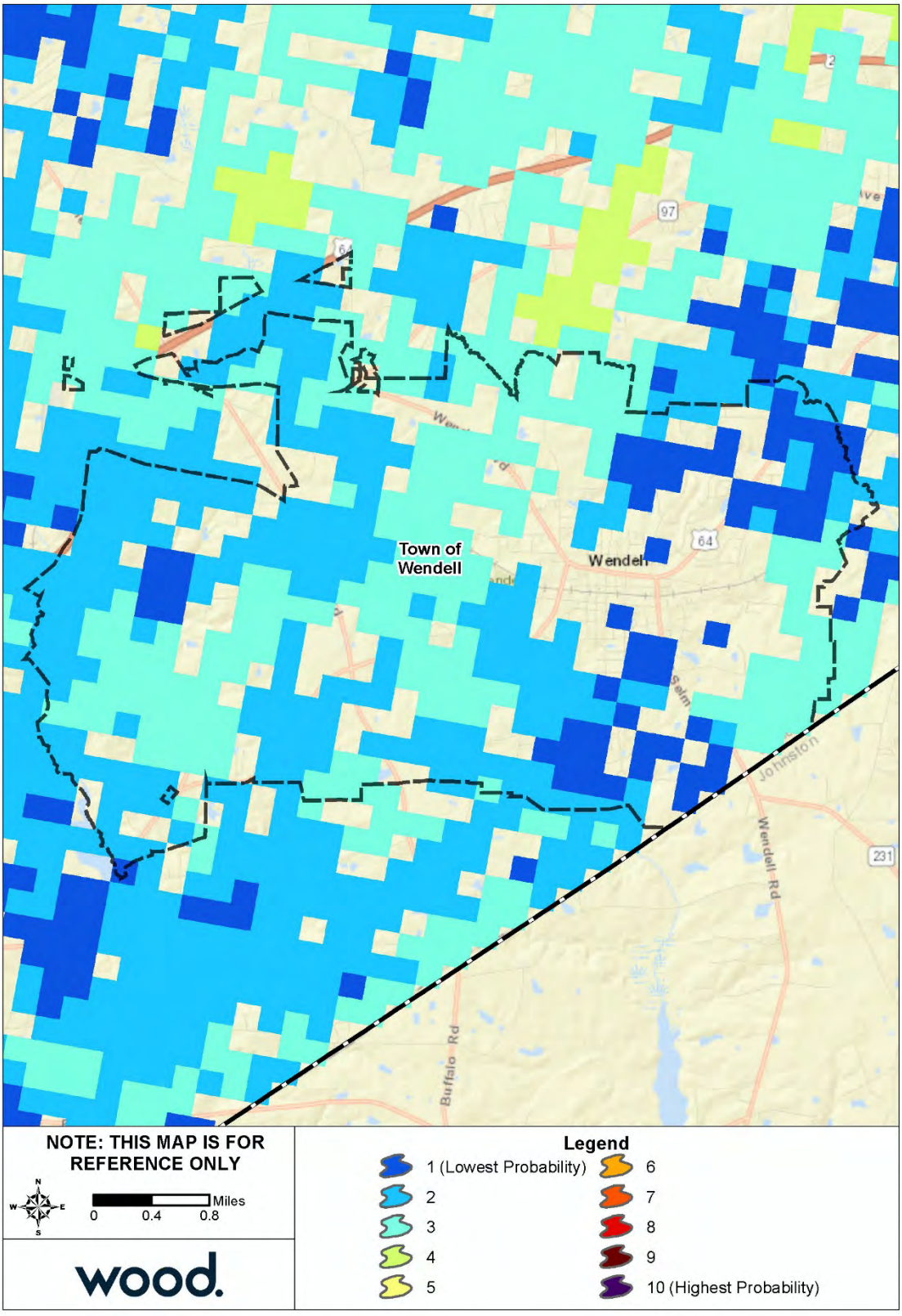
Source: Southern Wildfire Risk Assessment

Figure L.6 – Fire Intensity Scale, Town of Wendell



Source: Southern Wildfire Risk Assessment

Figure L.7 – Burn Probability, Town of Wendell



Source: Southern Wildfire Risk Assessment

L.4 CAPABILITY ASSESSMENT

L.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Wendell were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Wendell has an overall capability rating of Limited. The Town's Self-Assessment of key capability areas is summarized in Table L.14 below.

Table L.14 – Capability Self-Assessment, Wendell

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	Moderate
Fiscal Capability	Limited
Education and Outreach Capability	Limited
Mitigation Capability	Limited
Political Capability	Limited
Overall Capability	Limited

L.4.2 Floodplain Management

The Town of Wendell joined the NFIP through emergency entry in January 1974 and has been a regular participant since June 1978. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table L.15 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	24	$11,725	$6,892,000	8	$144,907.36
2-4 Family	0	$0	$0	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	1	$4,211	$125,000	0	$0.00
Total	25	$15,936	$7,017,000	8	$144,907.36

Source: FEMA Community Information System, accessed November 2018

Table L.16 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	12	$11,163	$3,062,000	5	$72,164.94
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone					

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Standard	0	$0	$0	0	$0.00
Preferred	13	$4,773	$3,955,000	3	$72,742.42
Total	25	$15,936	$7,017,000	8	$144,907.36

Source: FEMA Community Information System, accessed November 2018

Table L.17 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	2	$2,289	$209,000	4	$55,546.12
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	5	$1,780	$1,365,000	1	$7,986.13
Standard	0	$0	$0	0	$0.00
Preferred	5	$1,780	$1,365,000	1	$7,986.13
Total	7	$4,069	$1,574,000	5	$63,532.25

Source: FEMA Community Information System, accessed November 2018

Table L.18 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	10	$8,874	$2,853,000	1	$16,618.82
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	8	$2,993	$2,590,000	2	$64,756.29
Standard	0	$0	$0	0	$0.00
Preferred	8	$2,993	$2,590,000	2	$64,756.29
Total	18	$11,867	$5,443,000	3	$81,375.11

Source: FEMA Community Information System, accessed November 2018

L.5 MITIGATION STRATEGY

Town of Wendell											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Install generators as needed at lift stations.	3	2	All	High	City of Raleigh Public Utilities	To be determined	Internal	3-5 years	Not Started – Carry Forward	No funds were budgeted by CORPUD for this since 2014, but a new pump station is planned south of Hollybrook Rd, which would require a generator.
P-2	Amend the Town's Water Allocation Policy to add a new point category for voluntarily increasing undisturbed riparian buffer protections from 50 to 100 feet around Neuse perennial streams	4	1	Flood, Dam Failure, Hurricane	High	Wendell Planning	$0	N/A	1 year	New	N/A
P-3	Add environmentally sensitive and hazard areas to the Future Land Use Map and adopt updated Comprehensive Plan, which will allow environmental conditions and hazard areas to guide zoning and density decisions.	4	2	Flood, Dam Failure, Hazardous Materials Incident, Radiological Incident, Terrorism	High	Wendell Planning	$120,000	Town of Wendell	2-3 years	New	N/A
P-4	Consider amendments to the UDO to establish minimum ingress/egress standards for new residential development based on density/# of lots	4	1	Earthquake, Flood, Dam Failure, Hurricane, Wildfire, Tornado, Severe Winter Storm, Hazardous Materials Incident, Radiological Incident, Terrorism	High	Wendell Planning	$0	N/A	1 year	New	N/A
P-5	Encourage the use of low-impact development techniques through amendments to the Town's Water Allocation Policy	4	1	Flood, Dam Failure, Hurricane	High	Wendell Planning	$0	N/A	1 year	New	N/A
P-6	Consider regulations to regulate clear-cutting to help control erosion from construction sites	4	1	Flood, Drought	Moderate	Wendell Planning	$0	Town of Wendell	2-3 years	New	N/A
P-7	Evaluate potential changes to the Town's Arterial and Collector Street Plan to minimize adverse impacts to environmentally sensitive areas due to new roadway construction or widening	4	2	Flood	Moderate	Wendell Planning	$500	Town of Wendell	2-3 years	New	N/A
Natural Resource Protection											
NRP-1	Perform environmental asset mapping in order to identify areas most key for preservation and potential acquisition due to an array of environmental factors	2	2	Flood, Drought	Moderate	Wendell Planning	$10,000	Town of Wendell	2-3 years	New	N/A
NRP-2	Evaluate policy regarding greenway dedication requirements in order to expand greenway network and further protect riparian corridors	4	2	Flood	High	Wendell Planning	$0	Town of Wendell	2-3 years	New	N/A
Structural Projects											
SP-1	Perform improvements to existing open drainage device near intersection of 1st St & Pine St. to increase total water volume & flow	3	1	Flood	Moderate	Wendell Public Works	$5,000	Town of Wendell	3-5 years	New	N/A
Emergency Services											
ES-1	Make electrical improvements in the downtown in order to help ensure continuity of service during extreme weather	3	1	Severe Weather, Severe Winter Storm, Hurricane	High	Wendell Public Works	$5,000	Town of Wendell	2-3 years	New	N/A
ES-2	Develop Adverse Weather Plan Map for Public Works crew	2	1	Severe Weather, Severe Winter Storm, Hurricane	High	Wendell Planning	$0	N/A	1 year	New	N/A
ES-3	Evaluate potential locations for a future Public Works debris site, to accommodate debris associated with natural hazards	2	2	All	Moderate	Wendell Public Works	$0	Town of Wendell	3-5 years	New	N/A
ES-4	Provide written after-action report of response to severe weather and hazard events to include recommendations for process improvements and improve planning for future disasters	2	2	All	Moderate	Wendell Police Dept.	$0	Town of Wendell	2-3 years	New	N/A

Town of Wendell											
Action #	Description	Goal	Objective	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
ES-5	Secure and utilize visual warning barricades for vehicular and pedestrian traffic to block properties, roadways, etc. for public safety during or following hazard events	2	1	All	Moderate	Wendell Public Works	$2,000	Town of Wendell	3-5 years	New	N/A
ES-6	Conduct periodic training exercises, related to higher-risk hazard threats identified by the Hazard Mitigation Plan	2	2	All	Moderate	Wendell Police Dept.	$500	Town of Wendell	2-3 years	New	N/A
ES-7	Work with Wake County and the City of Raleigh to operate and update the County's Master Address Repository program, which will support emergency response following hazards.	2	2	All	High	Wendell Planning	$0	Town of Wendell	2-3 years	New	N/A
Public Education and Awareness											
PEA-1	Modify the Town's "Tell Wendell" webpage application to allow citizens to report flood issues and create a tracking mechanism for the Town	1	2	Flood	High	Wendell Planning	$0	Town of Wendell	2-3 years	New	N/A
PEA-2	Incorporate Hazard Awareness class into the Track-Out Camp run by the Wendell Parks & Recreation Dept.	1	1	Flood, Earthquake, Extreme Heat, Drought, Hurricane, Severe Weather, Severe Winter Storm, Tornado	Moderate	Wendell Parks and Recreation	$0	Town of Wendell	2-3 years	New	N/A
PEA-3	Post warning signage at local parks for lightning	1	2	Severe Weather	High	Wendell Parks and Recreation	$500	Town of Wendell	2-3 years	New	N/A
PEA-4	Facilitate community outreach and distribution of educational materials regarding hazard awareness to the community, to include participation at community events such as Public Safety Day.	1	1	All	Moderate	Wendell Public Works	$500	Town of Wendell	2-3 years	New	N/A
PEA-5	Perform Continuing Education Training for select Public Works personnel as it relates to state storm water regulations	2	2	Flood	High	Wendell Public Works	$1,200	Town of Wendell	2-3 years	New	N/A

Annex M Town of Zebulon

M.1 PLANNING PROCESS

The table below lists the HMPC members who represented the Town of Zebulon.

Table M.1 – HMPC Members

Agency	Representative	Position or Title
Public Works Department	Chris Ray	Public Works Director
Town of Zebulon	Joe Moore	Town Manager
Planning Department	Teresa Piner	Interim Planning Director
Planning Department	Meade Bradshaw	Assistant Planning Director

M.2 COMMUNITY PROFILE

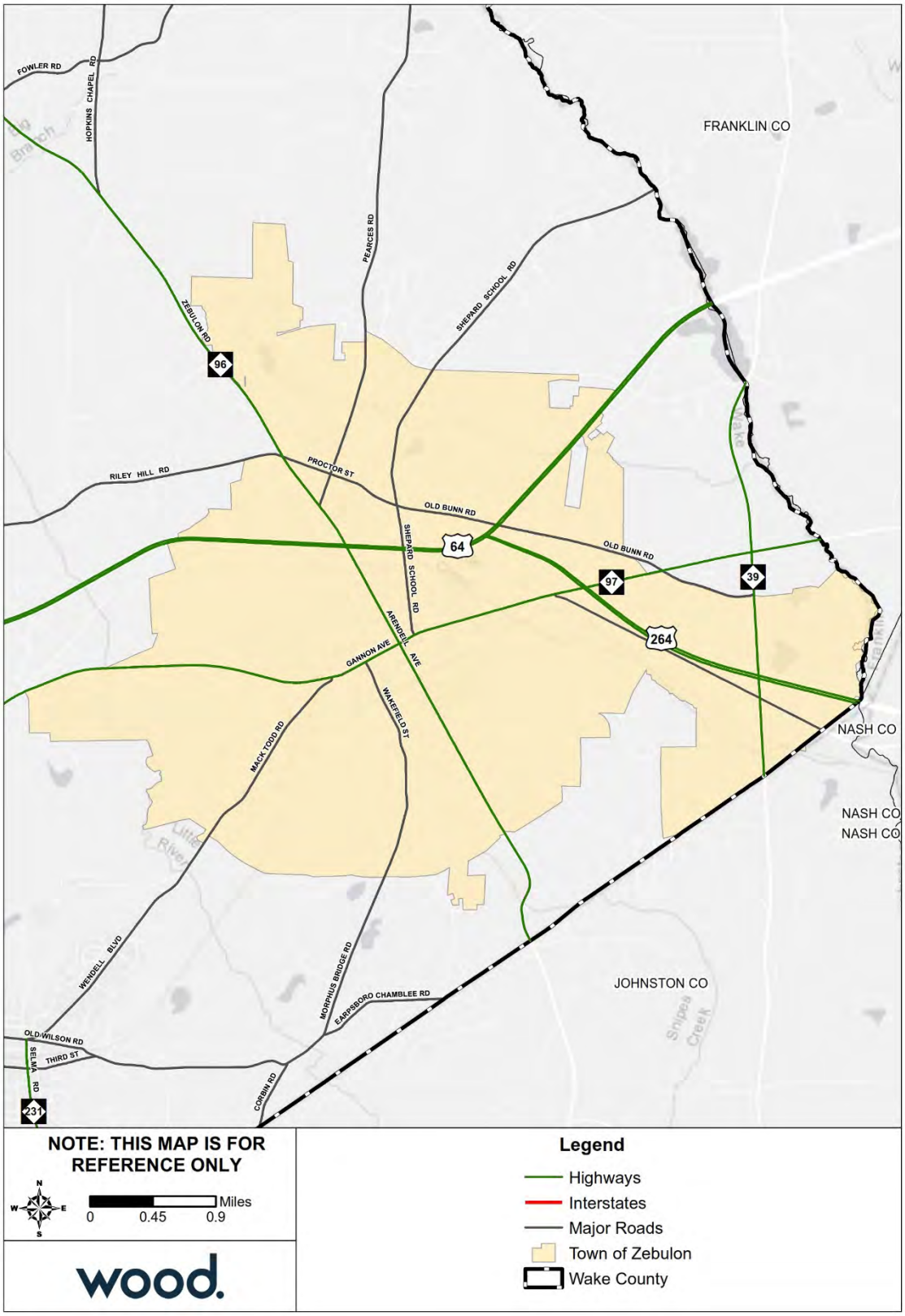
Geography

The Town of Zebulon is located in eastern Wake County. It is neighbored by Wendell to the southwest and Franklin, Nash, and Johnston Counties to the east. The Town is part of the Raleigh, NC Metropolitan Statistical Area, which falls within the larger Raleigh-Durham-Chapel Hill, NC Combined Statistical Area. Zebulon comprises a total land area of 4.1 square miles.

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 1,274 acres of wetlands in Zebulon.

Figure M.1 shows a base map of the major transportation routes in the Town of Zebulon.

Figure M.1 – Major Transportation Routes – Town of Zebulon



Source: Wake County GIS Open Data

Population and Demographics

Table M.2 provides population counts and growth estimates for the Town of Zebulon as compared to the County overall. Table M.3 provides demographic information for Zebulon as compared to the whole County.

Table M.2 – Population Counts, Zebulon, 2010-2017

Jurisdiction	2000 Census Population	2010 Census Population	2017 ACS Population Estimate	Total Change 2010-2017	% Change 2010-2017
Wake County total	**627,846**	**900,993**	**1,023,811**	**122,818**	**13.6%**
Town of Zebulon	4,046	4,433	4,943	510	11.5%

Source: US Census Bureau Decennial Census 2000, Decennial Census 2010; American Community Survey 2013-2017 5-Year Estimates

Table M.3 – Racial Demographics, Zebulon, 2017

Jurisdiction	White, %	Black, %	Asian, %	Other Race, %	Two or More Races, %	Persons of Hispanic or Latino Origin*, %
Wake County total	**66.5%**	**20.4%**	**6.5%**	**3.6%**	**2.7%**	**10.0%**
Town of Zebulon	50.0%	42.1%	1.2%	1.6%	5.1%	13.1%

Source: US Census Bureau American Community Survey 2013-2017 5-Year Estimates

*Persons of Hispanic origin may be of any race, so also are included in applicable race categories

Asset Inventory

The following tables summarize the asset inventory for Zebulon in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure M.2 on the following page. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table M.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food & Agriculture	Banking & Finance	Chemical	Commercial Facilities	Communications	Manufacturing	Defense	Government	Healthcare	IT	National Monuments	Nuclear	Postal & Shipping	Transportation	Energy	Emergency Services	Water	Other	Total
Town of Zebulon	60	8	0	151	0	85	0	52	18	0	0	0	0	19	0	2	2	0	**397**

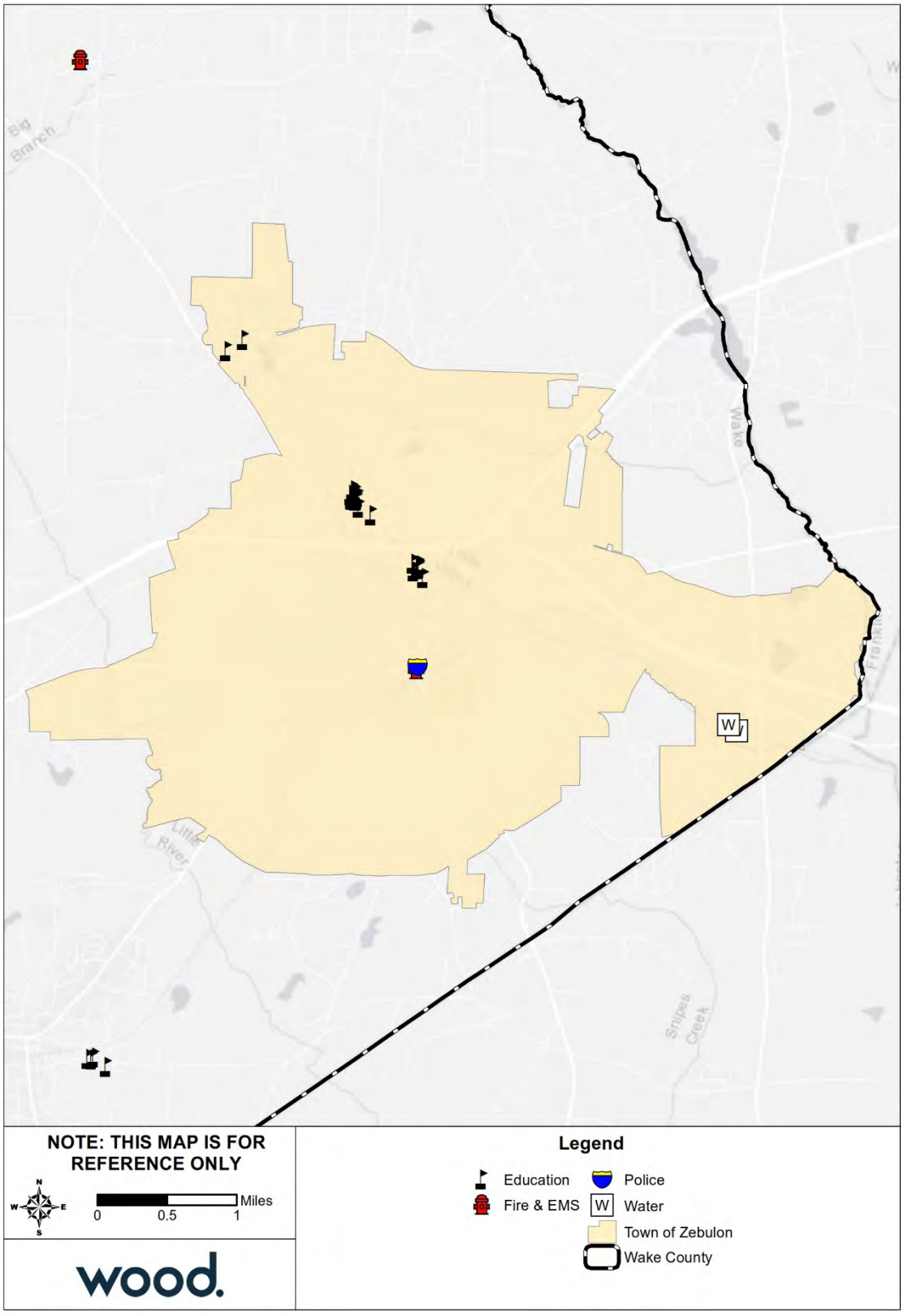
Source: NCEM Risk Management Tool

Table M.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Other	Total
Town of Zebulon	3	21	15	16	0	5	2	0	**62**

Source: NCEM Risk Management Tool

Figure M.2 – Critical Facilities, Town of Zebulon



Source: NCEM IRISK Database, GIS Analysis

To supplement the asset inventory and provide a clearer picture of the current asset exposure in the Town of Zebulon, current parcel data was evaluated to identify development since 2010. This information is not incorporated into the risk assessment, which was prepared using NCEM's IRISK database. However, this summary of development since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

Table M.6 provides a summary by land class of parcel development from January 2011 to April 2019.

Table M.6 – Parcels Developed 2011 or Later, Town of Zebulon

Land Class	Number of Parcels	Sum of Building Value
Acres Greater Than 10 With House	2	$677,543
Commercial	5	$3,743,423
EXEMPT	2	$1,908,171
Industrial	2	$43,774,649
Residential Less Than 10 Acres	381	$65,244,585
Grand Total	**392**	**$115,348,371**

Source: Wake County Open Data; retrieved April 8, 2019

There are three listings on the National Register of Historic Places for the Town of Zebulon. These sites are listed in the table below.

Table M.7 – Historic Properties

Ref#	Property Name	Status Date	Category	City
76001345	Wakelon School	5/13/1976	Building	Zebulon
86000157	Bunn, Bennett, Plantation	2/4/1986	Building	Zebulon
07000881	Barbee, George and Neva, House	8/28/2007	Building	Zebulon

Source: National Parks Service, National Register of Historic Places, October 2018

Housing

The table below details key housing statistics for Zebulon as compared to the County overall.

Table M.8 – Housing Statistics, Zebulon, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	Housing Units Percent Change (2010-2017)	Owner-Occupied, % (2017)	Vacant Units, % (2017)	Median Home Value (2017)
Wake County total	**371,836**	**411,632**	**10.7%**	**59.5%**	**7.2%**	**$250,700**
Town of Zebulon	1,862	1,790	-3.9%	52.1%	6.8%	$145,000

Source: U.S. Census Bureau 2010 Decennial Census, American Community Survey 2013-2017 5-Year Estimates
Note: Owner-Occupied and vacant-unit measures are reported as a percent of the total number of housing units.

Economy

The following tables present key economic statistics for Zebulon as compared to the County overall.

Table M.9 – Employment Statistics, Zebulon, 2017

Jurisdiction	Population in Labor Force	Percent Employed* (%)	Percent Unemployed* (%)	Percent Not in Labor Force* (%)	Unemployment Rate (%)
Wake County	**564,096**	**67.2**	**3.5**	**29.2**	**4.9**
Town of Zebulon	2,169	57.2	3.8	39.0	6.2

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

Note: This table reports only the civilian labor force. The labor force in armed services accounted for 0.3% or less of the population 16 and over in all jurisdictions. *Population employed, population unemployed, and Population not in labor force are reported as a percent of the total population aged 16 years and older.

Table M.10 – Percent of Employed Population by Occupation, Zebulon, 2017

Occupation	Management, business, science and arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, transportation, and material moving (%)
Wake County	**50.1**	**13.8**	**23.4**	**6.0**	**6.7**
Town of Zebulon	35.0	22.9	20.9	8.4	12.7

Source: U.S. Census Bureau, American Community Survey 2013-2017 5-Year Estimates

M.3 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority for the Town of Zebulon than for Wake County as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are: Flood and Wildfire.

M.3.1 Flood

Table M.11 details the acreage of the Town of Zebulon by flood zone on the effective DFIRM. Per this assessment, over 7 percent of the Town of Zebulon falls within the mapped 1%-annual-chance floodplains.

Table M.11 – Flood Zone Acreage in the Town of Zebulon

Flood Zone	Acreage	Percent of Total (%)
Zone A	5.95	0.07
Zone AE	646.923	7.40
Zone X (500-year)	63.04	0.72
Zone X Unshaded	8,022.87	91.81
Total	**8,738.783**	--

Source: FEMA Effective DFIRM; Wake County GIS

Figure M.3 reflects the effective mapped flood hazard zones for the Town of Zebulon, and Figure M.4 displays the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

To supplement the IRISK assessment of property at risk from the 1% annual chance flood event in Section 4 and provide a clearer picture of the current property at risk in PLACE, current parcel data was evaluated to identify parcels developed since 2010. Using GIS analysis, parcels developed after 2010 were compared to the boundaries of the 1% annual chance floodplain to identify the exposure of newly developed property to the base flood. In most cases, a parcel was considered exposed to the floodplain if any portion of the parcel was located in the floodplain.

This assessment does not evaluate flood impacts or provide damage estimates. However, this summary of development in or near the floodplain since 2010 provides some context to understand the degree to which the IRISK exposure and vulnerability numbers differ from current conditions.

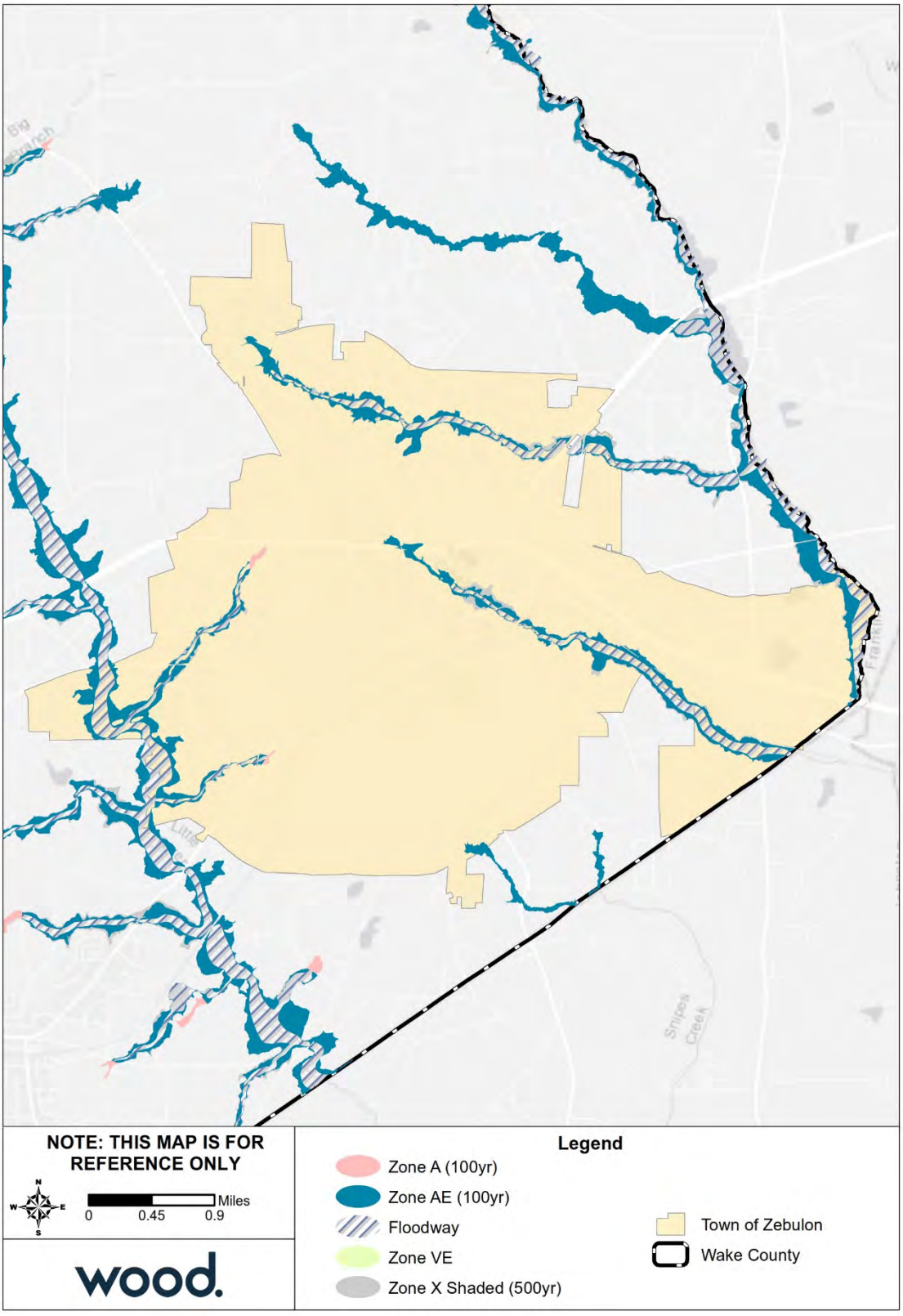
Table M.12 provides a summary by land class of parcel development located in the 1% annual chance floodplain from January 2011 to April 2019.

Table M.12 – Parcels Developed 2011 or Later and Located in 100-Year Floodplain

Land Class	Number of Parcels	Sum of Building Value
EXEMPT	1	-
Industrial	1	$1,156,500
Residential Less Than 10 Acres	4	$842,196
Grand Total	**6**	**$1,998,696**

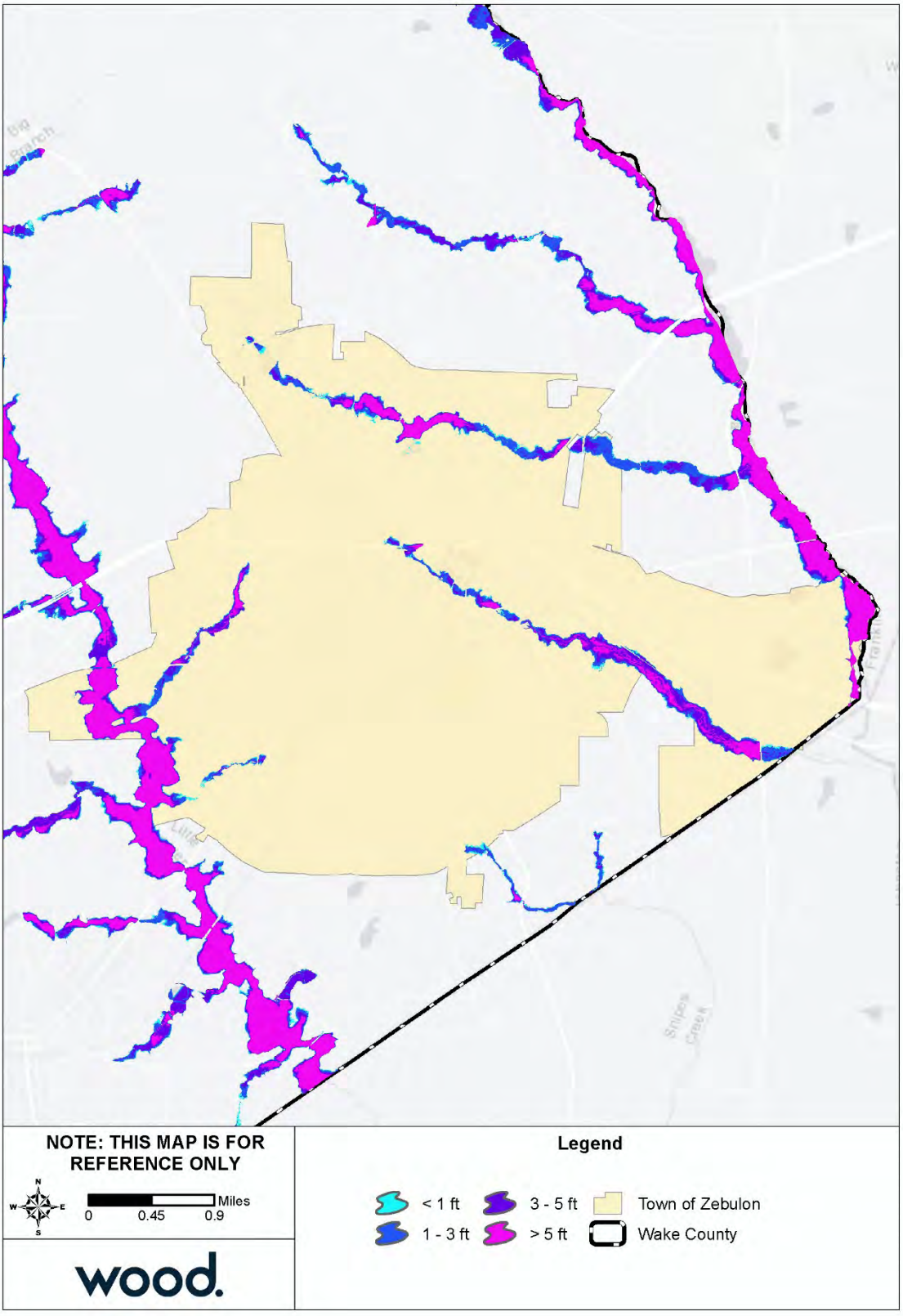
Source: Wake County Open Data; retrieved April 8, 2019; FEMA Effective DFIRM

Figure M.3 – FEMA Flood Hazard Areas, Town of Zebulon



Source: FEMA Effective DFIRM

Figure M.4 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Zebulon



Source: FEMA Effective DFIRM

M.3.2 Wildfire

Table M.13 summarizes the acreage in the Town of Zebulon that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. 20 percent of the Town of Zebulon is not included in the WUI.

Table M.13 – Wildland Urban Interface Acreage, Town of Zebulon

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*1,747.8*	*20.0%*
	LT 1hs/40ac	1,200.3	13.8%
	1hs/40ac to 1hs/20ac	677.7	7.8%
	1hs/20ac to 1hs/10ac	932.6	10.7%
	1hs/10ac to 1hs/5ac	1,102.3	12.6%
	1hs/5ac to 1hs/2ac	1,471.9	16.9%
	1hs/2ac to 3hs/1ac	1,581.0	18.1%
	GT 3hs/1ac	7.2	0.1%
	Total	8,720.7	

Source: Southern Wildfire Risk Assessment

Figure M.5 depicts the WUI for the Town of Zebulon. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure M.6 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure M.7 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

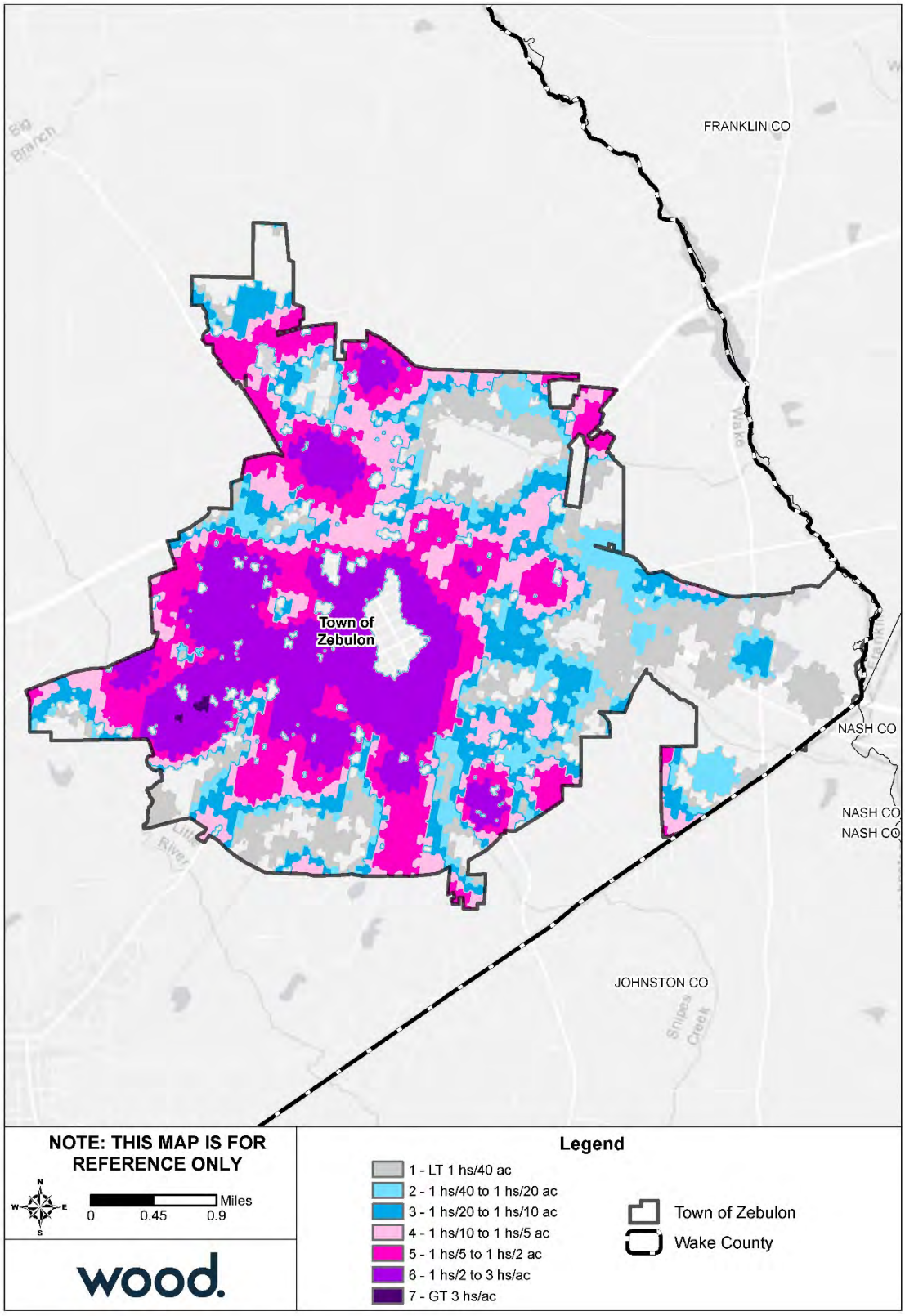
Potential fire intensity is highest in east and west Zebulon; however, these areas are largely outside of the WUI and have low burn probabilities. The area with the highest burn probability, in northwest Zebulon, does not overlay with high potential fire intensity and is partially outside of the WUI.

Table M.14 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector at risk to wildfire hazard.

Table M.14 – Critical Facilities Exposed to Wildfire, Town of Knightdale

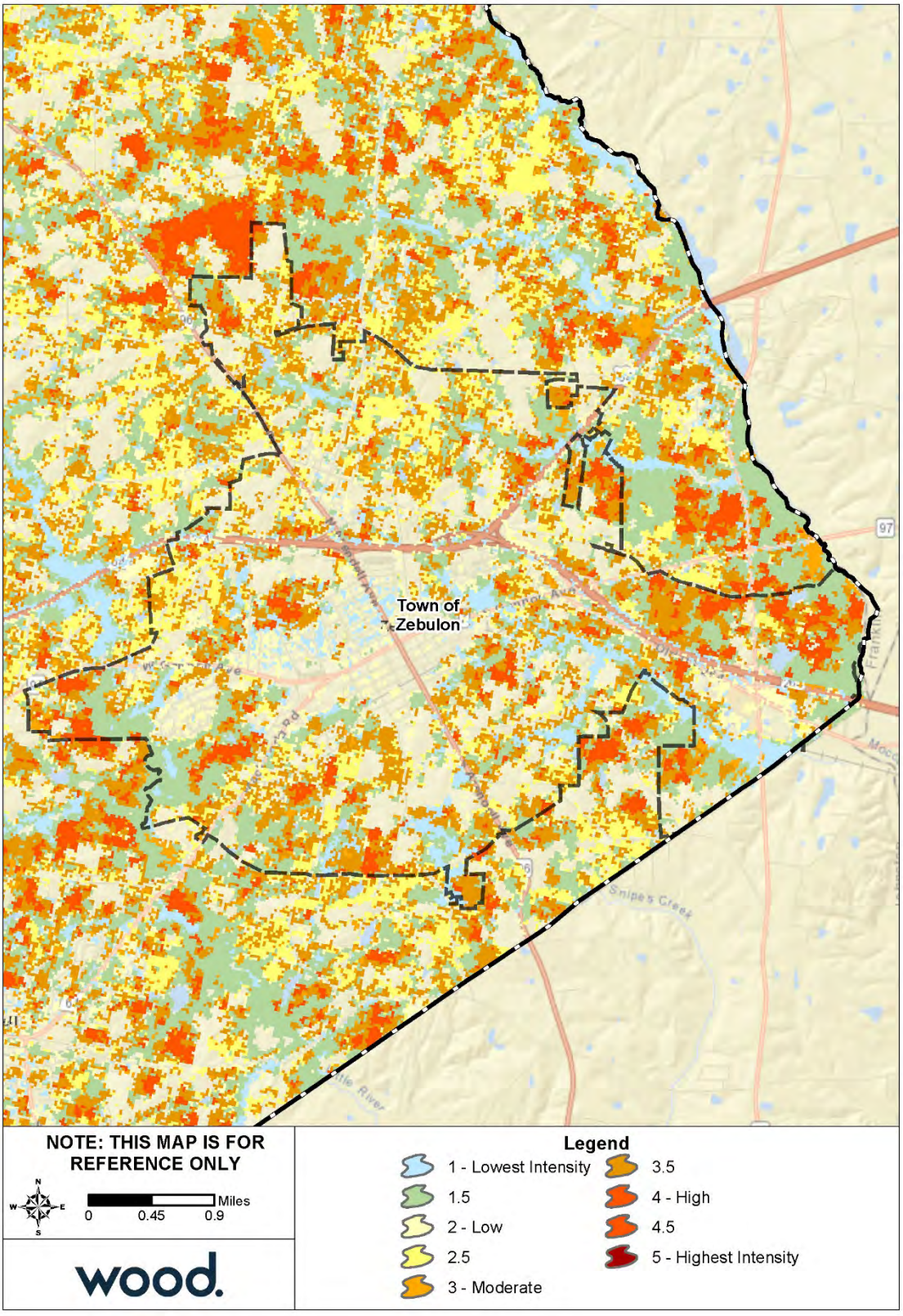
Sector	Event	Number of Buildings at Risk	Estimated Damages
Critical Manufacturing	Wildfire Hazard	1	$71,156
All Categories	**Wildfire Hazard**	**1**	**$71,156**

Figure M.5 – Wildland Urban Interface, Town of Zebulon



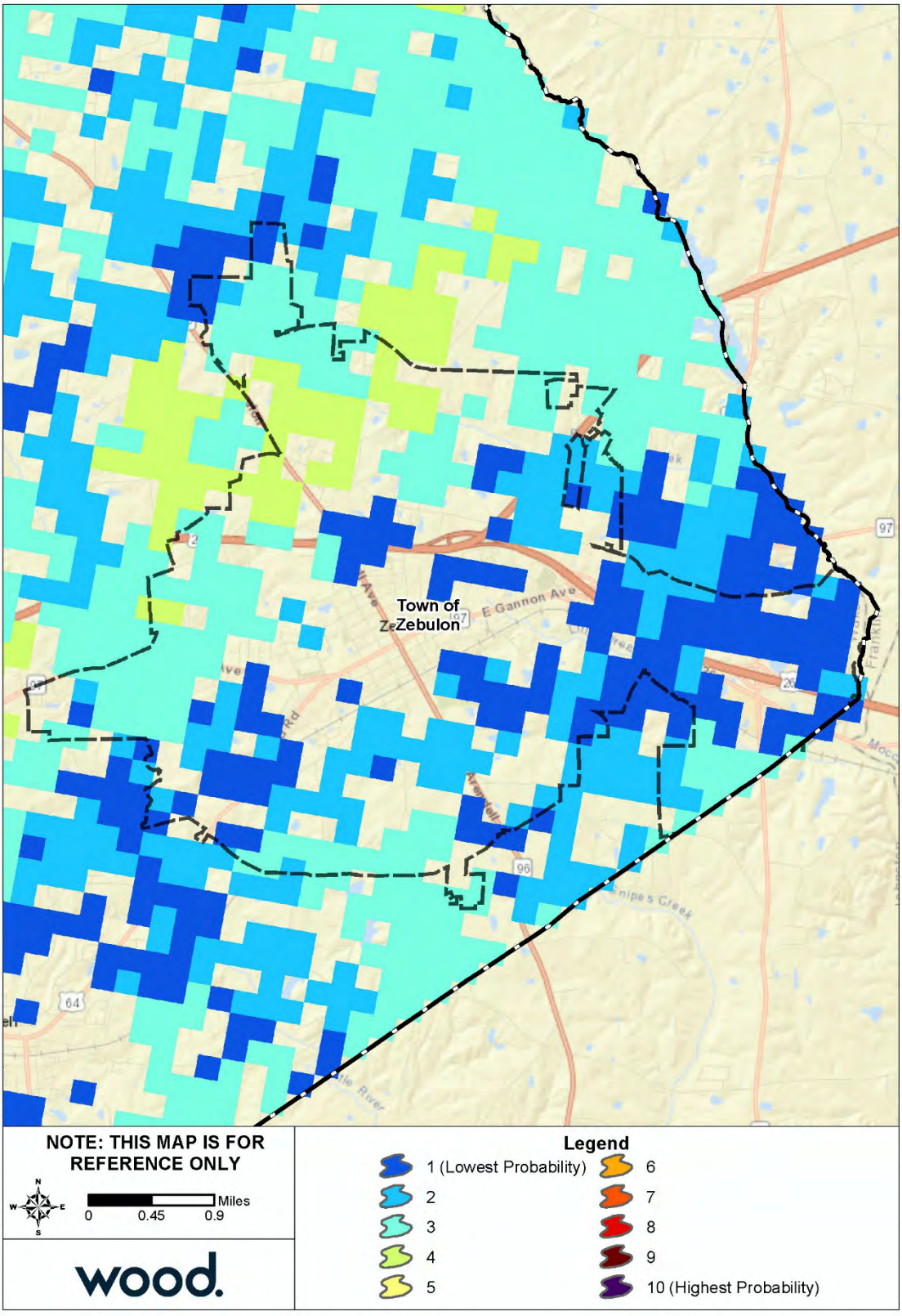
Source: Southern Wildfire Risk Assessment

Figure M.6 – Fire Intensity Scale, Town of Zebulon



Source: Southern Wildfire Risk Assessment

Figure M.7 – Burn Probability, Town of Zebulon



Source: Southern Wildfire Risk Assessment

M.4 CAPABILITY ASSESSMENT

M.4.1 Overall Capability

Details on the tools and resources in place and available to the Town of Zebulon were provided by the Town's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Zebulon has an overall capability rating of Moderate. The Town's Self-Assessment of key capability areas is summarized in Table M.15 below.

Table M.15 – Capability Self-Assessment, Zebulon

Capability Area	Rating
Plans, Ordinances, Codes and Programs	Moderate
Administrative and Technical Capability	Moderate
Fiscal Capability	Moderate
Education and Outreach Capability	Moderate
Mitigation Capability	Limited
Political Capability	Moderate
Overall Capability	Moderate

M.4.2 Floodplain Management

The Town of Zebulon joined the NFIP through emergency entry in August 1974 and has been a regular participant since July 1978. The following tables reflect NFIP policy and claims data for the Town categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table M.16 – NFIP Policy and Claims Data by Structure Type

Structure Type	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	28	$11,775	$5,471,600	8	$173,307.69
2-4 Family	0	$0	$0	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	0	$0	$0	2	$13,757.62
Total	28	$11,775	$5,471,600	10	$187,065.31

Source: FEMA Community Information System, accessed November 2018

Table M.17 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	18	$8,406	$2,616,600	4	$48,093.86
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
B, C & X Zone					
Standard	0	$0	$0	3	$14,133.86
Preferred	10	$3,369	$2,855,000	3	$124,837.59
Total	28	$11,775	$5,471,600	10	$187,065.31

Source: FEMA Community Information System, accessed November 2018

Table M.18 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	0	$0	$0	1	$44,120.87
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	1	$300	$175,000	4	$79,347.69
Standard	0	$0	$0	3	$14,133.86
Preferred	1	$300	$175,000	1	$65,213.83
Total	1	$300	$175,000	5	$123,468.56

Source: FEMA Community Information System, accessed November 2018

Table M.19 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	18	$8,406	$2,616,600	3	$3,972.99
A Zones	0	$0	$0	0	$0.00
AO Zones	0	$0	$0	0	$0.00
AH Zones	0	$0	$0	0	$0.00
AR Zones	0	$0	$0	0	$0.00
A99 Zones	0	$0	$0	0	$0.00
V01-30 & VE Zones	0	$0	$0	0	$0.00
V Zones	0	$0	$0	0	$0.00
D Zones	0	$0	$0	0	$0.00
B, C & X Zone	9	$3,069	$2,680,000	2	$59,623.76
Standard	0	$0	$0	0	$0.00
Preferred	9	$3,069	$2,680,000	2	$59,623.76
Total	27	$11,475	$5,296,600	5	$63,596.75

Source: FEMA Community Information System, accessed November 2018

M.5 MITIGATION STRATEGY

Town of Zebulon											
Action #	**Description**	**Goal**	**Objective**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**2019 Status**	**Status Comments/Explanation**
Prevention											
P-1	Prepare Plan maintenance report.	2	2	All	High	Zebulon Planning Department	Staff time	Town of Zebulon	2019, Annually	Not Started – Carry Forward	Plan maintenance meetings have been held annually and will continue to be held going forward.
P-2	Enforce subdivision standards for development in flood hazard areas.	3	2	Flood	High	Zebulon Planning & Inspections	Staff time	Town of Zebulon, Wake County	2019	In-Progress – Carry Forward	UDO Revision is in final stages.
P-3	Further restrict development in floodplain by prohibiting development or requiring 2 feet of freeboard.	3	2	Flood	High	Zebulon Planning	Staff time	Town of Zebulon	2019	In-Progress – Carry Forward	UDO Revision is in final stages.
P-4	Revise floodplain ordinance.	4	1	Flood	High	Zebulon Planning	Staff time	Town of Zebulon	2019	In-Progress – Carry Forward	UDO Revision is in final stages.
P-5	Require burial of power lines for new developments.	3	1	Hurricane, Tornadoes, Winter Storms/ Freezes	Moderate	Zebulon Planning	Unknown	Town of Zebulon	2019	In-Progress – Carry Forward	UDO Revision is in final stages.
Structural Projects											
SP-1	Resolve localize flooding issue that occurs in/around West Sycamore Streets, Gannon Avenue, and North Arendell Avenue during heavy rainfall events.	3	2	Flood	Moderate	Zebulon Administration, Zebulon Public Works	$900,000	Town of Zebulon	2020	New	The town has completed design and permitting of project improvements and is currently acquiring easements.
Emergency Services											
ES-1	Develop an Emergency Operations Plan	2	2	All	Moderate	Zebulon Fire Department	TBD	Town of Zebulon	2019	New	The Town has been in the process of developing an Emergency Operations Plan and hopes to adopt the plan within the year.
Public Education and Awareness											
PEA-3	Require disclosure of flood hazard in real estate transactions.	1	1	Flood	Moderate	Zebulon Planning Department	Little to no cost	Town of Zebulon	2019	In-Progress – Carry Forward	N/A
PEA-2	Develop a public education program to provide hazard risk and preparedness education via social media	1	1	All	High	Zebulon Fire Department	Staff time	Town of Zebulon	2019	New	The Town is currently using social media for some public education but will formalize a program for hazards awareness.

Appendix A Plan Review Tool

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LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: **Wake County, NC**	**Title of Plan: Wake County Multi-Jurisdictional Hazard Mitigation Plan**	**Date of Plan:** **July 2019**
Local Point of Contact: **David Stroud**		**Address:** **4021 Stirrup Creek Drive, Suite 100** **Durham, NC 27703**
Title:		
Agency:		
Phone Number: **919-856-6485**		**E-Mail:** **David.stroud@woodplc.com**

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer:	**Title:**	
Date Received in FEMA Region ***(insert #)***		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1:
REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan (section and/or page number)**	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 2 (p. 4-23)		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Section 2 (p. 7-8, 14); Appendix B (p.B.46-B.47)		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 2 (p. 13-14); Appendix B (p.B.24-B.45)		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 2 (p. 7-8)		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 8 (p. 260)		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 8 (p. 256-260)		
ELEMENT A: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 4.5 (p. 61-209; Hazard Description, Location, Extent, Hazard Summary by Jurisdiction), Annex A-M		
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 4.5 (p. 61-209; Past Occurrences, Probability of Future Occurrence, Hazard Summary by Jurisdiction),		
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 4.5 (p. 61-209; Vulnerability Assessment, Hazard Summary by Jurisdiction), Annex A-M		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 4.5.5 (p.114)		
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 5 (p. 210-225)		
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 5 (p. 216-217)		
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 6 (p.226-228)		
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 6 (p. 229-230), Section 7 (p. 231-255)		
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 6 (p. 229-230), Section 7 (p. 231-255)		

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 8 (p.256-257)		
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Section 3 (p. 24-45), Section 4 (p. 54-209; Asset Inventory, Vulnerability Assessment), Annex A-M		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 2 (p. 14-23), Section 5 (p.210-225)		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 6 (p. 229-230), Section 7 (p. 231-255)		
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Plan will be adopted pending APA letter from FEMA; Adoption resolutions will be added to Section 9		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Plan will be adopted pending APA letter from FEMA; Adoption resolutions will be added to Section 9		
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:
PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

1) *A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;*
2) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and*
3) *A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.*

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- *Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

Element C: Mitigation Strategy

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:

- *Key problems identified in, and linkages to, the vulnerability assessment;*
- *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;*
- *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;*
- *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);*
- *Specific mitigation actions for each participating jurisdictions that reflects their unique risks and capabilities;*
- *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and*
- *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:

- *Status of previously recommended mitigation actions;*
- *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;*
- *Documentation of annual reviews and committee involvement;*
- *Identification of a lead person to take ownership of, and champion the Plan;*
- *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;*
- *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);*
- *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and*
- *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

B. Resources for Implementing Your Approved Plan

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following:

- *What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?*
- *What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?*
- *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?*
- *Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?*
- *What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?*

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET													
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
1	Wake County	County										
2	Raleigh	City										
3	Apex	Town										
4	Cary	Town										
5	Fuquay-Varina	Town										
6	Garner	Town										
7	Holly Springs	Town										
8	Knightdale	Town										
9	Morrisville	Town										

MULTI-JURISDICTION SUMMARY SHEET													
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
10	Rolesville	Town										
11	Wake Forest	Town										
12	Wendell	Town										
13	Zebulon	Town										

Appendix B Planning Process Documentation

PLANNING STEP 1: ORGANIZE TO PREPARE THE PLAN

Table B.1 – HMPC Meeting Topics, Dates, and Locations

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
HMPC Mtg. #1 – Project Kick-Off	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	November 14, 2018	Wake County Commons Bldg. 4011 Carya Drive, Raleigh
HMPC Mtg. #2 – East Working Group	1) Review and update plan goals 2) Brainstorm a vision statement 3) Report on status of actions from the 2015 plan 4) Complete the capability self-assessment	January 07, 2019	Wake County Eastern Regional Center 1002 Dogwood Drive, Room 157, Zebulon
HMPC Mtg. #2 – West Working Group		January 09, 2019	Page Walker Arts & History Center, 3rd fl., 119 Ambassador Loop, Cary
HMPC Mtg. #3 – East Working Group	1) Review Draft Hazard Identification & Risk Assessment (HIRA) 2) Draft objectives and Mitigation Action Plans	March 04, 2019	Knightdale Fire Dept. Training Rm 979 Steeple Square Ct, Knightdale, NC 27545
HMPC Mtg. #3 – West Working Group		March 08, 2019	Holly Springs Cultural Center, 300 West Ballentine Street, Holly Springs, NC 27540
HMPC Mtg. #4	1) Review the Draft Hazard Mitigation Plan 2) Solicit comments and feedback	April 22, 2019	Wake County Commons Bldg. 4011 Carya Drive, Raleigh

Note: All HMPC Meetings were open to the public.

HMPC Meeting Agendas, Minutes, and Sign-in Sheets

HMPC Meeting 1: November 14, 2018

Wake County Multi-Jurisdictional Hazard Mitigation Plan Update

Meeting 1: Hazard Mitigation Planning Committee Project Kick-Off Meeting
Time & Date: Wednesday, November 14, 2018, 3:00-4:30 p.m.
Location: Wake County Commons Building, 4011 Carya Drive

Agenda

1. Introductions
2. Project Overview
    a. Requirement for Update
    b. Trends in Disasters – Why Plan?
    c. Disaster Mitigation Act (DMA) Requirements
        i. Organize Resources
        ii. Risk Assessment
            1. Hazard Identification
            2. Vulnerability Assessment
            3. Capability Assessment
        iii. Develop Mitigation Plan
            1. Hazard Strategies
            2. Mitigation Categories
    d. Scope of Work
    e. Risk Management Tool
3. Project Schedule
4. Working Groups
5. Plan Website
6. Next Steps
    a. Capability Assessment
    b. Mitigation Action Status Updates
    c. Mitigation Goals Update
7. Questions
8. Adjourn

Page **1** of **1**

Wake County Multi-Jurisdictional Hazard Mitigation Plan

Meeting 1: Hazard Mitigation Planning Committee Project Kick-Off Meeting
Time & Date: Wednesday, November 14, 2018, 3:00-4:30 p.m.
Location: Wake County Commons Building, 4011 Carya Drive

Introductions

Josh Creighton, Wake County Emergency Management Director, welcomed everyone to the meeting, gave a brief overview of the previous multi-jurisdictional planning process, and reiterated the need for all communities to identify a primary contact, secondary contact, and citizen contact to participate in the planning effort. Josh then introduced David Stroud and Abby Moore, consultants from Wood, to facilitate the rest of the meeting. David began by providing the meeting agenda and had everyone in attendance introduce themselves. There were 26 people in attendance and recorded on the sign-in sheet, including representatives from 8 of the 13 jurisdictions participating in the plan update.

Hazard Mitigation Plan Update Requirement

David discussed the Disaster Mitigation Act of 2000 plan update requirement and the HMGP grant process. Communities are required to update their hazard mitigation plans every five years to remain eligible for federal disaster funding. HMGP funding is provided by the North Carolina Division of Emergency Management with a 75% federal/25% local cost share.

Trends in Disasters

Trends are resulting in increases costs for disaster response and recovery. There has been an increase in population and community growth in recent years, especially in Wake County, which means that more people are living in hazardous areas and there is greater exposure to hazard risk. Exposure to risk includes the people as well as the infrastructure and buildings. Because exposure has increased, when hazard events occur they cause more damage. There are also more hazards, with recognition of technological, civil, and terrorist hazards. There has been a continual increase in hazard expenses and an increase in the issuance of major disaster declarations. David reviewed a list of the 14 costliest natural disasters by NOAA estimates. All of them occurred within the last 30 years, and 4 of the top 5 occurred within the last 14 years. These figures did not include Hurricanes Florence and Michael because it is still too early to estimate the full costs of these disasters. David also noted that these costs are general damage estimates, but that the actual cost of disasters to state and local governments, businesses, insurance companies, homeowners, and others is much higher.

Four reasons why addressing these trends is a priority were presented: 1) the cost of doing nothing is too high as the costs of response and recovery continue to grow; 2) many events are predictable and repetitive; 3) loss reduction activities can be undertaken, and they work, they're cost effective and environmentally sound, and there are funds available to help; and 4) there are legal and moral responsibilities to act.

Planning Requirements

David reviewed the Disaster Mitigation Act (DMA) of 2000 planning requirements, which include a four-phase planning process: organize resources, risk assessment, develop a mitigation plan, and adoption and implementation. The approach that will be led by the consultant team at Wood blends this four-phase process with the processes of the Flood Mitigation Assistance (FMA) Program and the Community Rating System (CRS) Floodplain Management Planning. This completed Hazard Mitigation Plan (HMP) will meet the requirements of all three FEMA programs.

David discussed the main phases of this planning process, as follows:

Phase I: Organize Resources, will involve planning for public involvement and coordinating with other departments and agencies. The HMPC needs to finalize a list of stakeholders for involvement. Mr. Stroud recommended considering North Carolina Emergency Management, FEMA Region IV, NOAA, other adjoining communities, citizens, schools, businesses, and others in brainstorming this list.

Phase II: Risk Assessment entails hazard identification (what can happen here), vulnerability assessment (what will be affected or impacted), and capability assessment (how prepared we are). The HMPC agreed on profiling the following hazards: Flooding, Hurricane Wind, Severe Winter Weather, Extreme Heat, Earthquake, Wildfire, Dam Failure, Drought, Severe Thunderstorm, Landslide, Hazardous Materials Incident, Radiological Emergency, and Terrorism. The vulnerability assessment will use County parcel data, FEMA Hazus analysis, and NCEM I-Risk data. Hazards will be prioritized using the Priority Risk Index. Each community will self-assess capability to determine what mitigation activities can be undertaken and where gaps exist.

Phase III: Develop Mitigation Plan involves setting planning goals, reviewing mitigation alternatives, and drafting an action plan. Typical strategies are to alter the hazard, avert the hazard, adapt to the hazard, or avoid the hazard. In addition to reviewing actions from the previous plan, the HMPC may need to develop new actions.

Scope of Work

The plan will meet the following criteria:

- The plan will include all required elements, as defined in the FEMA Local Mitigation Plan Review Guide.
- The plan will meet or exceed the final rule for local mitigation planning found in 44 CFR, Section 201.6, in order to be approved by FEMA.
- Natural hazards assessed in the plan will coordinate with the current FEMA-approved State Mitigation Plan.
- The plan will include natural and human-caused hazards and mitigation measures.
- The plan will incorporate any local climate adaptation data and findings.

Risk Management Tool

Abby discussed North Carolina Emergency Management's new tool for mitigation planning, which will be used in this effort. NCEM will generate and maintain a digital version of the plan, which may be useful in plan maintenance and future updates.

Project Schedule

The anticipated project schedule was presented. The process will aim for completion of a final draft document by April 2019 to send to NCEM for review. It was noted that this timeline does not include final approval and adoption of the plan. The update must be approved and adopted by January 2020.

The HMPC will divide into working groups for the next two meetings. The next meeting will be held in January.

Working Groups

The breakdown of the working groups is as follows: West: Apex, Cary, Fuquay-Varina, Garner, Holly Springs, Morrisville; and East: Knightdale, Rolesville, Wake Forest, Wendell, Zebulon. Raleigh and Wake County representatives will participate in both working group meetings.

Plan Website

Abby presented the website for the planning process, which will be a tool for HMPC coordination and public outreach. The website is www.WakeCountyHMP.com. The site contains upcoming meetings announcements, meeting agendas and minutes, the public survey, draft documents of the plan update, information on the identified hazards, and opportunities to provide feedback. All communities are encouraged to place a link to this website on their local community pages to encourage more public involvement.

Next Steps

Community representatives need to complete the capability assessment and return it to Abby at abigail.moore@woodplc.com by January 11th. Representatives should come to the next meeting prepared to discuss the mitigation goals and past actions. It was noted that more substantial information than "ongoing" must be provided for continuing actions and that all actions must relate to a mitigation goal. Details on completed actions may be provided in the status and/or may be relevant to include in the capability assessment. Abby will send the capability assessment and past actions to all HMPC members for review and completion.

WAKE COUNTY NORTH CAROLINA

Wake County, NC
Hazard Mitigation Planning Committee Kick-Off Meeting
Wednesday, November 14th, 3:00 PM

	Name	Organization	Phone	E-Mail
1.	Abby Moore	Wood	919-768-9927	abigail.moore@woodplc.com
2.	DAVID STRAND	WOOD	919-325-6497	david.strand@woodplc.com
3.	ERIC KRUZ	CARY	919 462 3951	ERIC.KRUZ@TOWNOFCARY.ORG
4.	John Mello	NCEM/Mitigation	919-825-2334	john.mello@ncdps.gov
5.	Steve Bosma	Mooresville	919 468 5932	sbosma@gmail.com
6.	Elizabeth Smith	F-V	919-274-0744	erismith@gmail.com
7.	Kimberly Keyes	Town of Holly Springs	919 557 2929	kimberly.keyes@hollyspringsnc.us
8.	Chris Cahill	NCEM	919 825 2305	john.cahill@ncdps.gov
9.	Josh Creighton	Wake Co	919 856 6485	joshua.creighton@wakegov.com
10.	Daniel Govito	Holly Springs	919 567 4027	daniel.govito@hollyspringsnc.us
11.	Kelly Lindsey	City of Raleigh	919-616-9032	kellylindsey@raleighnc.gov
12.	Shannon Dyer	Fuquay Varina	919 552 1421	sdyer@fuquay-varina.org
13.	Alyssa Stafford	Fuquay Varina	919 753 1874	astafford@fuquay-varina.org
14.	Byron Coates	Wake Cnty	919-856-5434	byron.coates@wakegov.com
15.	Dianne Khin	Town of Apex	919-249-3332	dianne.khin@apexnc.org
16.	Ivan Hegele	CARY EAST	919-819-3415	ihegelecgis@aol.com
17.	Emily Barnhart	Cary	469 5125	See sheet
18.	Shawn Peterson	WakeCounty Planning	919 856-6325	shawn.peterson@wakegov.com
19.	Emma DiCaprio	property owner	919 673 1973	ffupiterfarm@aol.com
20.	John Sutherland	property owner	919-387-7342	jds4526@aol.com

Wake County, NC
Hazard Mitigation Planning Committee Kick-Off Meeting

Wednesday, November 14th, 3:00 PM

21.	Milton Carpenter	NCDPS	919-825-2307	Milton.Carpenter@NCDPS.gov
22.	Shelley Mayo	Town of Apex	919 249-1136	shelley.mayo@apexnc.org
23.	Dylan Bruchhaus	Town of Morrisville	919 463-6923	dbruchhaus@townofmorrisville.org
24.	Brad West	Town of Morrisville	919-463-6926	bwest@townofmorrisville.org
25.	David Bergmark	Town of Wendell	919-366-1464	dbergmark@townofwendell.com
26.	Jason Alvero	RDU (Wake County)	720-530-4545	jason.alvero@rdu.com
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HMPC Meeting 2 – East Wake Working Group: January 7, 2019

Wake County Multi-Jurisdictional Hazard Mitigation Plan Update

Meeting 2: Hazard Mitigation Planning Committee Meeting #2 – East Wake Working Group
Time & Date: Monday, January 7, 2019, 10:00 a.m.-12:00 p.m.
Location: Wake County Eastern Regional Center, 1002 Dogwood Drive, Room 157, Zebulon

Agenda

1. Review and Update Plan Goals
2. Create a Vision Statement
3. Review Existing Mitigation Projects
4. Report on Community Capability
5. Next Steps
6. Questions
7. Adjourn

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Wake County Multi-Jurisdictional Hazard Mitigation Plan

Meeting 2: Hazard Mitigation Planning Committee – East Wake Working Group
Time & Date: Monday, January 7, 2019, 10:00 a.m.-12:00 p.m.
Location: Wake County Eastern Regional Center, Room 157, 1002 Dogwood Drive

There were 12 people in attendance and recorded on the sign-in sheet, including HMPC representatives from Wake Forest, Zebulon, Rolesville, Wake County, Wendell, and Knightdale. David Stroud and Abby Moore, consultants from Wood, facilitated the meeting. David began by providing the meeting agenda.

Review and Update Plan Goals

As part of the plan update process, the HMPC must review the existing goals from the previous plan and make changes where needed. The consultants from Wood compiled the goals from the previous plan and presented them alongside a set of recommended changes. David reviewed each goal and the proposed changes for the HMPC to consider. The existing goals were as follows:

#1	Protect public health, life, safety, and welfare by increasing public awareness and education of hazards and by encouraging collective and individual responsibility for mitigating hazard risks.
#2	Improve technical capability to respond to hazards and to improve the effectiveness of hazard mitigation actions.
#3	Enhance existing or create new policies and ordinances that will help reduce the damaging effects of natural hazards.
#4	Minimize threats to life and property by protecting the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
#5	Generally reduce the impact of all natural hazards.
#6	Ensure that hazard mitigation is considered when redevelopment occurs after a natural disaster.
#7	Ensure that disaster response and recovery personnel have the necessary equipment and supplies available in order to serve the public in the event of a disaster.

The following changes were proposed:

- Re-word Goal #2 to emphasize implementing hazard mitigation in addition to hazard response.
- Delete Goal #3 and incorporate it as an objective under the existing Goal #6.
- Delete Goal #5.
- Modify Goal #6 to include new development in addition to post-disaster redevelopment. Emphasize the need for resilience.
- Delete Goal #7 and incorporate it as an objective under the existing Goal #2.

There were two comments on the goal revisions. For Goal #2, the scope of technical capability was questioned and the group decided it should include administrative resources as well as tools, data, and equipment. For Goal #6, it was recommended that the action specifically include recovery because a current capability gap for the County and jurisdictions is the lack of a recovery plan. With the inclusion of these comments, the HMPC approved of the recommended goal revisions.

The proposed new goals were as follows:

#1	Protect public health, life, safety, and welfare by increasing public awareness and education of hazards and by encouraging collective and individual responsibility for mitigating hazard risks.
#2	Improve technical capability (including administrative resources, tools, data, and equipment) to implement hazard mitigation and respond to hazard events.
#3	Minimize threats to life and property by protecting the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.

#4 Incorporate resiliency into future growth by ensuring that hazard mitigation is considered for both new development and post-disaster redevelopment and recovery.

Vision Statement

The next meeting task was to develop a vision statement to guide the plan development. David explained that the East Working Group would generate a list of ideas and the consultant team would combine these recommendations with those to be generated by the West Working Group in order to develop a draft vision statement. This draft vision statement will then be sent out to the entire HMPC for comment, revision, and approval.

David led the group in brainstorming key words or concepts that should be included in the vision for the plan. HMPC members were asked to consider what the successful implementation of the plan would bring about, what outcomes the plan would generate, and what Wake County will look like in five years. With these guiding questions, the group developed the following list of vision concepts:

- Resilience – the County should have the ability to adapt to changing conditions
- Intentional – the County should think about long-term outcomes and act accordingly
- Sustainable – all resources (including personnel, time, funding, land, etc.) should be approached with a mindset of efficiency and reuse
- Scalable project – mitigation projects should build a foundation for larger scale future mitigation
- Managed growth – address having more people and a greater distribution of people; use long-term planning and encourage higher density where it's safe to build; pursue higher regulatory standards
- Prepared – the County, jurisdictions, and residents are more prepared for hazard events
- Coordination – planning efforts are integrated within and across jurisdictions; plans are consistent

Update Existing Mitigation Actions

HMPC representatives worked among their jurisdictional partners to review and determine the status of existing mitigation actions from the 2015 plan. Even if representatives had already provided feedback, they were asked to review their answers to ensure that it is clear for every action whether that action will be carried forward in this plan update or removed from this plan update.

David and Abby introduced a worksheet that will be used to collect details and prioritization criteria for all actions that are going to be carried forward as well as all new actions. Representatives were asked to fill out a worksheet for each action that they know will be carried forward. This information will be due to the consultant team by January 30th.

Update Capability Assessment

HMPC representatives were given time and print worksheets to provide any missing capability assessment information. This information will be due to the consultant team by January 11th.

Joshua Creighton, the Wake County Emergency Management Deputy Director, noted that the SARA Title III Plan, Radiological Emergency Plan, and Emergency Operations Plan (if adopted locally) cover all jurisdictions in the County. Additionally, with the exception of Cary, Raleigh, and Wake Forest, all jurisdictions are covered by a County-developed Historic Preservation Plan.

Next Steps

The Capability Assessment must be completed and returned by January 11th. The action status reporting and action prioritization worksheets for carried forward actions must be completed by January 30th. The HIRA will be presented at the next HMPC meeting, to be scheduled for February.

Wake County, NC
Hazard Mitigation Planning Committee Meeting #2 – East Wake Working Group
Monday, January 7th, 10:00 AM

	Name	Organization	Phone	E-Mail
1.	DAVID STROUD	WOOD	919 325 6497	david.stroude@woodplc.com
2.	Abby Moore	Wood	919 768 9927	abigail.moore@woodplc.com
3.	Patrick Reidy	Town of Wake Forest	919-435-9515	preidy@wakeforestnc.gov
4.	MEADE BRADSHAW	TOWN OF ZEBULON		MBRADSHAW@TOWNOFZEBULON.ORG
5.	DANNY JOHNSON	TOWN of ROLESVILLE	919-554-6517	danny.johnson@rolesville.nc.gov
6.	Byron Coates	Wake County	919-856-5636	byron.coates@wakegov.com
7.	Josh Creighton	WCEM	856 6485	joshua.creighton@wakegov.com
8.	Jason Alvero	RDUAA / Wake County	9/840-7541	jason.alvero@rdu.com
9.	David Bergmark	Wendell	919-365-4443	dbergmark@townofwendell.com
10.	Jason Brown	Knightdale	919-217-2245	jason.brown@knightdalenc.gov
11.	GRIF BOND	TOWN OF WAKE FOREST	919.247.5673	grifbond@embarqmail.com
12.	Jonathon Olson	EMS	9190566022	jolson@wakegov.com
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HMPC Meeting 2 – West Wake Working Group: January 9, 2019

Wake County Multi-Jurisdictional Hazard Mitigation Plan Update

Meeting 2: Hazard Mitigation Planning Committee Meeting #2 – West Wake Working Group
Time & Date: Wednesday, January 9, 2019, 10:00-11:30 a.m.
Location: Page Walker Arts & History Center, 3rd fl., 119 Ambassador Loop, Cary

Agenda

1. Review and Update Plan Goals
2. Create a Vision Statement
3. Review Existing Mitigation Projects
4. Report on Community Capability
5. Next Steps
6. Questions
7. Adjourn

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Wake County Multi-Jurisdictional Hazard Mitigation Plan

Meeting 2: Hazard Mitigation Planning Committee – West Wake Working Group
Time & Date: Wednesday, January 9, 2019, 10:00-11:30 a.m.
Location: Page Walker Arts & History Center, 3rd Fl., 119 Ambassador Loop

There were 16 people in attendance and recorded on the sign-in sheet, including HMPC representatives from Apex, Cary, Fuquay-Varina, Garner, Holly Springs, Morrisville, Raleigh, and Wake County, and Chris Crew from NC Emergency Management. David Stroud and Abby Moore, consultants from Wood, facilitated the meeting. David began by providing the meeting agenda.

Review and Update Plan Goals

As part of the plan update process, the HMPC must review the existing goals from the previous plan and make changes where needed. The consultants from Wood compiled the goals from the previous plan and presented them alongside a set of recommended changes. These changes incorporated input from gathered from the rest of the HMPC during the East Wake Working Group meeting held on Monday, January 7th. David reviewed each goal and the proposed changes for the HMPC to consider. The existing goals were as follows:

#1	Protect public health, life, safety, and welfare by increasing public awareness and education of hazards and by encouraging collective and individual responsibility for mitigating hazard risks.
#2	Improve technical capability to respond to hazards and to improve the effectiveness of hazard mitigation actions.
#3	Enhance existing or create new policies and ordinances that will help reduce the damaging effects of natural hazards.
#4	Minimize threats to life and property by protecting the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
#5	Generally reduce the impact of all natural hazards.
#6	Ensure that hazard mitigation is considered when redevelopment occurs after a natural disaster.
#7	Ensure that disaster response and recovery personnel have the necessary equipment and supplies available in order to serve the public in the event of a disaster.

The following changes were proposed:

- Re-word Goal #2 to emphasize implementing hazard mitigation in addition to hazard response. Clarify technical capability.
- Delete Goal #3 and incorporate it as an objective under the existing Goal #6.
- Delete Goal #5.
- Modify Goal #6 to include new development in addition to post-disaster redevelopment. Emphasize recovery development and the need for resilience.
- Delete Goal #7 and incorporate it as an objective under the existing Goal #2.

There was one comment on the goal revisions. For Goal #4, it was recommended that adaptation be included in addition to resiliency, to emphasize the need to consider future conditions during the development and redevelopment processes.

The proposed new goals were as follows:

#1	Protect public health, life, safety, and welfare by increasing public awareness and education of hazards and by encouraging collective and individual responsibility for mitigating hazard risks.
#2	Improve technical capability (including administrative resources, tools, data, and equipment) to implement hazard mitigation and respond to hazard events.

#3	Minimize threats to life and property by protecting the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
#4	Incorporate resiliency and adaptation into future growth by ensuring that hazard mitigation is considered for both new development and post-disaster redevelopment and recovery.

Vision Statement

The next meeting task was to develop a vision statement to guide the plan development. David explained that the East Working Group generated a list of ideas and the consultant team would combine these recommendations with those to be generated by the West Working Group in order to develop a draft vision statement. This draft vision statement will then be sent out to the entire HMPC for comment, revision, and approval. To generate the vision statement concepts, HMPC members were asked to consider what the successful implementation of the plan would achieve, what outcomes the plan would generate, and what Wake County will look like in five years.

David began by reviewing the list of concepts generated by the East Wake Working Group, which were as follows:

- Resilience – the County should have the ability to adapt to changing conditions
- Intentional – the County should think about long-term outcomes and act accordingly
- Sustainable – all resources (including personnel, time, funding, land, etc.) should be approached with a mindset of efficiency and reuse
- Scalable project – mitigation projects should build a foundation for larger scale future mitigation
- Managed growth – address having more people and a greater distribution of people; use long-term planning and encourage higher density where it's safe to build; pursue higher regulatory standards
- Prepared – the County, jurisdictions, and residents are more prepared for hazard events
- Coordination – planning efforts are integrated within and across jurisdictions; plans are consistent

HMPC members reviewed the above ideas and contributed the following additions, clarifications, and revisions:

- Acknowledge past success achieved through the previous plan and build on what we have already started.
- Incorporate a protective mindset within sustainability to address the need to protect sensitive land and water resources.
- Incorporate others scales of planning under coordination to encourage planning at a watershed and/or ecosystem level.
- Identify and consider the needs of vulnerable populations in planning mitigation projects.
- Combine resilience with adaptation, where resilience is the ability to react and recover and adaptation is the incorporation into recovery of intentional changes that reduce future vulnerability. Emphasize a commitment to re-evaluate conditions after every event and incorporate improvements during the return to "normal."

Update Existing Mitigation Actions

HMPC representatives worked among their jurisdictional partners to review and determine the status of existing mitigation actions from the 2015 plan. Even if representatives had already provided feedback, they were asked to review their answers to ensure that it is clear for every action whether that action will be carried forward in this plan update or removed from this plan update.

David introduced a worksheet that will be used to collect details and prioritization criteria for all actions that are going to be carried forward as well as all new actions. Representatives were asked to fill out a worksheet for each action that they know will be carried forward. This information will be due to the consultant team by January 30th.

Update Capability Assessment

HMPC representatives were given time and print worksheets to provide any missing capability assessment information. This information will be due to the consultant team by January 11th.

David shared information from Joshua Creighton, the Wake County Emergency Management Deputy Director, to note that the SARA Title III Plan, Radiological Emergency Plan, and Emergency Operations Plan (if adopted locally)

cover all jurisdictions in the County and can therefore be marked as "County Developed". Additionally, apart from Cary, Raleigh, and Wake Forest, all jurisdictions are covered by a County-developed Historic Preservation Plan.

Chris Crew, NC Emergency Management Mitigation Plans Manager, shared that the State Historic Preservation Office is interested in the mitigation planning process and would like to encourage jurisdictions to consider historic properties when evaluating vulnerabilities and developing new mitigation actions.

Next Steps

The Capability Assessment must be completed and returned by January 11th. The action status reporting and action prioritization worksheets for carried forward actions must be completed by January 30th. The HIRA will be presented at the next HMPC meeting, to be scheduled for February.

Wake County, NC
Hazard Mitigation Planning Committee ~~Kick-Off~~ Meeting #2 - West Wake

Wednesday, January 9th, 10:00 AM

	Name	Organization	Phone	E-Mail
1.	DAVID STROUD	WOOD	919-325-6497	david.Stroud@woodplc.com
2.	Abby Moore	Wood	919-768-9927	abigail.moore@woodplc.com
3.	ERIC KULZ	TOC	919-462-3931	ERIC.KULZ@TOWNOFCARY.ORG
4.	KIMBERLY KEYES	TOH	910 391 7710	KIMBERLY.KEYES@HOLLYSPRINGSNC.US
5.	Ed Ridpath	Fuquay-Varina	919-274-0744	eridpath@gmail.com
6.	David Bamford	Garner	919-773-4443	dbamford@garnernc.gov
7.	Dylan Bruchhaus	Morrisville	(919) 463-6923	dbruchhaus@townofmorrisville.org
8.	TOM HEGELE	CARY CERT	919-819-3415	Thegele@gmail.com
9.	CHRIS CREW	NCEM	919 825 2305	JOHN.CREW@NCDPS.GOV
10.	Kelly Lindsey	City of Raleigh	919-616-9032	kelly.lindsey@raleighnc.gov
11.	Shelly Mayo	Apex	919-249-1136	shelly.mayo@apexnc.org
12.	Allyssa Stafford	Fuquay-Varina	919-753-1874	astafford@fuquay-varina.org
13.	Brad West	Town of Morrisville	919-463-6926	bwest@townofmorrisville.org
14.	Emily Barrett	Town of Cary	469 5125	emily.barrett@townofcary.org
15.	Sharon Peterson	Wake County Planning	919 856-6325	sharon.peterson@wakegov.com
16.	Jim Scarborough	Apex	919-404-9404	jimes@hiwaay.net
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HMPC Meeting 3 – East Wake Working Group: March 4, 2019

Wake County Multi-Jurisdictional Hazard Mitigation Plan

Meeting 3: Hazard Mitigation Planning Committee – East Wake Working Group
Time & Date: Monday, March 4, 2019, 9:00 a.m.-11:00 p.m.
Location: Knightdale Fire Department Training Room, 979 Steeple Square Ct, Knightdale

There were 13 people in attendance and recorded on the sign-in sheet, including HMPC representatives from Knightdale, Raleigh, Wendell, Wake Forest, and Wake County. David Stroud and Abby Moore, consultants from Wood, facilitated the meeting.

David began with a review of the planning process as a whole and where we are in that process – Step 4 Assess the Hazard & Step 5 Assess the Problem. We have already completed Step 6 Set Goals. Moving forward, the next step will be to review potential new mitigation actions and draft the plan.

Review the Hazard Identification and Risk Assessment (HIRA)

David reviewed the HIRA methodology and process and provided a summary of each hazard in the plan, explaining the overall risk level assigned to each hazard. Hazards were identified for initial review based on the list of hazards included in the 2018 State Hazard Mitigation Plan and the 2015 Wake County plan. Major disaster declarations, NCEI storm events data, and other sources of hazard risk were reviewed to determine which hazards would be fully profiled in the plan. The full list of hazards profiled is as follows:

- Dam Failure
- Drought
- Earthquake
- Extreme Heat
- Flood
- Hurricane & Tropical Storm
- Landslide
- Severe Weather (Thunderstorm, Lightning, and Hail)
- Severe Winter Storm
- Tornado
- Hazardous Materials Incident
- Radiological Incident
- Terrorism

The detailed summary info that was presented on each hazard can be found in the PDF of the presentation. The following comments were noted during the discussion of hazards:

- Dam failure: the review of historical occurrences should also include near misses. The HMPC noted near misses at Fairlake Lewis Dam in Wake Forest and Lake Johnson leading into Lake Benson and Lake Wheeler in Raleigh.
- Radiological: it was noted that the name should read "Harris Nuclear Plant" for all direct references to the plant.
- Asset Inventory: There was a clarification that EMS facilities are accounted for under the "Fire" category in Critical Facilities.

Plan Objectives

The next meeting task was to identify plan objectives under each goal. David presented optional objectives suggested by Wood. There were no objections to these objectives. The HMPC will consider revisions and/or additional objectives as they work on reviewing potential new mitigation alternatives.

Next Steps

The draft HIRA is posted on the plan website. The HMPC can review the HIRA and submit comments until Friday, March 22nd. The HMPC should also work on developing new mitigation actions based on gaps and information in the HIRA. New mitigation actions are due to Wood by Friday, March 29th. John Mello from NCEM noted that there must be two actions for every hazard and there must be at least one Structural mitigation project. An all-hazards action (such as public outreach) can satisfy the requirement for one of the required actions for each hazard.

A Doodle poll will be sent out to schedule the final HMPC meeting for mid-April.

WAKE COUNTY
NORTH CAROLINA

Wake County, NC
Hazard Mitigation Planning Committee Meeting #3
Monday, March 4th, 9:00 AM

	Name	Organization	Phone	E-Mail
1.	Abby Moore	Wood	919-768-9927	abigail.moore@woodplc.com
2.	DAVID STROUD	WOOD	919-325-6497	david.stroud@woodpc.com
3.	Nicole Goddard	City of Raleigh	919-996-4259	nicole.goddard@raleighnc.gov
4.	Whitney Schoenfeld	City of Raleigh	919-996-2704	Whitney.Schoenfeld@raleighnc.gov
5.	John Mello	NCEM/Mitigation	919-825-2334	john.mello@ncdps.gov
6.	Patrick Reidy	Town of Wake Forest	919-435-9515	preidy@wakeforestnc.gov
7.	Ben Brown	City of Raleigh	919-996-3515	ben.brown@raleighnc.gov
8.	Jon Olson	Wendell	919-796-6342	jolson@wdlgov.com
9.	Meggan Anderson	City Raleigh	8336 977 7376	meggan.anderson@raleighnc.gov
10.	Jeannine Nagwira	Town of Wendell	919-365-4448	jnagwira@townofwendell.com
11.	Jason Brown	Town of Knightdale	919-217-2245	jason.brown@knightdale.gov
12.	Grif Bond	Town of Wake Forest	919.554.7283	grifbond@gmail.com
13.	Josh Creighton	Wake Co	919 856 6485	joshua.creighton@wakegov.com
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HMPC Meeting 3 – West Wake Working Group: March 8, 2019

Wake County Multi-Jurisdictional Hazard Mitigation Plan

Meeting 3: Hazard Mitigation Planning Committee – West Wake Working Group
Time & Date: Friday, March 8, 2019, 1:30-3:00 p.m.
Location: Holly Springs Cultural Center, 300 W Ballentine St, Holly Springs

There were 13 people in attendance and recorded on the sign-in sheet, including HMPC representatives from Apex, Cary, Fuquay-Varina, Garner, Holly Springs, Morrisville, and Wake County. David Stroud and Abby Moore, consultants from Wood, facilitated the meeting.

David began with a review of the planning process as a whole and where we are in that process – Step 4 Assess the Hazard & Step 5 Assess the Problem. We have already completed Step 6 Set Goals. Moving forward, the next step will be to review potential new mitigation actions and draft the plan.

Review the Hazard Identification and Risk Assessment (HIRA)

David reviewed the HIRA methodology and process and provided a summary of each hazard in the plan, explaining the overall risk level assigned to each hazard. Hazards were identified for initial review based on the list of hazards included in the 2018 State Hazard Mitigation Plan and the 2015 Wake County plan. Major disaster declarations, NCEI storm events data, and other sources of hazard risk were reviewed to determine which hazards would be fully profiled in the plan. The full list of hazards profiled is as follows:

- Dam Failure
- Drought
- Earthquake
- Extreme Heat
- Flood
- Hurricane & Tropical Storm
- Landslide
- Severe Weather (Thunderstorm, Lightning, and Hail)
- Severe Winter Storm
- Tornado
- Hazardous Materials Incident
- Radiological Incident
- Terrorism

The detailed summary info that was presented on each hazard can be found in the PDF of the presentation. The following comments were noted during the discussion of hazards:

- Drought: Vulnerability to water supply was brought up. Current HIRA discusses public water supply but not private wells, but there are an estimated 40,000 private wells in Wake County. This will be added to the vulnerability assessment. Quantitative risk data is not available, but the potential vulnerability will be noted.
- Extreme Heat: Time period should be shortened to reflect more recent trends.
- Radiological: The 50-mile Ingestion Pathway Zone, which indicates the area within which food and water sources may be contaminated. The spatial extent rating for the hazard should be increased.
- Asset Inventory: There was discussion regarding the limitations of the IRISK database, which provides vulnerability estimates based on a 2010 asset inventory. Many jurisdictions have grown substantially since 2010, making the IRISK data an underestimate of actual risk. Wood will discuss growth and development by jurisdiction in the Community Profile section of the plan in order to quantify the extent of growth since the 2010 data. This information will also be noted in the Jurisdictional Annexes. These findings will be noted in the hazard profiles where possible. Additionally, the newest available parcel data will be used to run an additional assessment of flood vulnerability by providing a count of buildings in the floodplain by jurisdiction.

Plan Objectives

The next meeting task was to identify plan objectives under each goal. David presented optional objectives suggested by Wood. There were no objections to these objectives. The HMPC will consider revisions and/or additional objectives as they work on reviewing potential new mitigation alternatives.

Next Steps

The draft HIRA is posted on the plan website. The HMPC can review the HIRA and submit comments until Friday, March 22nd. The HMPC should also work on developing new mitigation actions based on gaps and information in the HIRA. New mitigation actions are due to Wood by Friday, March 29th. Per FEMA requirements, each jurisdiction must have two actions for every hazard and at least one Structural mitigation project. An all-hazards action (such as public outreach) can satisfy the requirement for one of the required actions for each hazard.

A Doodle poll will be sent out to schedule the final HMPC meeting for mid-April.

Wake County, NC
Hazard Mitigation Planning Committee Meeting #3

Friday, March 8th, 1:30 PM

	Name	Organization	Phone	E-Mail
1.	Abby Moore	Wood	919-768-9927	abigail.moore@woodplc.com
2.	Allyssa Stafford	Fuquay-Varina	919-753-1874	astafford@fuquay-varina.org
3.	DAVID STROUD	WOOD	919-325-649	david.Stroud@woodplc.com
4.	Kimberly Kayes	Town of Holly Springs	910-557-2929	Kimberly.Kayes@hollyspringsnc.us
5.	Dylan Bruchhaus	Town of Morrisville	919 463-8923	dbruchhaus@townofmorrisville.org
6.	Daniel Colavito	Town of Holly Springs	919.567.4027	daniel.colavito@hollyspringsnc.us
7.	Ed Ridpath	F-V	919-274-0744	eridpath@gmail.com
8.	Shelly Mayo	Apex	919-249-3426	shelly.mayo@apexnc.org
9.	ERIC KULZ	CARY	919-462-3931	ERIC.KULZ@TOWNOFCARY.ORG
10.	Josh Creighton	Wake Co	919 856 6485	joshua.creighton@wakegov.com
11.	Mike Dixon	Wake Co	919 464 7192	michael.dixon@wakegov.com
12.	David Bamford	GARNER	919-773-4443	dbamford@garnernc.gov
13.	Samantha Smith	FV	919 552 1421	ssmith@fquay-
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HMPC Meeting 4: April 22, 2019

Wake County Multi-Jurisdictional Hazard Mitigation Plan

Meeting 4: Hazard Mitigation Planning Committee Meeting
Time & Date: Monday, April 22, 2019, 3:00-4:30 p.m.
Location: Wake County Commons Building, 4011 Carya Drive

There were 18 attendees recorded on the meeting sign-in sheet.

Planning Process Update

David Stroud, the consultant from Wood leading the plan update, began the meeting with a review of the planning process. The process is now in Step 7 (Review Possible Activities) and Step 8 (Draft an Action Plan). Once the plan is fully drafted and approved, all communities will adopt the plan (Step 9) and then implement, evaluate, and revise the plan (Step 10) over the next five years until the next update cycle begins.

Structure of the Plan

To prepare the HMPC to review and comment on the draft plan, David presented the structure of the plan, discussing each of the nine sections as well as the appendices and annexes to the plan. This summary of each plan section as well as annex content can be found in the presentation slides.

Additionally, David clarified where and how data on development since 2011 was added to the annexes to address concerns from the review of the HIRA. This data on development since 2011 provides a good indication of growth in each participating jurisdiction and puts the IRISK data presented in the HIRA into context. This data was also assessed in terms of flood risk, by comparing parcels (and building footprints, if available) to floodplains in the effective FIRM in order to estimate additional exposure to flooding.

David also noted that the IRISK data is updated only once the new FIRM is adopted, which is why newer data was not yet available for this plan update.

Review of Key Plan Components

David reviewed the major components of the plan as follows:

- Hazards Profiled: listed the hazards assessed in this plan; the list was coordinated with the hazards in the State Hazard Mitigation Plan
- Risk Assessment Summary & PRI Results: presented the Priority Risk Index scores for each hazard, demonstrating how hazards were classified as high, moderate, or low risk. Only natural hazards with a high or moderate risk rating need to be targeted for mitigation.
- Goals & Objectives: no comments were submitted on the objectives presented at the last meeting, and no new objectives were submitted. All mitigation actions must nest under one of these goals and objectives.
- Mitigation Action Plans: a set of example actions were presented. Each jurisdiction's representatives reviewed their mitigation actions with the planning consultants later in the meeting. A question was raised about whether certain mitigation actions should be carried across jurisdictions if they are regional. David advised that yes, the more actions are aligned the better in terms of encouraging implementation and showing coordination to FEMA. It was decided that representatives should review all mitigation action plans and look for opportunities to duplicate regional actions in their own mitigation action plans.

Plan Implementation & Maintenance

David reviewed the HMPC's responsibilities for implementing and maintaining the plan once it is adopted. The Disaster Mitigation Act of 2000 (DMA) requires that the HMPC conduct annual reviews of the plan to discuss implementation progress and any needed revisions. Each participating community can conduct these reviews internally and submit annual reports to their own governing bodies. David recommended that communities adhere to the CRS program requirements for quarterly reviews instead, because more regular meetings will help the committee make progress on implementation.

David and Abby also discussed the need for each participating jurisdiction to report on any ways that they integrated the 2015 plan with other local planning efforts as well as any ways they plan to integrate this plan update with other planning efforts moving forward.

Moving forward, the final components of the plan will be compiled into a complete draft, which will be posted for review on the plan website. Committee members and the public will have two weeks to review the draft. Comments and feedback will be compiled into a final draft plan, which will be sent to the State to review. Once the State has approved the plan, it will be sent to FEMA for review. After FEMA sends the Approval Pending Adoption (APA) letter, all communities must adopt the plan.

John Mello from NCEM noted that FEMA has 45 days to complete their review. He noted that the State can let us know when they submit the plan to FEMA so that communities will have a general idea of when they'll need to begin preparing for adoption of the plan.

John also mentioned that the State will work with communities to amend the plan and add new projects if needed, such as if a community wants to apply for HMGP funding for a project that is not currently listed in the plan.

Mitigation Actions Workshop

David and Abby worked with representatives from each participating jurisdiction present at the meeting to review their mitigation action plans and identify any gaps or necessary revisions and to discuss integration of the 2015 plan and this plan update.

Next Steps

HMPC representatives should try to submit any mitigation action revisions as well as any information on integration by Wednesday, May 1st. HMPC members also have until Friday, May 17th to review the draft plan. Comments and feedback on the plan can be sent to Abby at abigail.moore@woodplc.com.

Wake County, NC
Hazard Mitigation Planning Committee Meeting #4

Monday, April 22nd, 3:00 PM

	Name	Organization	Phone	E-Mail
1.	Ed Ridpath	Town of FV	919-274-0744	eridpath@gmail.com
2.	Patrick Reidy	Town of Wake Forest	919-435-9515	preidy@wakeforestnc.gov
3.	Brad West	Town of Morrisville	919-463-6926	bradofwest@gmail.com
4.	John Mello	NCEM/Mit Plans	919-825-2334	john.mello@ncdps.gov
5.	Mike Dixon	Wake Co	919-464-7192	michael.dixon@wakegov.com
6.	Jeannine Nguira	Town of Wendell	919-365-4448	jnguira@townofwendell.com
7.	DANNY JOHNSON	Town of Rolesville	919-554 6514	DANNY.JOHNSON@ROLESVILLENC.GOV
8.	Nicole Goddard	City of Raleigh	919-996-4259	nicole.goddard@raleighnc.gov
9.	Dylan Bruchhaus	Town of Morrisville	919-463-6923	dbruchhaus@townofmorrisville.org
10.	Jason Brown	Town of Knightdale	919-217-2245	jason.brown@knightdalenc.gov
11.	Whitney Schoenfeld	City of Raleigh	919-996-2204	whitney.schoenfeld@raleighnc.gov
12.	Ben Brown	City of Raleigh	919 996 3515	ben.brown@raleighnc.gov
13.	Shelly Mayo	Apex	919-249-1136	shelly.mayo@apexnc.org
14.	Alyssa Stafford	Fuquay-Varina	919-552-1429	astafford@fv.org
15.	Samantha Smith	"	"	ssmith@f-v.org
16.	Emily Barrett	Town of Cary	919 469 5125	emily.barrett@townofcary.org
17.	Abby Moore	Wood	919 768 9927	abigail.moore@woodplc.com
18.	DAVID STRAND	WOOD	919-325 6497	david.strande woodplc.com
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PLANNING STEP 2: INVOLVE THE PUBLIC

Table B.2 – Public Meeting Topics, Dates, Locations

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
Public Meeting #1	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	November 14, 2018	Wake County Commons Bldg. 4011 Carya Drive, Raleigh
Public Meeting #2	1) Review "Draft" Hazard Mitigation Plan 2) Solicit comments and feedback	April 22, 2019	Wake County Commons Bldg. 4011 Carya Drive, Raleigh

Public Meeting Agendas, Minutes, Sign-in Sheets, and Announcements

Public Meeting 1: November 14, 2018

Wake County Multi-Jurisdictional Hazard Mitigation Plan Update

Meeting 1: Public Kick-Off Meeting
Time & Date: Wednesday, November 14, 2018, 5:00 p.m.
Location: Wake County Commons Building, 4011 Carya Drive

Agenda

1. Introductions
2. Project Overview
    a. Requirement for Update
    b. Trends in Disasters – Why Plan?
    c. Disaster Mitigation Act (DMA) Requirements
        i. Organize Resources
        ii. Risk Assessment
            1. Hazard Identification
            2. Vulnerability Assessment
            3. Capability Assessment
        iii. Develop Mitigation Plan
            1. Hazard Strategies
            2. Mitigation Categories
    d. Scope of Work
    e. Risk Management Tool
3. Project Schedule
4. Working Groups
5. Plan Website
6. Next Steps
    a. Plan Website
    b. Public Survey
7. Questions
8. Adjourn

Page 1 of 1

Wake County Multi-Jurisdictional Hazard Mitigation Plan

Meeting 1: Public Kick-Off Meeting
Time & Date: Wednesday, November 14, 2018, 5:00 p.m.
Location: Wake County Commons Building, 4011 Carya Drive

One member of the public came to the meeting. In lieu of providing the prepared presentation, David Stroud, consultant at Wood, discussed the key points of the presentation with the attendee and answered questions about the planning process. David provided information about the plan website and the public survey. The attendee provided his email in order to receive further information about the website and other ways to stay involved throughout the rest of the planning process.

Wake County, NC
Hazard Mitigation Planning Public Meeting #1

Wednesday, November 14th, 5:00 PM

	Name	Organization (resident)	Phone	E-Mail
1.	Bill Carter	Town of Wendell	919-365-4444	bcarter@townofwendell.com
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NEWS RELEASE

Contact: Communications Office
Alice Avery, Communications Specialist
Alice.Avery@wakegov.com, 919-856-7550
Communications Office After Hours, 919-857-WAKE
wakegov.com/news

For Release: Nov. 13, 2018

Residents Invited to Weigh in on Hazard Mitigation Plan

While natural disasters cannot be prevented, there are things communities can do to make their people and property less vulnerable to damage.

Residents are invited to share their thoughts on the Wake County Multi-Jurisdictional Hazard Mitigation Plan at a public meeting Wednesday, Nov. 13. The meeting will take place at 5 p.m. at the Wake County Commons Building, 4011 Carya Drive.

The Wake County Multi-Jurisdictional Hazard Mitigation Plan, which was developed five years ago, recommends structural solutions to reduce existing vulnerability. It also considers policies on community growth and development, incentives for natural resource protection, and public awareness and outreach activities. The plan brings together all jurisdictions in the county under one comprehensive document.

Wake County and its partners are now beginning the process to update the plan—which is why public input is important.

The meeting will take place in the lower level of the Commons Building, which can be accessed by an entrance on the right side of the building at the end of the driveway.
Learn more about Wake County's Hazard Mitigation Plan here.

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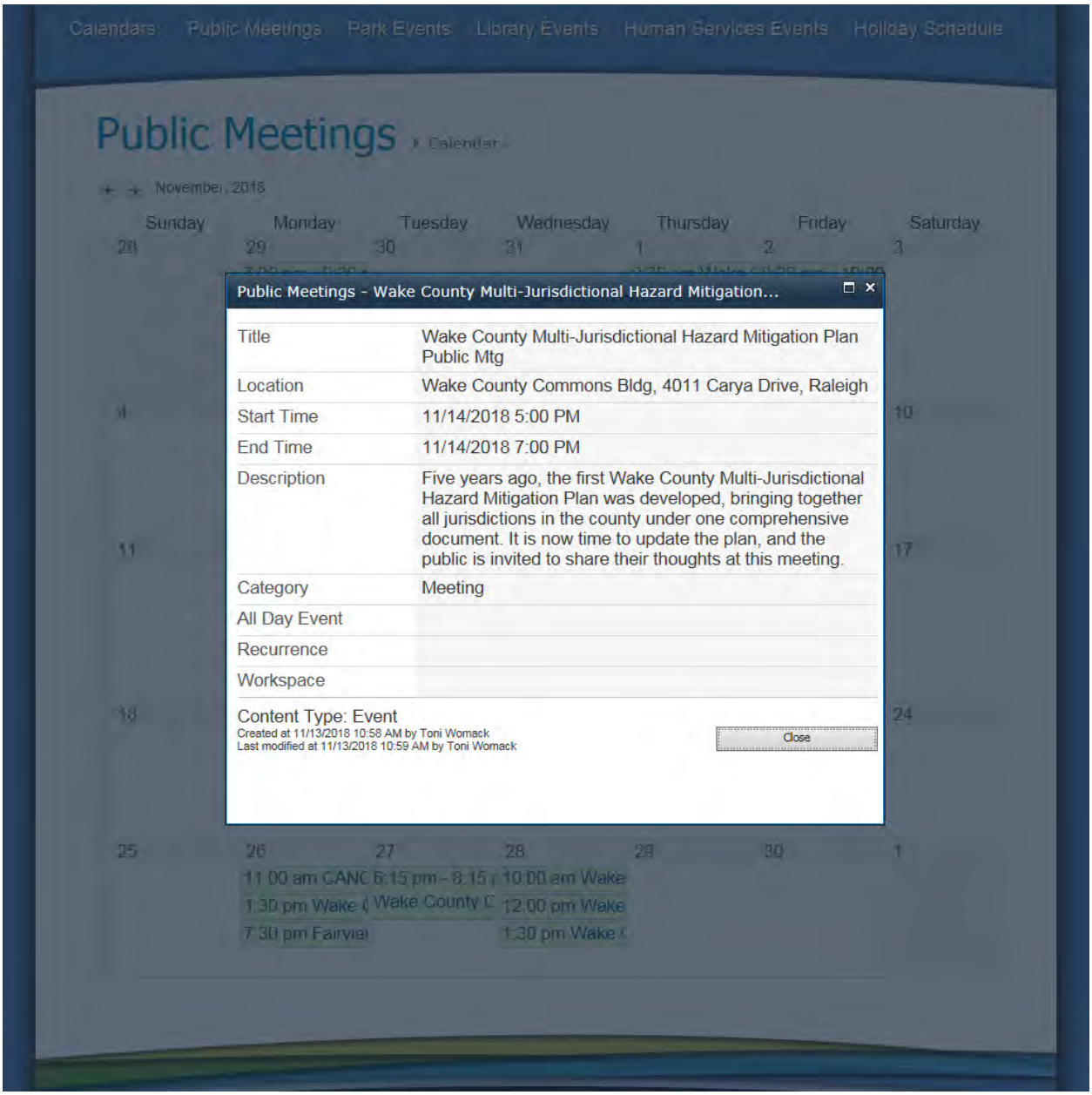
wakegov.com | @wakegov




Calendars
Public Meetings
Park Events
Library Events
Human Services Events
Holiday Schedule
Public Meetings
Calendar
November, 2018
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Public Meetings - Wake County Multi-Jurisdictional Hazard Mitigation...
Title
Wake County Multi-Jurisdictional Hazard Mitigation Plan Public Mtg
Location
Wake County Commons Bldg, 4011 Carya Drive, Raleigh
Start Time
11/14/2018 5:00 PM
End Time
11/14/2018 7:00 PM
Description
Five years ago, the first Wake County Multi-Jurisdictional Hazard Mitigation Plan was developed, bringing together all jurisdictions in the county under one comprehensive document. It is now time to update the plan, and the public is invited to share their thoughts at this meeting.
Category
Meeting
All Day Event
Recurrence
Workspace
Content Type: Event
Created at 11/13/2018 10:58 AM by Toni Womack
Last modified at 11/13/2018 10:59 AM by Toni Womack
Close


Raleigh
Search
Vision: To pursue world-class quality of life by actively collaborating with our community towards a fulfilling and inspired future for all
Arts & Parks
Services
Government
Business & Development
Community
Projects
Public Safety
Sustainability
MyRaleigh
Departments
Maps
Directory
Calendar
Subscriptions
Pay
Utility Bill
Parking Citations
Safelight Citations
Public Meeting Set For Update to Wake County Hazard Mitigation Plan
News posted Nov. 13, 2018 - 6:00 am
On Nov. 14 at 5 p.m., the public is invited to a meeting on the update to Wake County Hazard Mitigation Plan at 5 p.m. at the Wake County Commons Building, 4011 Carya Drive in Raleigh.
Nearly five years ago, the first Wake County Multi-Jurisdictional Hazard Mitigation Plan was developed bringing together all jurisdictions in the County under one comprehensive document.
Subscribe to the City's News RSS Feed
0
News
Raleigh Names Convention Center Complex GM/Director (today)
[Alert] Traffic Closure: 7900 Block of Lead Mine Road for Sewer Repair (today)
Public Meeting Set For Update to Wake County Hazard Mitigation Plan
Events
Nov 13
City Council Meeting
Work Session
4:00 pm

Public Meeting 2: April 22, 2019

Wake County Multi-Jurisdictional Hazard Mitigation Plan

Meeting 2: Final Public Meeting
Time & Date: Monday, April 22, 2019, 5:00-6:00 p.m.
Location: Wake County Commons Building, 4011 Carya Drive

There were six attendees recorded on the meeting sign-in sheet including stakeholder representatives from North Carolina Department of Environmental Quality's Division of Water Resources and Triangle J Council of Governments. Additionally, HMPC representatives from Wake County and Cary attended the meeting.

Planning Process Update

David Stroud, the consultant from Wood leading the plan update, began the meeting with a review of the planning process, which is now in Step 7 (Review Possible Activities) and Step 8 (Draft an Action Plan). Once the plan is fully drafted and approved, all communities will adopt the plan (Step 9) and then implement, evaluate, and revise the plan (Step 10) over the next five years until the next update cycle begins.

Structure of the Plan

To prepare stakeholders and citizens to review and comment on the draft plan, David presented the structure of the plan, discussing each of the nine sections as well as the appendices and annexes to the plan. This summary of each plan section as well as annex content can be found in the presentation slides.

Review of Key Plan Components

David reviewed the major components of the plan as follows:

- Hazards Profiled: listed the hazards assessed in this plan; the list was coordinated with the hazards in the State Hazard Mitigation Plan to ensure consistency
- Risk Assessment Summary & PRI Results: presented the Priority Risk Index scores for each hazard, demonstrating how hazards were classified as high, moderate, or low risk. Only natural hazards with a high or moderate risk rating need to be targeted for mitigation.
- Goals & Objectives: presented the goals and their associated objectives as agreed upon by the HMPC. All mitigation actions must nest under one of these goals and objectives.
- Mitigation Action Plans: a set of example actions were presented. A complete set of draft mitigation action plans from each jurisdiction was made available for citizens and stakeholders to review.

Plan Implementation & Maintenance

David reviewed the HMPC's responsibilities for implementing and maintaining the plan once it is adopted, noting that continued public involvement is among these requirements. The HMPC or each participating community must conduct at least annual reviews internally and submit annual reports to their own governing bodies. The public will be able to review these annual reports to track implementation progress.

Moving forward, the final components of the plan will be compiled into a complete draft, which will be posted for review on the plan website. The public will have two weeks to review the draft. Comments and feedback will be compiled into a final draft plan, which will be sent to the State to review. Once the State has approved the plan, it will be sent to FEMA for review. After FEMA sends the Approval Pending Adoption (APA) letter, all communities must adopt the plan.

Next Steps

The draft plan will be posted on the website at http://www.wakecountyhmp.com/draftDocuments.html. Stakeholders will have until Friday, May 17th to review the draft plan. Comments and feedback on the plan can be sent to Abby at abigail.moore@woodplc.com.

Wake County Multi-Jurisdictional Hazard Mitigation Plan Update
Public Meeting 1

Page **1** of **1**

Wake County, NC
Hazard Mitigation Planning Public Meeting #2

Monday, April 22nd, 5:00 PM

	Name	Organization (resident)	Phone	E-Mail
1.	david.Strack	WOOD	919-325-6497	david.Strackwoodplc.com
2.	Abby Moore	wood	919-768-4927	abigail.moore@woodplc.com
3.	Celeste Sugg	DEQ / DWR	919-707-3628	celeste.sugg@ncdenr.gov
4.	Jim GREGSON	NCDEQ / DWR	919-707-9147	JIM.GREGSON@NCDENR.GOV
5.	KLAUS ALBERTIN	NC DWR	919 707 8035	KLAUS.ALBERTIN@NCDENR.GOV
6.	Jen Schmitt	TJCOG	919-438-0896	jschmitt@tjcog.org
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The **Final** meetings for the Wake County HMP will be held on **Monday, April 22, 2019**. The **HMPC Meeting** will be held from **3PM to 4:30PM**. The **Public Meeting** will follow from **5PM to 6PM**. Both of the meetings will be held in the Wake County Commons Building, Room 100B & 100C - 4011 Carya Drive, Raleigh

WAKE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

wood.

Wake County Multi-jurisdictional Hazard Mitigation Plan

Welcome to the website for the 2019 Wake County Multi-jurisdictional Hazard Mitigation Plan update. Wake County is updating its 2015 plan to better protect the people and property of the County from the effects of natural and human-caused hazards and to maintain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA). On this website you can find information about upcoming and past Hazard Mitigation Planning Committee meetings and public meetings, take a survey on hazard risk and mitigation options to inform the plan's development, review draft documents a summary of the hazards that affect Wake County, and learn more about the hazards that affect Wake County.

MEETING SCHEDULES, AGENDAS, AND MINUTES

TAKE THE PUBLIC SURVEY

REVIEW DRAFT DOCUMENTS

Plan Website Outreach

The **Final** meetings for the Wake County HMP will be held on **Monday, April 22, 2019**. The **HMPC Meeting** will be held from **3PM to 4:30PM**. The **Public Meeting** will follow from **5PM to 6PM**. Both of the meetings will be held in the Wake County Commons Building, Room 100B & 100C - 4011 Carya Drive, Raleigh

WAKE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

wood.

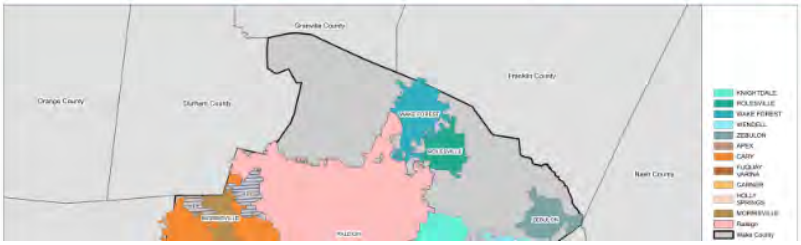
Wake County Multi-jurisdictional Hazard Mitigation Plan

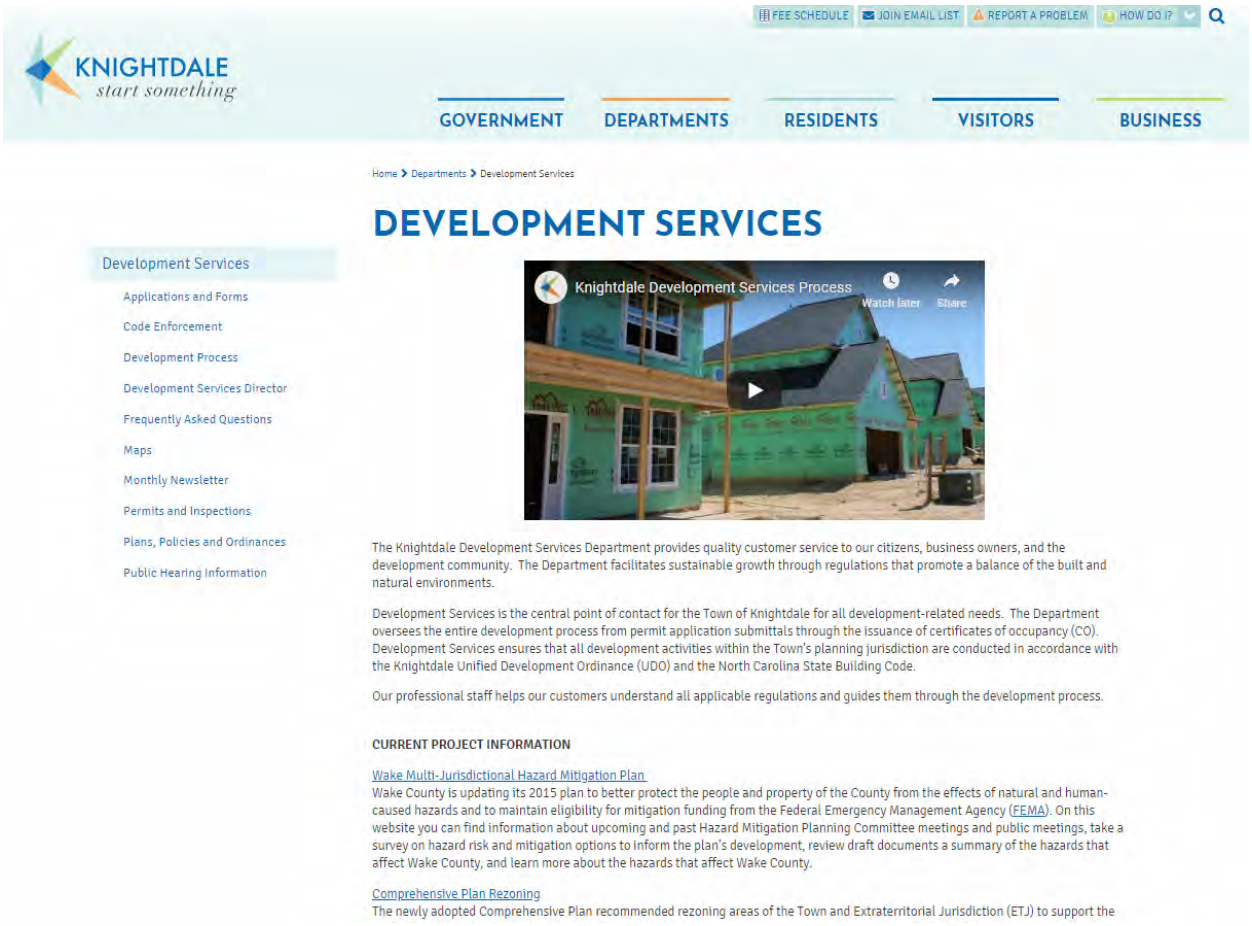
Welcome to the website for the 2019 Wake County Multi-jurisdictional Hazard Mitigation Plan update. Wake County is updating its 2015 plan to better protect the people and property of the County from the effects of natural and human-caused hazards and to maintain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA). On this website you can find information about upcoming and past Hazard Mitigation Planning Committee meetings and public meetings, take a survey on hazard risk and mitigation options to inform the plan's development, review draft documents a summary of the hazards that affect Wake County, and learn more about the hazards that affect Wake County.

MEETING SCHEDULES, AGENDAS, AND MINUTES

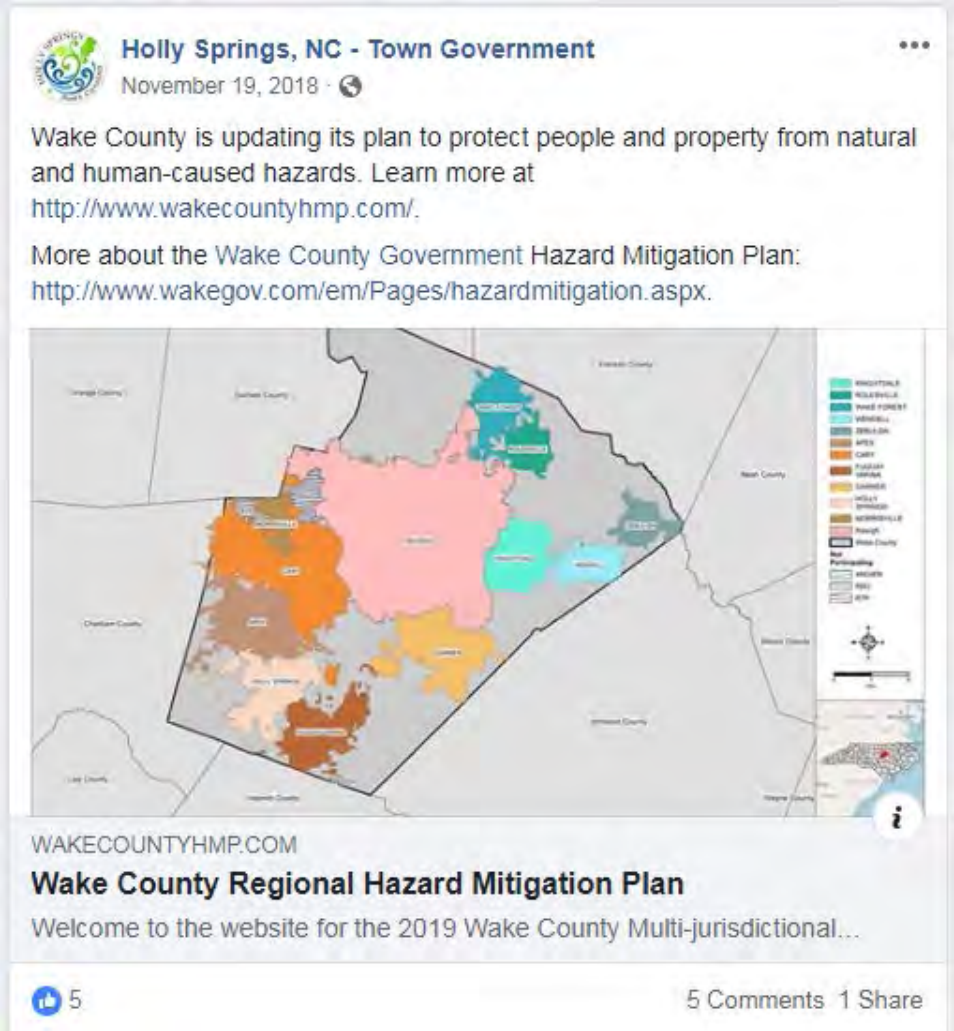
TAKE THE PUBLIC SURVEY

REVIEW DRAFT DOCUMENTS




FEE SCHEDULE
JOIN EMAIL LIST
REPORT A PROBLEM
HOW DO I?
KNIGHTDALE
start something
GOVERNMENT
DEPARTMENTS
RESIDENTS
VISITORS
BUSINESS
Home > Departments > Development Services
DEVELOPMENT SERVICES
Development Services
Applications and Forms
Code Enforcement
Development Process
Development Services Director
Frequently Asked Questions
Maps
Monthly Newsletter
Permits and Inspections
Plans, Policies and Ordinances
Public Hearing Information
Knightdale Development Services Process
Watch later
Share
The Knightdale Development Services Department provides quality customer service to our citizens, business owners, and the development community. The Department facilitates sustainable growth through regulations that promote a balance of the built and natural environments.
Development Services is the central point of contact for the Town of Knightdale for all development-related needs. The Department oversees the entire development process from permit application submittals through the issuance of certificates of occupancy (CO). Development Services ensures that all development activities within the Town's planning jurisdiction are conducted in accordance with the Knightdale Unified Development Ordinance (UDO) and the North Carolina State Building Code.
Our professional staff helps our customers understand all applicable regulations and guides them through the development process.
CURRENT PROJECT INFORMATION
Wake Multi-Jurisdictional Hazard Mitigation Plan
Wake County is updating its 2015 plan to better protect the people and property of the County from the effects of natural and human-caused hazards and to maintain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA). On this website you can find information about upcoming and past Hazard Mitigation Planning Committee meetings and public meetings, take a survey on hazard risk and mitigation options to inform the plan's development, review draft documents a summary of the hazards that affect Wake County, and learn more about the hazards that affect Wake County.
Comprehensive Plan Rezoning
The newly adopted Comprehensive Plan recommended rezoning areas of the Town and Extraterritorial Jurisdiction (ETJ) to support the

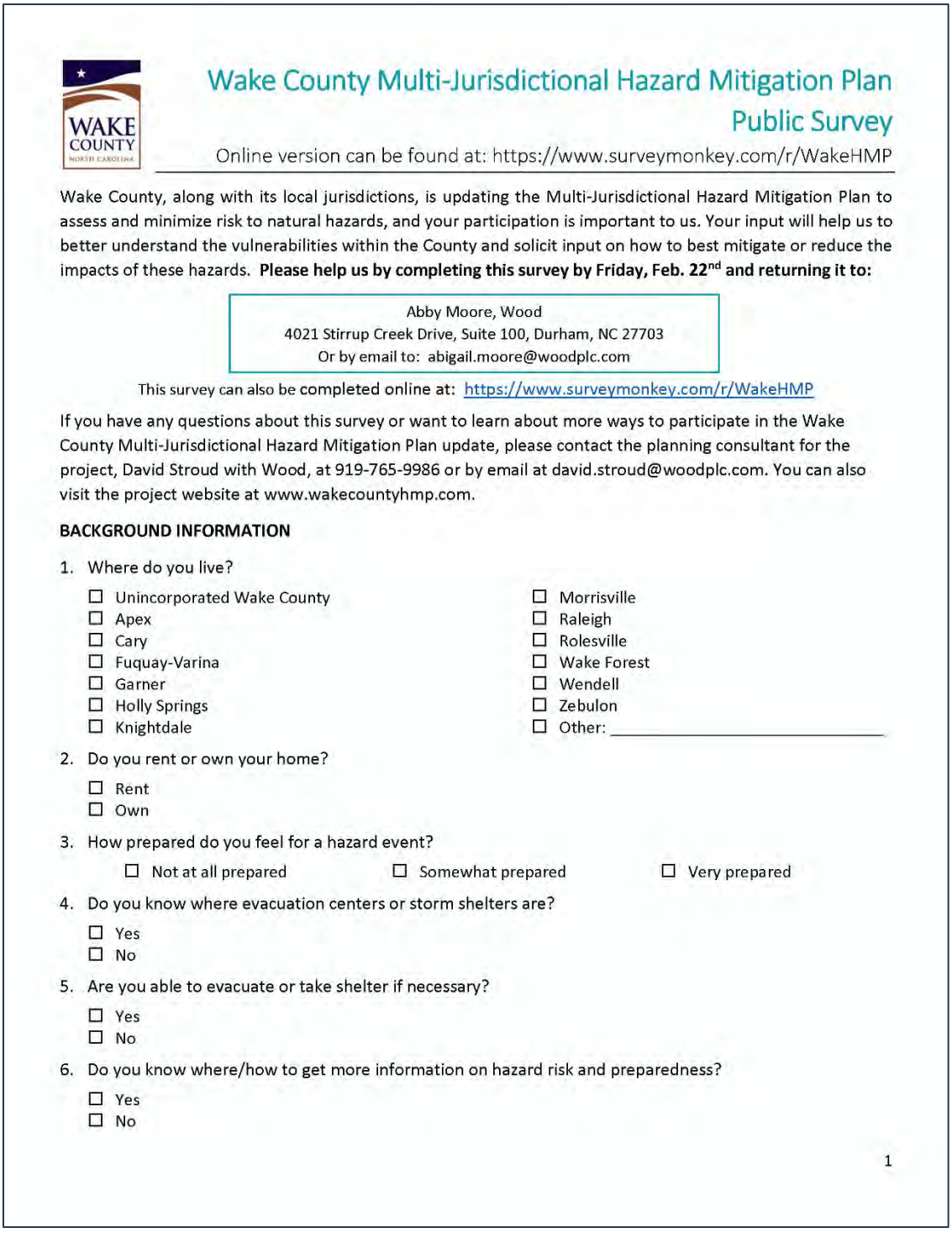

KnightdaleNext
January 8
Help Wake County and Knightdale, NC inform the Multi-Jurisdictional Hazard Mitigation Plan. Take the survey here:
http://www.wakecountyhmp.com/Survey.html
Wake County EMS Wake County Government Knightdale Fire Department Knightdale Police Department
WAKECOUNTYHMP.COM
Wake County Regional Hazard Mitigation Plan
1 Share


Holly Springs, NC - Town Government
November 19, 2018
Wake County is updating its plan to protect people and property from natural and human-caused hazards. Learn more at http://www.wakecountyhmp.com/.
More about the Wake County Government Hazard Mitigation Plan: http://www.wakegov.com/em/Pages/hazardmitigation.aspx.
WAKECOUNTYHMP.COM
Wake County Regional Hazard Mitigation Plan
Welcome to the website for the 2019 Wake County Multi-jurisdictional...
5
5 Comments 1 Share


Zebulon Planning
@tozplanning
Follow
2015 Hazard Mitigation Plan Update. Zebulon and Wake County need your assistance!
wakecountyhmp.com
2:04 PM - 19 Dec 2018
North Carolina 811 provides you a communications link

Public Survey

Wake County distributed a public survey, shown below, that requested public input into the Hazard Mitigation Plan planning process and the identification of mitigation activities that could lessen the risk and impact of future flood hazard events. The survey was announced at the first public meeting, provided via a link on participating jurisdictions web and social media accounts, and made available online on the plan website.



Wake County Multi-Jurisdictional Hazard Mitigation Plan
Public Survey

Online version can be found at: https://www.surveymonkey.com/r/WakeHMP

Wake County, along with its local jurisdictions, is updating the Multi-Jurisdictional Hazard Mitigation Plan to assess and minimize risk to natural hazards, and your participation is important to us. Your input will help us to better understand the vulnerabilities within the County and solicit input on how to best mitigate or reduce the impacts of these hazards. **Please help us by completing this survey by Friday, Feb. 22nd and returning it to:**

Abby Moore, Wood
4021 Stirrup Creek Drive, Suite 100, Durham, NC 27703
Or by email to: abigail.moore@woodplc.com

This survey can also be completed online at: https://www.surveymonkey.com/r/WakeHMP

If you have any questions about this survey or want to learn about more ways to participate in the Wake County Multi-Jurisdictional Hazard Mitigation Plan update, please contact the planning consultant for the project, David Stroud with Wood, at 919-765-9986 or by email at david.stroud@woodplc.com. You can also visit the project website at www.wakecountyhmp.com.

BACKGROUND INFORMATION

1. Where do you live?
   - ☐ Unincorporated Wake County
   - ☐ Apex
   - ☐ Cary
   - ☐ Fuquay-Varina
   - ☐ Garner
   - ☐ Holly Springs
   - ☐ Knightdale
   - ☐ Morrisville
   - ☐ Raleigh
   - ☐ Rolesville
   - ☐ Wake Forest
   - ☐ Wendell
   - ☐ Zebulon
   - ☐ Other: _____
2. Do you rent or own your home?
   - ☐ Rent
   - ☐ Own
3. How prepared do you feel for a hazard event?
   - ☐ Not at all prepared ☐ Somewhat prepared ☐ Very prepared
4. Do you know where evacuation centers or storm shelters are?
   - ☐ Yes
   - ☐ No
5. Are you able to evacuate or take shelter if necessary?
   - ☐ Yes
   - ☐ No
6. Do you know where/how to get more information on hazard risk and preparedness?
   - ☐ Yes
   - ☐ No

1

HAZARD INFORMATION

7. The hazards addressed in the Hazard Mitigation Plan are listed below. Please indicate the level of significance that you perceive for each hazard. Please rate these hazards 1 through 3 as follows: 1=low, 2=moderate, 3=high.

____ Dam Failure	____ Severe Weather (Thunderstorm/Lightning/Hail)
____ Drought	____ Severe Winter Storm
____ Earthquake	____ Tornado
____ Extreme Heat	____ Wildfire
____ Flood	____ Hazardous Materials Incident
____ Hurricane	____ Radiological Emergency
____ Landslide	____ Terrorism

8. Describe specific hazard issues/problem areas that you would like the planning committee to consider.

9. Describe any actions you have taken to mitigate hazard risk for your family, home, or neighborhood.

10. Which categories of mitigation actions do you feel would be most effective?

- ☐ Preventive activities (e.g. planning and zoning, building codes)
- ☐ Property protection (e.g. retrofitting, insurance, flood prone property buyout)
- ☐ Natural resource protection (e.g. wetlands protection, erosion control, forest health protection)
- ☐ Emergency services (e.g. hazard threat recognition, hazard warning systems, critical facilities protection)
- ☐ Structural projects (e.g. storm drain improvements, hazardous tree removal,
- ☐ Public information (e.g. outreach projects, environmental education, public education)

11. What is the best way for you to receive information about how to make your family, home, or neighborhood more resilient to hazards? Please check all that apply.

☐ Television News/Advertisements	☐ County website
☐ Radio News/Advertisements	☐ County social media
☐ Public Forums/Workshops	☐ Email
☐ Public Library	☐ Text messages
☐ Print Media – newspaper, phone book, informational brochures	☐ Other _____

Thank you for your input!

Please provide your name and email below if you would like to be informed of future meetings related to the planning process.

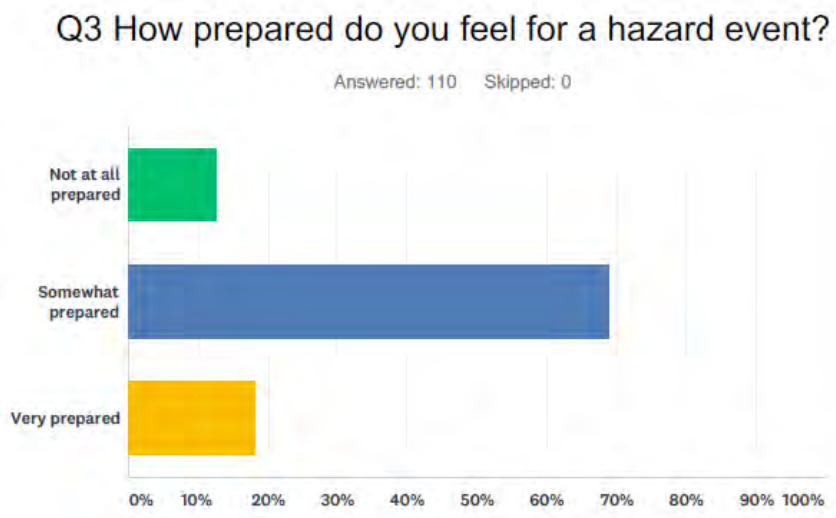
Name: _____ Email: _____

2

The County received 110 responses to the survey. The following bullet points summarize significant findings from the survey. Key questions and responses are detailed in Figure B.1 through Figure B.9.

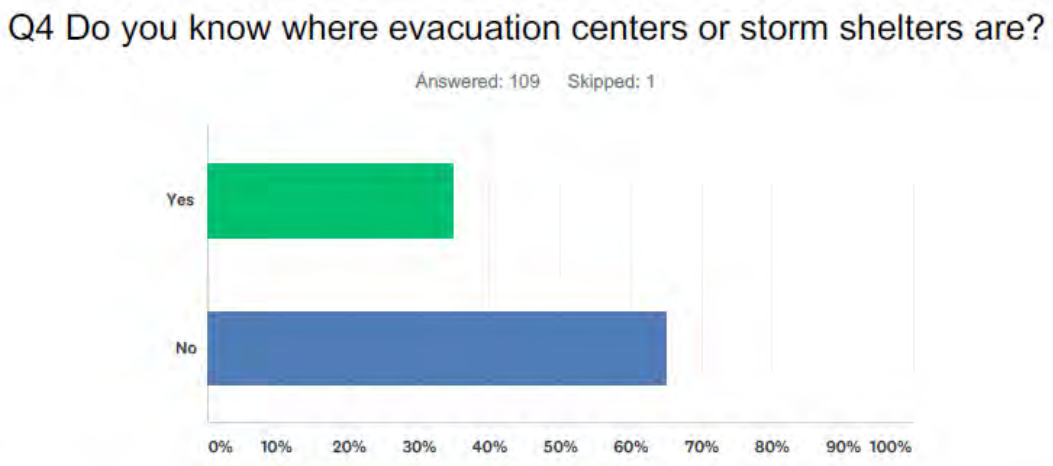
- 12.7% of respondents say they feel not at all prepared for a hazard event; 69.1% feel somewhat prepared.
- 65.1% of respondents do not know where evacuation centers or storm shelters are located; however, 96.3% of respondents say they are able to evacuate or take shelter if necessary, which indicates that most people manage evacuating or taking shelter through their own resources. It is possible that these results skew toward those with more awareness of hazard risk and resources to respond.
- Over 40% of respondents do not know where to get more information on hazard risk and preparedness.
- Hurricane was rated the most significant hazard, followed by tornado, severe winter storm, and severe weather. Landslide was rated the least significant hazard, followed by dam failure and earthquake.
- Many respondents who reported having taken steps to mitigate risk at home reported preparedness actions such as emergency kits and supplies and evacuation plans. Few respondents noted prevention or property protection actions; therefore, these may be important ideas to promote in outreach.
- Respondents largely favored emergency services projects and structural projects for mitigation.

Figure B.1 – Survey Response, Preparedness



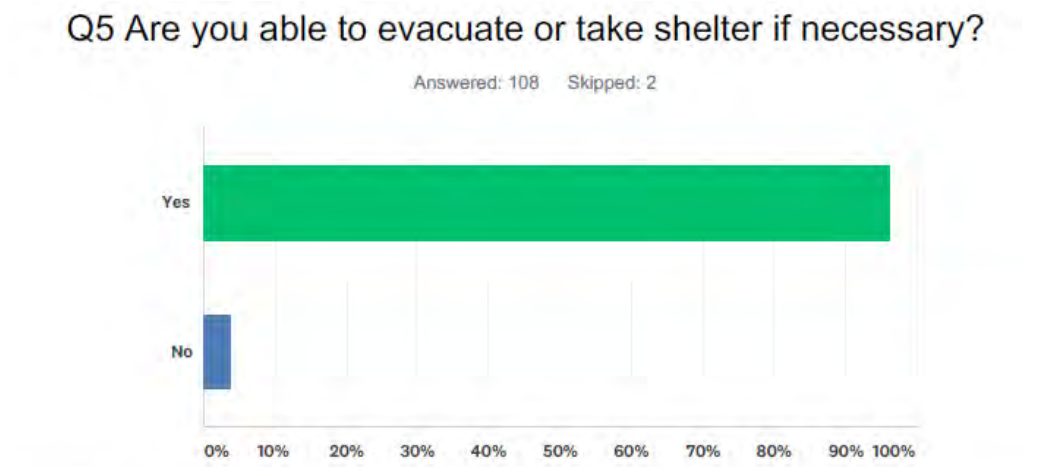
ANSWER CHOICES	RESPONSES	
Not at all prepared	12.73%	14
Somewhat prepared	69.09%	76
Very prepared	18.18%	20
TOTAL		110

Figure B.2 – Survey Response, Evacuation Center/Shelter Awareness



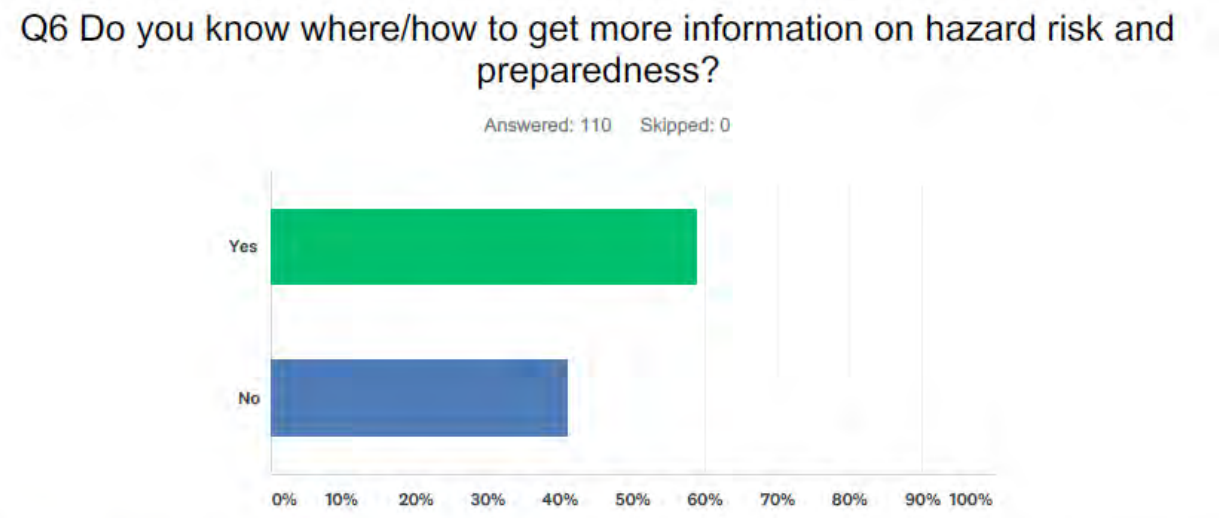
ANSWER CHOICES	RESPONSES	
Yes	34.86%	38
No	65.14%	71
TOTAL		109

Figure B.3 – Survey Response, Ability to Evacuate/Take Shelter



ANSWER CHOICES	RESPONSES	
Yes	96.30%	104
No	3.70%	4
TOTAL		108

Figure B.4 – Survey Response, Knowledge of Where to Find Hazard Information



ANSWER CHOICES	RESPONSES	
Yes	59.09%	65
No	40.91%	45
TOTAL		110

Figure B.5 – Survey Response, Hazard Significance Ratings

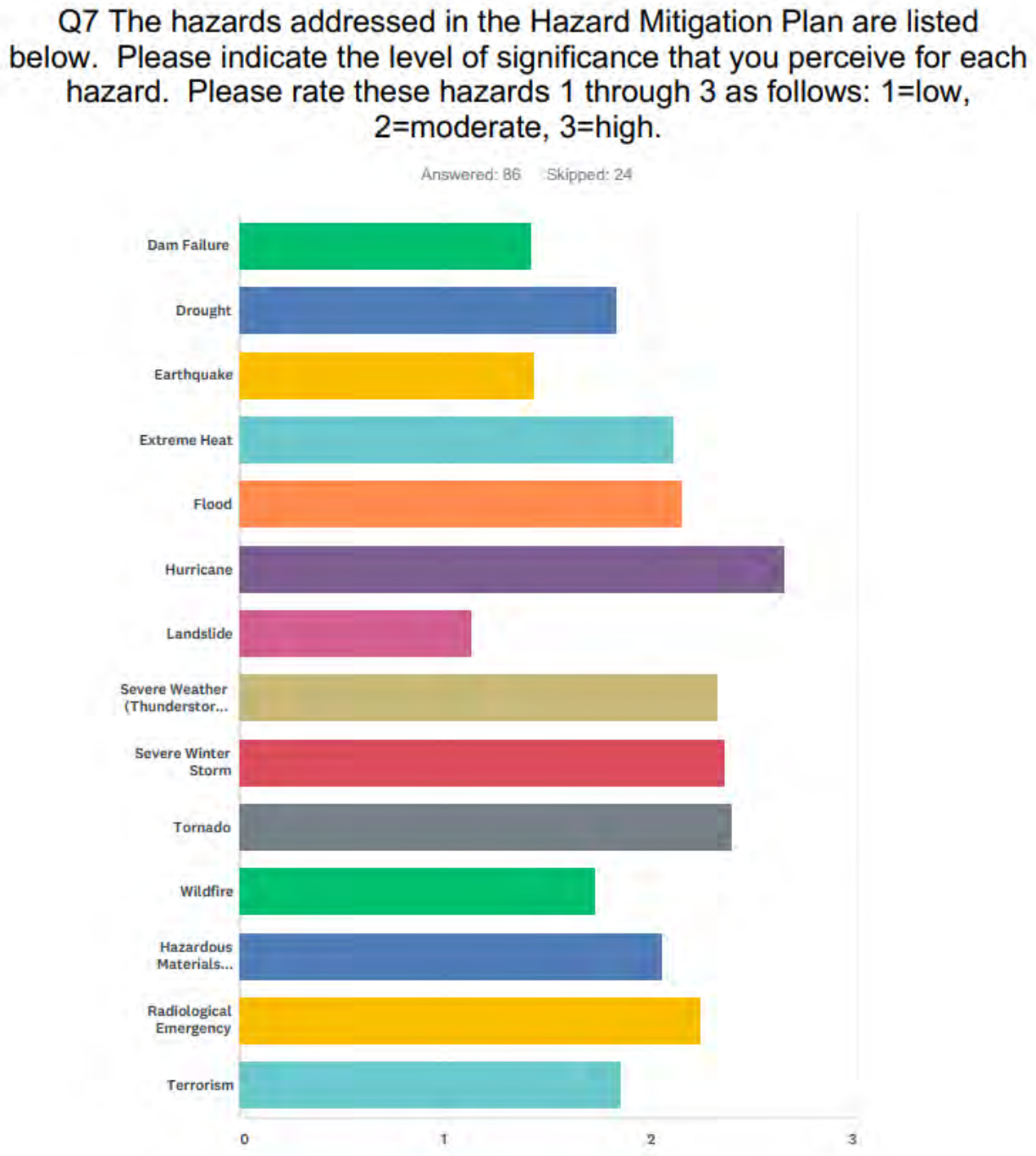


Figure B.6 – Survey Response, Key Hazard Issues/Concerns

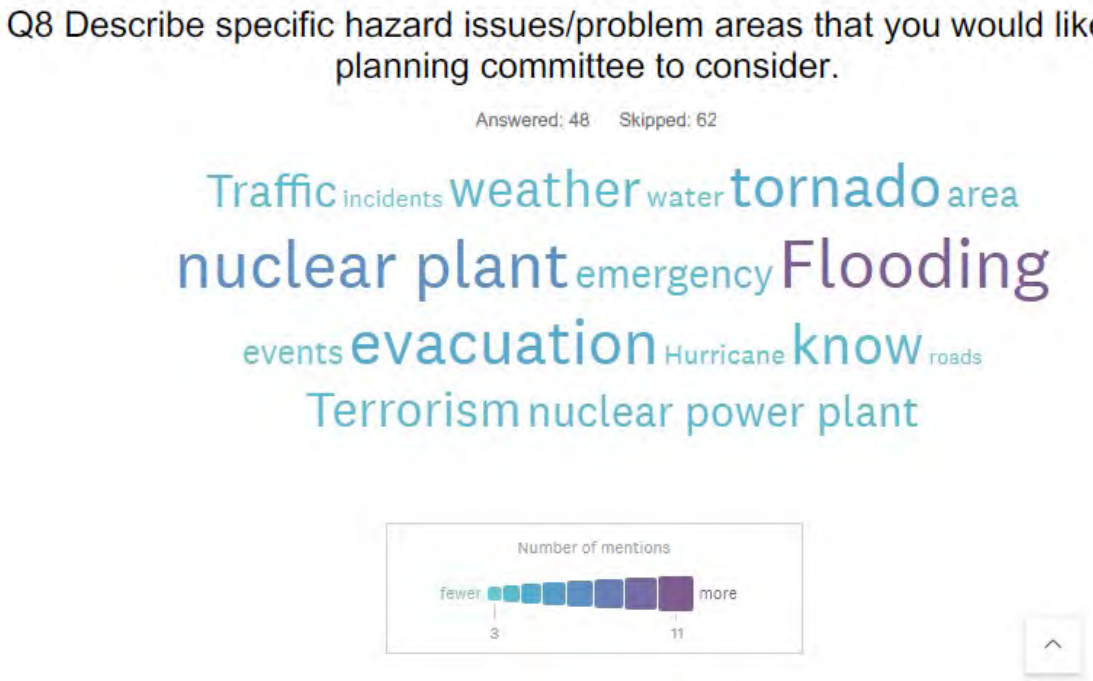


Figure B.7 – Survey Response, Personal Actions Taken for Mitigation

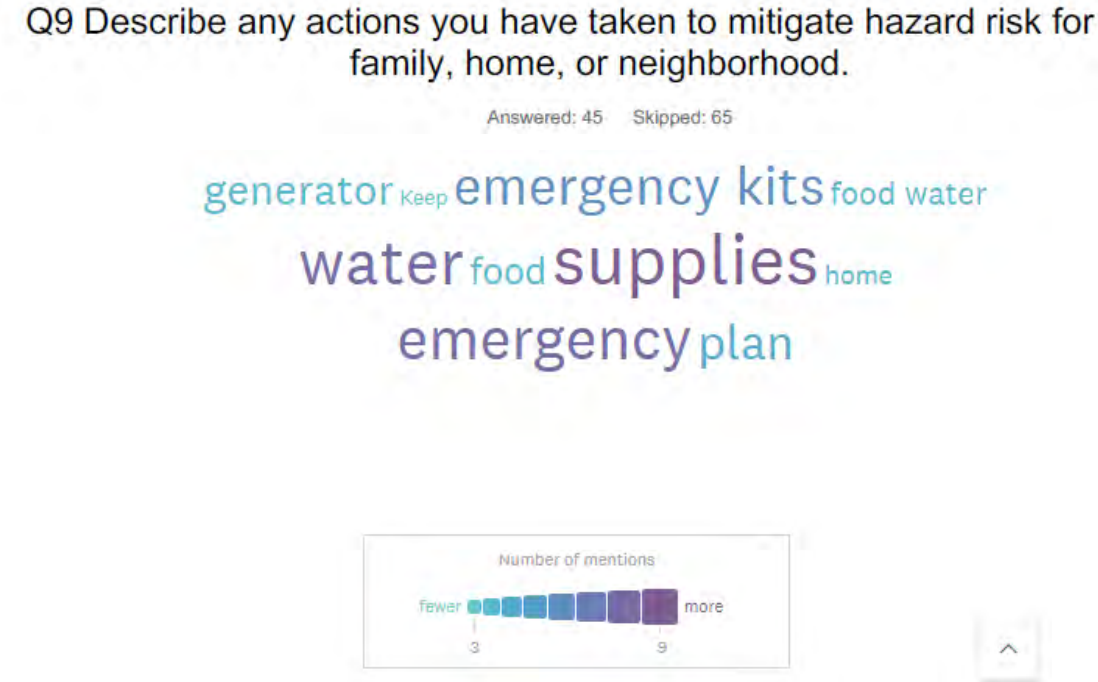
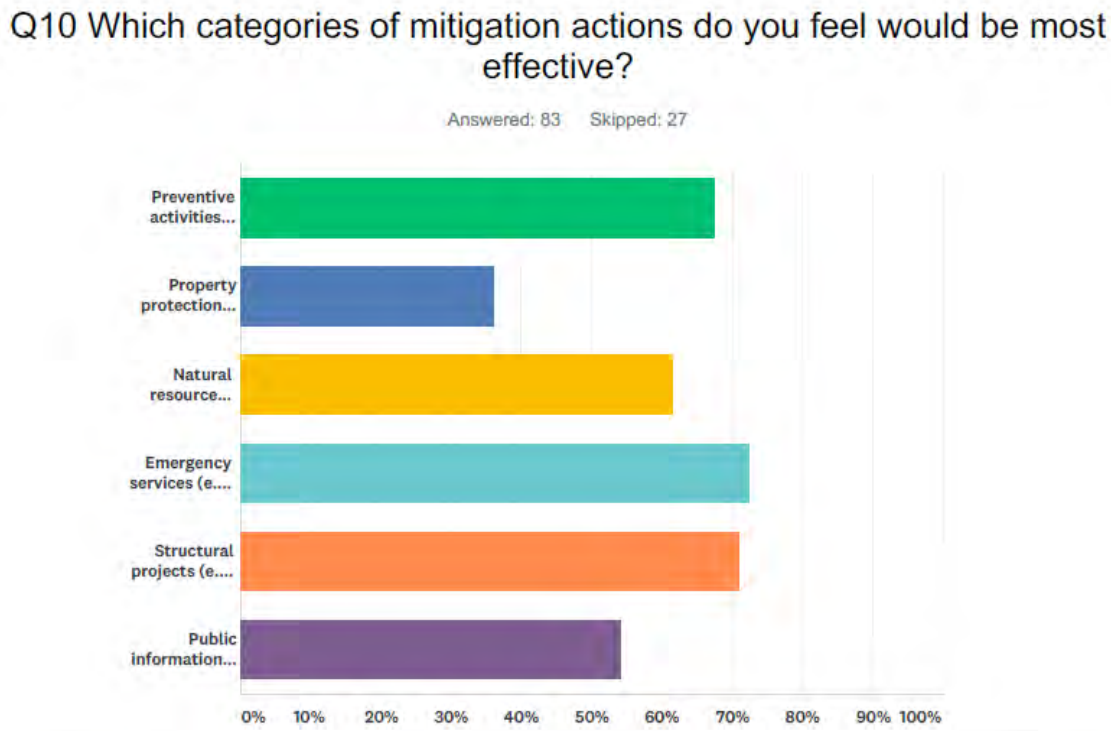
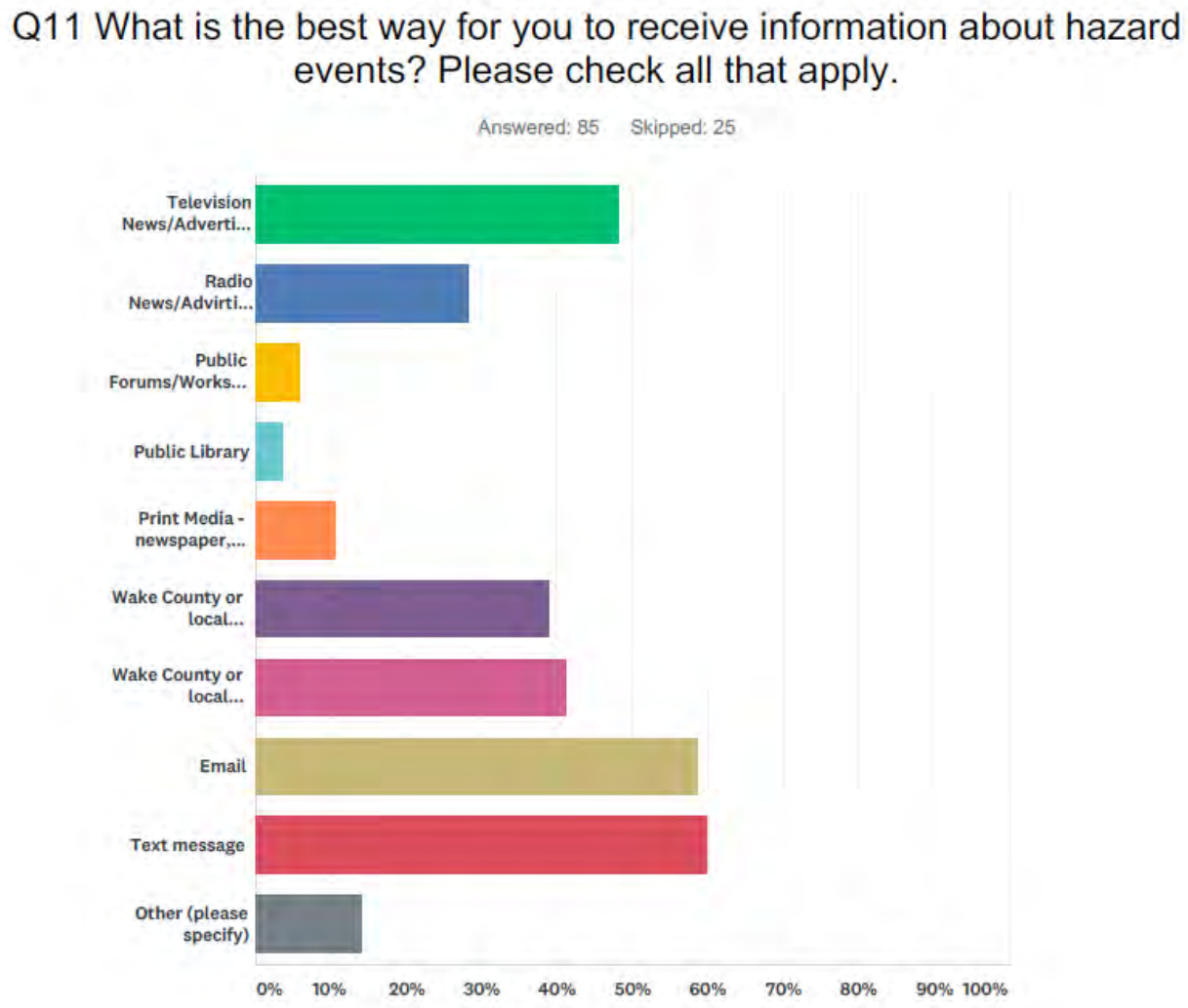


Figure B.8 – Survey Response, Preferred Mitigation Categories



ANSWER CHOICES	RESPONSES	
Preventive activities (e.g. planning and zoning, building codes)	67.47%	56
Property protection (e.g. retrofitting, insurance, flood prone property buyout)	36.14%	30
Natural resource protection (e.g. wetlands protection, erosion control, forest health protection)	61.45%	51
Emergency services (e.g. hazard threat recognition, hazard warning systems, critical facilities protection)	72.29%	60
Structural projects (e.g. storm drain improvements, hazardous tree removal,	71.08%	59
Public information (e.g. outreach projects, environmental education, public education)	54.22%	45
Total Respondents: 83		

Figure B.9 – Survey Response, Preferred Public Outreach Methods



PLANNING STEP 3: COORDINATE

This planning step credits the incorporation of other plans and other agencies' efforts into the development of the Hazard Mitigation Plan. Other agencies and organizations must be contacted to determine if they have studies, plans and information pertinent to the Hazard Mitigation Plan, to determine if their programs or initiatives may affect the community's program, and to see if they could support the community's efforts. To incorporate stakeholder input into the plan, a variety of stakeholders were identified by the HMPC and sent an email inviting them to attend a public meeting, review the draft plan, and provide feedback and comments. The coordination letter sent via email is provided below. A list of stakeholders detailing their involvement is provided in Table B.3.

Stakeholders were also involved through specific requests for data to support the development of the plan.

From: Moore, Abigail
To: rhowes@triangleland.org; brian@ncconservationnetwork.org; chris@ctnc.org; barry.porter@redcross.org; cgmoore@wcpss.net; mtbecker@ncsu.edu; gleasona@meredith.edu; daplautz@waketech.edu; doug.logan@granvillecounty.org; jlewis@franklincountync.us; brian.brantley@nashcountync.gov; kevin.hubbard@johnstonnc.com; ltsmith@harnett.org; alan.byrd@chathamnc.org; jgroves@dconc.gov; Edwardine.Marrone@fema.dhs.gov; ktodd@ISO.com; jbratcher@iso.com; sharper@iso.com; ewstrom@usgs.gov; Dan.Brubaker@ncdps.gov; jcrew@ncem.org; john.holley@ncdenr.gov; linda.culpepper@ncdenr.gov; tim.baumgartner@ncdenr.gov; Hannah.thompson@ncagr.gov; jschmitz@ticog.com; nfeit@thestate.com; mpaul@ba-nc.com; jlong@carolinasmallbusiness.org; roy.mcclure@fema.dhs.gov; johnhc@ticog.org
Cc: Stroud, David A; Joshua Creighton
Subject: Wake County Hazard Mitigation Plan
Date: Tuesday, April 16, 2019 5:15:00 PM
Attachments: image002.png

Good afternoon,

Wake County, North Carolina is in the process of developing an update to the 2015 Wake County Multi-Jurisdictional Hazard Mitigation Plan. To assist with this process, the County and the Hazard Mitigation Planning Committee are seeking your input and expertise to support our planning effort.

We invite you to attend a public information meeting on the draft plan on Monday, April 22nd at 5 p.m. at the Wake County Commons Building, Room 100B & 100C (located at 4011 Carya Drive, Raleigh, NC, 27610). Additionally, soon after the public meeting we will be releasing the full draft of the plan for review. The draft will be posted on the plan website, here: http://www.wakecountyhmp.com/draftDocuments.html. The website already contains information on the risk assessment findings and the planning process, which we encourage you to review. We appreciate any input you may have! Please email any comments or feedback on the draft plan to me at abigail.moore@woodplc.com.

Thank you for your assistance in this important effort to make our communities safer and more resilient to hazards!

Abby Moore
Hazard Mitigation & Resiliency Planner
Direct: +1 (919) 768 9927
www.woodplc.com

wood.

Table B.3 – Stakeholder List

First Name	Last Name	Organization
Non-Profit Organizations		
Bo	Howes	Triangle Land Conservancy, Director
Brian	Buzby	NC Conservation Network
Chris	Canfield	Conservation Trust for North Carolina
Barry	Porter	American Red Cross Triangle Area - Regional CEO
Educational Institutions		
Cathy	Quiroz Moore	Wake County Public School System, Superintendent
Todd	Becker	NCSU Department of Emergency Management and Mission Continuity, Emergency Manager
Ann	Gleason	Meredith College, Incident Response Team Chair
Douglas	Plautz	Environmental, Health & Safety, Director
Surrounding Municipalities		
Doug	Logan	Granville County Emergency Management, Emergency Services Director
Jeff	Lewis	Franklin County Office of Emergency Services, Emergency Services Director
Brian	Brantley	Nash County Emergency Management, Emergency Services Director
Kevin	Hubbard	Johnston County Emergency Management, Emergency Management Director
Larry	Smith	Harnett County Emergency Management, Emergency Services Director
Alan	Byrd	Chatham County Emergency Management, Emergency Management Coordinator
Jim	Groves	Durham County Emergency Management, Emergency Management Director
Federal Government		
Roy	McClure	FEMA NFIP/CRS Specialist
Edwardine	Marrone	FEMA Mitigation Planning Specialist
Mandy	Todd	ISO/CRS Specialist
Mike	Bratcher	ISO/CRS Specialist
Sherry	Harper	ISO/CRS Technical Coordinator
Eric	Strom	USGS - Raleigh Field Office
State Government		
Dan	Brubaker	State NFIP Coordinator
Chris	Crew	State Hazard Mitigation Officer
John	Holley	NCDENR - Land Quality Section Regional Office
Linda	Culpepper	DEQ Division of Water Resources, Director
Tim	Baumgartner	DEQ Division of Mitigation Services, Director
Hannah	Thompson-Welch	NC Forest Service, Wildfire Mitigation Specialist
Regional Planning Organization		
John	Hodges-Copple	TJCOG Regional Planning Director
Jen	Schmitz	TJCOG
Business Community		
Noah	Feit	The News & Observer
Melanie	Paul	Business Alliance of North Carolina
Lenwood	Long Sr.	Carolina Small Business Development Fund, President/CEO

Appendix C Mitigation Alternatives

44 CFR Subsection D §201.6(c)(3)(ii): [The mitigation strategy section shall include] a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

As part of the process of developing the mitigation action plans found in Section 7, the HMPC reviewed and considered a comprehensive range of mitigation options before selecting the actions identified for implementation. This section summarizes the full range of mitigation measures evaluated and considered by the HMPC, including a review of the categories of mitigation measures outlined in the 2017 CRS Coordinator's Manual, a discussion of current local implementation and CRS credits earned for those measures, and a list of the specific mitigation projects considered and recommended for implementation.

Mitigation alternatives identified for implementation by the HMPC were evaluated and prioritized using the criteria discussed in Section 6 of this plan.

C.1 CATEGORIES OF MITIGATION MEASURES CONSIDERED

Once it was determined which flood hazards warranted the development of specific mitigation actions, the HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of mitigation categories which are utilized as part of the CRS planning process.

- Prevention
- Property Protection
- Natural Resource Protection
- Structural Projects
- Emergency Services
- Public Information and Outreach

C.2 ALTERNATIVE MITIGATION MEASURES PER CATEGORY

Note: the CRS Credit Sections are based on the 2017 CRS Coordinator's Manual.

C.2.1 Preventative and Regulatory Measures

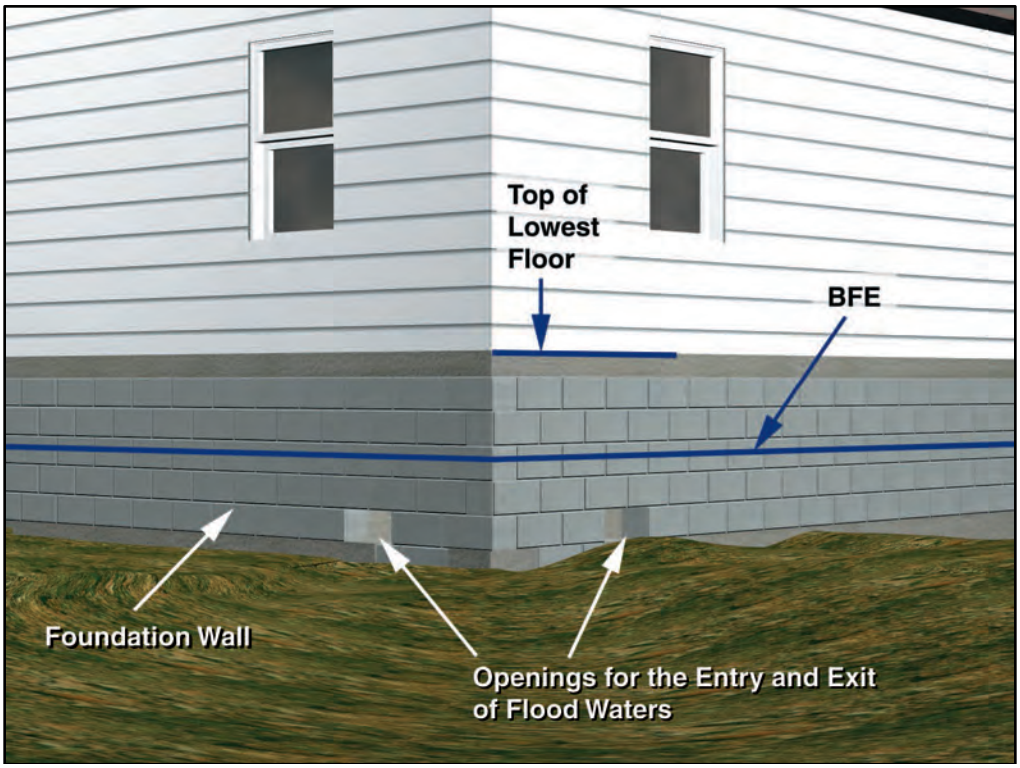
Preventative measures are designed to keep a problem - such as flooding - from occurring or from getting worse. The objective of preventative measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventative measures. Some examples of types of preventative measures include:

- Building codes
- Zoning ordinance
- Comprehensive or land use plan
- Open space preservation
- Floodplain regulations
- Subdivision regulations
- Stormwater management regulations

Building Codes

Building codes provide one of the best methods for addressing natural hazards. When properly designed and constructed according to code, the average building can withstand many of the impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be higher than the elevation of the 100-year flood (the flood that is expected to have a one percent chance of occurring in any given year). This is shown in Figure B.1.

Just as important as having code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly elevated and anchored requires site inspections at each step.



Source: FEMA Publication: *Above the Flood: Elevating Your Floodprone House, 2000*

Figure B.1 – Building Codes and Flood Elevations

ASCE 24 is a referenced standard in the International Building Code. Any building or structure that falls within the scope of the IBC that is proposed in a flood hazard area is to be designed in accordance with ASCE 24. Freeboard is required as a function of the nature of occupancy and the flood zone. Dwellings and most other buildings have 1-foot of freeboard; certain essential facilities have 2-3 feet; only agricultural facilities, temporary facilities and minor storage facilities are allowed to have their lowest floors at the BFE.

Comprehensive or Land Use Plan

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, particularly floodplains and wetlands. They do this by designating land uses that are compatible with the natural conditions of land that is prone to flooding, such as open

space or recreation. Planning and zoning activities can also provide benefits by simply allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach.

The 2030 City of Raleigh Comprehensive Plan was adopted via Resolution 2009-997 on October 7, 2009. The 2030 Comprehensive Plan is a long-range policy document adopted and amended by the City Council. The Plan establishes a vision for the City, provides policy guidance for growth and development and contains action items directed at the City to implement the vision. The Plan contains six strategic vision themes, which are referenced in every element, or chapter, of the document. The Plan is divided into four major sections: the Introduction and Framework, the Plan Elements, the Area Plans, and Implementation.

Open Space Preservation

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made to the owner if the owner agrees to not build on the part set aside in the easement.

Although there are some federal programs that can help acquire or reserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes.

The City of Raleigh has an extensive park and greenway system throughout the city. The City defines a broad vision for the entire park and greenway system primarily through two documents: the City of Raleigh 2030 Comprehensive Plan and the City of Raleigh Parks, Recreation and Cultural Resources System Plan. The documents provide a vision, goals, objectives and policies that guide staff. The System Plan is a supplemental document to the Comprehensive Plan and is the strategic system plan that guides the growth and development of the City's park and greenway system. Future park needs are compared with an existing inventory of park facilities over a twenty to thirty-year horizon. Included within this plan are recommendations for new park development, maintenance and continued renovation of existing parks and facilities, and guidelines that will allow the system to provide ample recreational opportunities for all citizens while remaining flexible to change with recreational trends, significant development opportunities and Raleigh's growing population. A system plan is developed every five to ten years. On May 6, 2014 the Raleigh City Council voted unanimously to approve the Parks, Recreation and Cultural Resources System Plan.

Zoning Ordinance



The City of Raleigh operates under a Unified Development Ordinance (UDO). This UDO divides the jurisdictions into zoning districts, including various residential, commercial, mixed-use and industrial districts. The zoning regulations describe what type of land use and specific activities are permitted in each district, and how to regulate how buildings, signs, parking, and other construction may be placed on a lot. The zoning regulations also provide procedures for rezoning and other planning applications. The zoning map and zoning

regulations provide properties in Raleigh planning and zoning jurisdiction with certain rights to development.

Floodplain Regulations

The City of Raleigh's Flood Damage Prevention Ordinance requires that all new residential construction or substantial improvement shall have the lowest floor, including the basement, elevated to no lower than two foot above the base flood elevation (BFE).

Vegetation along a stream bank is extremely beneficial for the health of the stream. Trees and other plants have an extensive root system that strengthen stream banks and help prevent erosion.

Vegetation that has sprouted up near streams should remain undisturbed unless removing it will significantly reduce a threat of flooding, or further destruction of the stream channel.

North Carolina regulations prohibit the removal of vegetation within 50 feet of all streams in the Raleigh area. These are known as the Neuse River Riparian Buffer Rules and the North Carolina Division of Water Resources should be consulted before any activities are undertaken in these areas.

Raleigh enforces reconstruction regulations to ensure that mitigation is integrated into recovery. Requiring permits for building repairs and conducting inspections are vital activities to ensure that damaged structures are safe for people to reenter and repair. There is a special requirement to do this in floodplains, regardless of the type of disaster or the cause of damage. The NFIP requires that local officials enforce the substantial damage regulations. These rules require that if the cost to repair a building in the mapped floodplain equals or exceeds 50% of the building's market value, the building must be retrofitted to meet the standards of a new building in the floodplain. In Raleigh, this means that a substantially damaged building must be elevated above the base flood elevation.

Stormwater Management Regulations

Stormwater runoff is increased when natural ground cover is replaced by urban development. Development in the watershed that drains to a river can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality. There are three ways to prevent flooding problems caused by stormwater runoff:

1) Regulating development in the floodplain to ensure that it will be protected from flooding and that it won't divert floodwaters onto other properties;
2) Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions; and
3) Set construction standards so buildings are protected from shallow water.

The City of Raleigh's Stormwater regulations requires that if more than one acre of land is disturbed, a permit must be obtained by North Carolina Department of Environmental Quality (NCDEQ). Further a stormwater management plan (SWMP) must be developed for all projects required to have a permit for land disturbing activities. These SWMPs must include better site design practices for stormwater management, treat stormwater runoff quality, provide stream channel protection, and provide downstream overbank flood protection. The SWMPs must also provide extreme flood protection such that there is no increase in flood elevations upstream or downstream from the 100-year flood.

Reducing Future Flood Losses

Zoning and comprehensive planning can work together to reduce future flood losses by directing development away from hazard prone areas. Creating or maintaining open space is the primary way to reduce future flood losses. The City of Raleigh has many open space and natural parcels and greenways which serve to reduce future flood losses by remaining open. These parks and natural preserved areas

create opportunities for the public to benefit from education and recreation while eliminating potential for future flooding. The City of Raleigh's Future Land Use Map designates preservation, conservation, and conservation-residential lands to maintain open space throughout the City.

Planning for open space must also be supplemented with development regulations to ensure that stormwater runoff is managed, and that development is protected from flooding. Future flood losses in Raleigh will be reduced through the implementation of the International Building Code, the City's Flood Damage Prevention Ordinance, and Stormwater Management Ordinance. Enforcement of the flood protection elevation requirement will provide an extra level of protection for buildings constructed in the City.

Stormwater management and the requirement that post-development runoff cannot exceed pre-development conditions is one way to prevent future flood losses. Retention and detention requirements also help to reduce future flood losses.

CRS Credit

The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's Building Code Effectiveness Grading Schedule (BCEGS) classification and points are awarded for adopting the International Code series. The HMPC was concerned about the State Building Code Council and the implementation of the most current version of the International Building Code.

CRS credits are available for regulations that encourage developers to preserve floodplains or other hazardous areas away from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. The City of Raleigh could receive credit for Activity 430 – Higher Regulatory Standards and for Activity 420 – Open Space Preservation for preserving parcels within the SFHA as open space. Preserving flood prone areas as open space is one of the highest priorities of the Community Rating System. The credits in the 2017 manual have doubled for OSP (Open Space Preservation). The City of Raleigh could also receive credit for Activity 450 – Stormwater Management for enforcing regulations for stormwater management and soil and erosion control. The HMPC did not recommend any changes to the City's Comprehensive Plan, Zoning Ordinance, or Subdivision Ordinance, but did agree that higher standards should be considered for the Flood Damage Prevention Ordinance.

Table C.1 – Prevention Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Prevention Measures Considered by HMPC and Not Recommended			
-	Encourage voluntary compliance with floodplain development regulations.	Could save money on enforcement but would not guarantee compliance with standards.	n/a
-	Manage growth and development in the City through a constantly updated Master Plan.	Limited staff resources and monies to support constant updates to a Master Plan.	n/a
-	Incorporate a lower substantial threshold for damage and improvement	No political appetite for lowering the 50% threshold. Would be difficult to get Council support.	n/a
Prevention Measures and Funding Recommended for Implementation			
P-1	Establish a Lake Preservation Policy that encourages private property owners to preserve existing lakes and ponds, and in certain circumstances provides for public assistance.	City Stormwater has also worked with the Stormwater Management Advisory Commission to develop recommendations to further enhance the lake preservation program. It is anticipated that the revised program will be considered by City Council	Operating Budget

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
		during calendar year 2019. Enhancements would include the continued ability to restore and upgrade dams and spillways associated with safety improvements as well as removal of dams to protect safety and restore natural conditions	
P-2	Develop ongoing multi-year program of detailed basin studies for each watershed in City's jurisdiction. Fifteen basin studies are complete with 10 additional studies budgeted in the capital program. (CRS 410).	City Stormwater is currently working on an Integrated Stormwater Management Master Plan. Basin studies will be reviewed and updated as needed with further improvement needs and opportunities identified and prioritized. Reduction of flooding hazards remains a key priority for improvement projects.	Operating Budget
P-3	Planning Commission to consider program to develop future conditions floodplain mapping for all FEMA mapped areas (this is already done for non-FEMA mapped areas). The program would consist of a multi-year capital program for mapping for all FEMA streams in the ETJ and consideration of changes to development regulations in these areas. Future conditions would be based on expected development per the Comprehensive Plan and zoning maps.	City Stormwater is working to help mitigate flooding throughout vulnerable areas of the City by increasing the standards by which full development occurs in a watershed. Future conditions modeling will make sure all runoff throughout the watershed is considered when each site is developed.	Operating Budget

C.2.2 Property Protection Measures

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building;
- Modify the building (retrofit) so it can withstand the impacts of the hazard; and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency.

Keeping the Hazard Away

Generally, natural hazards do not damage vacant areas. As noted earlier, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. For example, a berm can be built to prevent floodwaters from reaching a house.

Flooding

There are five common methods to keep a flood from reaching and damaging a building:

- Erect a barrier between the building and the source of the flooding.

- Move the building out of the flood-prone area.
- Elevate the building above the flood level.
- Demolish the building.
- Replace the building with a new one that is elevated above the flood level.

The latter three approaches are the most effective types to consider in the City of Raleigh.



This low floodwall has landscaping to minimize the adverse impact on the property's appearance.

Barriers

A flood protection barrier can be built of dirt or soil (a "berm") or concrete or steel (a "floodwall"). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that will fall inside the perimeter. This is usually done with a sump or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier. Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and properly maintained.

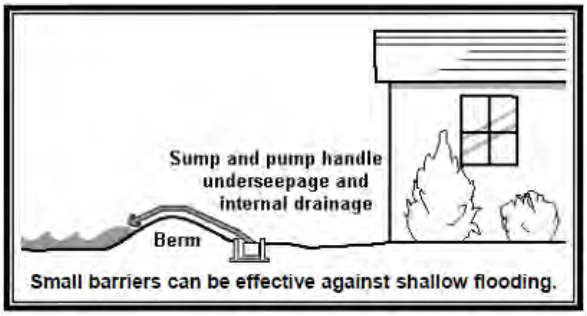


Small, wood frame buildings are the easiest to relocate

Source: Kennedy House Movers, Huntsville, AL

Relocation

Moving a building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost increases for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.



Small barriers can be effective against shallow flooding.

Building Elevation

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

Demolition

Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damages. It is cheaper to demolish them and either replace them with new, flood protected structures, or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move – such as larger, slab foundation or masonry structures – and for dilapidated structures that are not cost-beneficial to protect.



Demolishing a repetitively flooded home

Pilot Reconstruction

If a building is not in good shape, elevating it may not be worthwhile or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood protection codes. FEMA funding programs refer to this approach as "pilot reconstruction." It is still a pilot program, and not a regularly funded option. Certain rules must be followed to qualify for federal funds for pilot reconstruction.

Retrofitting

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

- ***Dry Floodproofing***

  Dry floodproofing means making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

  Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms.

- ***Wet Floodproofing***

  The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Insurance

Technically, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild, and hopefully afford to incorporate some of the other property protection measures in the process. Insurance offers the advantage of protecting the property, so long as the policy is in force, without requiring human intervention for the measure to work.

- ***Private Property***

  Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the NFIP. Flood insurance coverage is

provided for buildings and their contents damaged by a "general condition of surface flooding" in the area. Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Contents coverage can be purchased separately. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. Most people don't realize that there is a 30-day waiting period to purchase a flood insurance policy and there are limits on coverage.

- ***Public Property***
  Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

Local Implementation/CRS Credit

The CRS provides the most credit points for acquisition and relocation under Activity 520, because this measure permanently removes insurable buildings from the floodplain. The City of Raleigh could receive credit for Activity 520 – Acquisition and Relocation, for acquiring and relocating buildings from the SFHA. The HMPC recommended that the City continue the purchase of repetitive loss buildings through its Stormwater Utility funding and other buildings which are subject to flood damage in order to return this land to open space.

The CRS also credits barriers and elevating existing buildings under Activity 530. The credit for Activity 530 is based on the combination of flood protection techniques used and the level of flood protection provided. Points are calculated for each protected building. Bonus points are provided for the protection of repetitive loss buildings and critical facilities. It may not be likely that the City of Raleigh could receive credit for Activity 530 – Flood Protection, but the City could receive credit for Activity 360 – Flood Protection Assistance. There is capable staff at the City who have the technical expertise to provide advice and assistance to homeowners who may want to flood proof their home or business. Advice is provided both on property protection techniques and on financial assistance programs to help fund mitigation. Though it was not selected as a mitigation action due because it is already established and ongoing, the HMPC did not agree that any mitigation project would be necessary for Activity 360 Flood Protection Assistance.

Flood insurance information for the City is provided in Section 5 and in greater detail in Annex B. The City of Raleigh publicizes the requirement for flood insurance to those requesting FIRM information through the Mandatory Purchase Requirement and through outreach brochures to residents of the SFHA and repetitive loss areas.

There is no credit for purchasing flood insurance, but the CRS does provide credit for local public information programs that, among other topics, explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage. The City of Raleigh could receive credit for Activity 330 – Outreach Projects. The HMPC would like to focus outreach to property owners on the availability of Increased Cost of Compliance (ICC) coverage, which provides additional funds to repetitive loss properties and substantially damaged properties to offset the cost of improvements needed to bring these properties up to code.

Table C.2 – Property Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Prevention Measures Considered by HMPC and Not Recommended			
-	Continue to publicize technical assistance for Activity 360 Flood Protection Assistance.	This service is already well-established, and no additional effort is required for ongoing implementation to continue.	n/a
Prevention Measures and Funding Recommended for Implementation			
PP-1	Develop ongoing program designed to utilize Federal grant resources to assist private property owners in relocating existing structures out of flood hazard zones. (CRS 500/510/520)	Acquisition and demolition of repetitive loss structures completely removes the flood problem and eliminates vulnerability while also expanding open space and enhancing the land's natural and beneficial flood management functions.	HMGP and Stormwater Utility Funding
PP-2	Develop an ongoing program designed to utilize Federal grant resources to assist private property owners in elevating existing structures located within flood hazard zones. (CRS 510/530)	Pre-FIRM properties vulnerable to major flooding should be mitigated to prevent substantial damages, and substantially damaged properties already face high costs to be brought up to code and may benefit from alternative mitigation such as elevation.	HMGP, FMA
9	Develop an ongoing program designed to utilize Federal grant resources to assist private property owners in renovating and retrofitting existing structures in flood hazard zones to reduce vulnerability to flooding damage.	City staff evaluates potential candidates and approaches property owners for mitigation help.	HMGP, FMA, Stormwater Utility Funding

C.2.3 Natural Resource Protection

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Natural and beneficial functions of watersheds, floodplains and wetlands include:

- Reduction in runoff from rainwater and stormwater in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved through regulatory steps for protecting natural areas or natural functions. This section covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Six areas were reviewed:

- Wetland protection
- Erosion and sedimentation control
- Stream/River restoration
- Best management practices
- Dumping regulations
- Farmland protection

Wetland Protection



Wetlands are often found in floodplains and topographically depressed areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality, and they provide habitat for many species of fish, wildlife and plants.

Erosion and Sedimentation Control

Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along stream banks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil. Sediment suspended in the water tends to settle out where flowing water slows down. This can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices. The City of Raleigh has adopted a soil and erosion control ordinance.

Stream/River Restoration

There is a growing movement that has several names, such as "stream conservation," "bioengineering," or "riparian corridor restoration." The objective of these approaches is to return streams, stream banks and adjacent land to a more natural condition, including the natural meanders. Another term is "ecological restoration," which restores native indigenous plants and animals to an area.

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.

In all, restoring the right vegetation to a stream has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and its property value
- Prevents property loss due to erosion
- Provides recreational opportunities, such as hunting, fishing and bird watching
- Reduces long-term maintenance costs

As required by state and federal regulations, Raleigh works with municipal governments to monitor its storm water drainage outfalls and control storm water runoff.

Best Management Practices

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA. Nonpoint source pollutants come from non-specific locations and harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, other chemicals, animal wastes, oils from street surfaces and industrial areas, and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams.

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple usages of drainage and storage facilities.

Raleigh's Stormwater Management Ordinance contains regulations for stormwater BMPs.

Dumping Regulations

BMPs usually address pollutants that are liquids or are suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' abilities to convey or clean stormwater.

Many cities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property. Waterway dumping regulations need to also apply to "non-objectionable" materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard without realizing that is needed to drain street runoff. They may not understand how regarding their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

Farmland Protection

Farmland protection is an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can lead to additional stormwater runoff and emergency management difficulties.

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land. The Farmland Protection Program in the United States Department of

Agriculture's 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, and local governments as well as nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land.

Because of the urbanization of the City of Raleigh, the HMPC did not recommend any projects related to farmland protection.

Local Implementation/CRS Credit

There is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations. The City of Raleigh could receive credit for Activity 420 – Open Space Preservation for preserving a portion of the SFHA as open space.

Additionally, the City of Raleigh could receive credit for Activity 540 – Drainage System Maintenance. By having a portion of the City's drainage system inspected regularly throughout the year and maintenance performed as needed would earn credit. The City could also get credit under this activity for providing a listing of problem sites that are inspected more frequently, and for implementing an ongoing Capital Improvements Program.

Credit is available for the Erosion and Sediment Control (ESC) element under Activity 450 for regulating activities throughout the watershed to minimize erosion on construction sites that could result in sedimentation and water pollution. The City of Raleigh could receive credit for soil and erosion control regulations under Activity 450 – Stormwater Management. The HMPC proposes protecting wetland and conservation areas along with promoting LID techniques to protect these natural floodplain functions.

Table C.3 – Natural Resource Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Natural Resource Protection Measures Considered by HMPC and Not Recommended			
-	Develop a natural area restoration plan	Developing a Natural Floodplain Functions plan instead, which addresses restoration among other issues and can earn CRS credit.	n/a
-	Promote low-impact development projects where applicable to improve water quality and reduce runoff.	The City already has a requirement for developers to consider LID techniques when developing sites	n/a
-	Enact deed restrictions and other growth management tools to preserve wetland and natural resource areas and conserve their natural and ecological functions.	The City already has an established program for preserving wetlands and natural resource areas will protect these important areas for future flood protection and continued water quality improvement.	n/a
Natural Resource Protection Measures and Funding Recommended for Implementation			
-	*none identified*	-	-

C.2.4 Emergency Services Measures

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all local government departments. This section reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

Threat Recognition

The first step in responding to a flood is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

The National Weather Service (NWS) is the prime agency for detecting meteorological threats. Severe weather warnings are transmitted through NOAA's Weather Radio System. Local emergency managers can then provide more site-specific and timely recognition after the Weather Service issues a watch or a warning. A flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On smaller rivers and streams, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

Warning

The next step in emergency response following threat recognition is to notify the public and staff of other agencies and critical facilities. More people can implement protection measures if warnings are early and include specific detail.

The NWS issues notices to the public using two levels of notification:

- Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.
- Warning: a flood, tornado, etc., has started or been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- CodeRED countywide mass telephone emergency communication system
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- Email notifications

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should include a public information component.

StormReady

The National Weather Service (NWS) established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather-related warnings for the public. To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises

Being designated a NWS StormReady community is a good measure of a community's emergency warning program for weather hazards.

Response

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency preparedness)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (public works)
- Holding children at school or releasing children from school (school superintendent)
- Opening evacuation shelters (the American Red Cross)
- Monitoring water levels (public works)
- Establishing security and other protection measures (police)

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and of changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

Evacuation and Shelter

There are six key components to a successful evacuation:

- Adequate warning
- Adequate routes
- Proper timing to ensure the routes are clear
- Traffic control
- Knowledgeable travelers
- Care for special populations (e.g., disabled persons, prisoners, hospital patients, schoolchildren)

Those who cannot get out of harm's way need shelter. Typically, the American Red Cross will staff a shelter and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a

specialized skill. Managers must deal with problems like scared children, families that want to bring in their pets, and the potential for an overcrowded facility.

Local Implementation /CRS Credit

Flash flood warnings are issued by National Weather Service Offices, which have the local and county warning responsibility. Flood warnings are forecasts of coming floods, are distributed to the public by the NOAA Weather Radio, commercial radio and television, and through local emergency agencies. The warning message tells the expected degree of flooding, the affected river, when and where flooding will begin, and the expected maximum river level at specific forecast points during flood crest. The County has a Flood Incident Management (FIM) plan, as part of the Emergency Operations Plan. The FIM plan includes flood threat recognition, emergency warning dissemination, flood response operations, and critical facilities planning.

The City of Raleigh could receive credit for Activity 610 – Flood Warning Program for maintaining a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities (based on Wake County's Emergency Management Program). Community Rating System credits are based on the number and types of warning media that can reach the community's flood prone population. Depending on the location, communities can receive credit for the telephone calling system and more credits for additional measures, like telephone trees. Being designated as a StormReady community also provides additional credits.

Table C.4 – Emergency Services Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Emergency Services Measures Considered by HMPC and Not Recommended			
-	Develop post-disaster mitigation procedures that assign responsibilities for public information, code enforcement, planning, and other efforts that encourage loss reduction.	To avoid redundancy, these responsibilities are identified in the County's Emergency Operations Plan, and the other mitigation projects identified in this FMP can be used as a guide for flood loss reduction in post-disaster mitigation.	n/a
Emergency Services Measures and Funding Recommended for Implementation			
ES-1	Provide and enhance technical rescue capabilities more equitably throughout the City.	Ensure proper training of first responders to reduce danger when called throughout the City during flooding events.	Operating Budget
ES-2	Provide after-action report of emergency response to severe weather events in order to improve planning for future disasters.	Details from After Action Reports are valuable to help plan for future disasters to know what went well and what went wrong.	Operating Budget
ES-3	Maintain a standard operating guideline to direct operational planning prior to anticipated weather emergencies.	Staff turnover is a key condition to make sure that SOP's are in place to guide new staff members.	Operating Budget
ES-4	Design GIS programming capable of providing real-time data to emergency managers and historic data for future emergency response planning.	Current up-to-date information is critical to make sure that those in danger can be protected or rescued from that danger.	Operating Budget
ES-5	Continue to conduct disaster tabletop exercise program.	Training and exercises must be conducted so staff is properly trained on all possible issues that may arise in various events.	Operating Budget

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
ES-6	Program to install emergency electrical generators at all public utility facilities. Current focus on redundant generators at critical facilities, second fuel truck and completion of 100% generator coverage in Garner area.	This all hazards project will ensure that facilities can remain functional during times when power is lost due to various disasters.	Operating Budget

C.2.5 Structural Projects

Four general types of flood control projects are reviewed here: levees, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings.
- Many projects can be built without disrupting citizens' homes and businesses.
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, structural measures also have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

- Advantages
  - They may provide the greatest amount of protection for land area used
  - Because of land limitations, they may be the only practical solution in some circumstances
  - They can incorporate other benefits into structural project design, such as water supply and recreational uses
  - Regional detention may be more cost-efficient and effective than requiring numerous small detention basins
- Disadvantages
  - They can disturb the land and disrupt the natural water flows, often destroying wildlife habitat
  - They require regular maintenance
  - They are built to a certain flood protection level that can be exceeded by larger floods
  - They can create a false sense of security
  - They promote more intensive land use and development in the floodplain

Levees and Floodwalls

Probably the best-known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

Reservoirs and Detention

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, and then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could also help mitigate a drought).



Retention pond

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

Diversion

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

Local Implementation /CRS Credit

The City of Raleigh may not be eligible to receive credit for Activity 530 – Flood Protection. Structural flood control projects that provide at least 100-year flood protection and that result in revisions to the Flood Insurance Rate Map are not credited by the CRS so as not to duplicate the larger premium reduction provided by removing properties from the mapped floodplain. Other flood control projects can be accepted by offering a 25-year flood protection.

Table C.5 – Structural Projects Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Structural Project Measures Considered by HMPC and Not Recommended			
-	Promote detention and retention facilities to provide flood protection.	The City of Raleigh already requires developers to hold back water on site through either detention or retention.	n/a
-	Develop stormwater conveyance systems to alleviate flooding for existing and new development.	The City of Raleigh already has a program for improving stormwater conveyance systems in areas where drainage is currently inadequate will reduce stormwater flooding and prevent losses.	n/a
Structural Project Measures and Funding Recommended for Implementation			
SP-1	Install cameras in flood prone areas throughout the City of Raleigh to allow us to view these locations and make informed decisions as it relates to flooding	This project will enable the City to identify locations for stormwater improvement projects.	Not yet identified

C.2.6 Public Information

Outreach Projects

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Awareness of the hazard is not enough; people need to be told what they can do about the hazard. Thus, projects should include information on safety, health and property protection measures. Research has shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent only to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Local radio stations and cable TV channels can also help. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

Libraries and Websites

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Today, websites are commonly used as research tools. They provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed on the Internet.

In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for floods or a website about floods for children.

Technical Assistance

Hazard Information

Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Communities can easily provide map information from FEMA's FIRMs and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never flood.

Property Protection Assistance

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department

staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track. Building or public works department staffs can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Recommend or identify qualified or licensed contractors
- Inspect homes for anchoring of roofing and the home to the foundation
- Explain when building permits are needed for home improvements.

Public Information Program

A Program for Public Information (PPI) is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended plan of activities. A PPI consists of the following parts, which are incorporated into this plan:

- The local flood hazard
- The property protection measures appropriate for the flood hazard
- Flood safety measures appropriate for the local situation
- The public information activities currently being implemented within the community, including those being carried out by non-government agencies
- Goals for the community's public information program
- The outreach projects that will be done each year to reach the goals
- The process that will be followed to monitor and evaluate the projects

Local Implementation /CRS Credit

The City of Raleigh could receive credit under Activity 330 – Outreach Projects as well as Activity 350 – Flood Protection Information. The City sends out a monthly newsletter with its water bill which can contain flood protection information. Credit is also provided for general outreach projects including publications in local newspapers and expos at fairs. Credit is also provided for publications relating to floodplain management which are available in the reference section of the local Library. Credit is also provided for floodplain information displayed on the City's website.

Table C.6 – Public Information and Outreach Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Public Information and Outreach Measures Considered by HMPC and Not Recommended			
-	Provide flood-related information on the City's website.	The City's website already has flood-related information posted.	n/a
Public Information and Outreach Measures and Funding Recommended for Implementation			
PEA-2	Increase public awareness and participation in the Ready Wake program and resources.	Create a public information campaign to keep all residents of Wake County aware of natural disaster and other weather-related events in order to better protection people.	Operating Budget and Federal Funding

Appendix D References

- Chernet, Haregewoin Haile. 2013. The Impact of Climate Change on Dam Safety and Hydropower.
- https://www.carinsurance.com/Articles/top-states-hail-damage-claims.aspx
- FEMA Disaster Declarations Summary, Updated December 20, 2018.
- FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards. 2013.
- FEMA. Wake County and Incorporated Areas Flood Insurance Study. Revised November 17, 2017.
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- FEMA, ISO. Wake County Repetitive Loss Data. August 31, 2018.
- James B. Elsner, Svetoslava C. Elsner, and Thomas H. Jagger. The increasing efficiency of tornadoes in the United States. Climate Dynamics/vol. 45 issue 3-4, pp 651-659.
- National Climate Assessment, 2014.
- National Drought Mitigation Center, Drought Impact Reporter.
- National Integrated Drought Information System, U.S. Drought Portal.
- National Weather Service.
- NOAA, National Centers for Environmental Information, Storm Events Database.
- NOAA, National Hurricane Center.
- NOAA, Office of Coastal Management.
- North Carolina Department of Environmental Quality. Dam Inventory, July 2018.
- North Carolina Emergency Management. IRISK Database
- North Carolina Emergency Management. Risk Management Tool.
- North Carolina Forest Service. Annual Reports. 2009-2018.
- North Carolina Geological Survey. October 2018.
- North Carolina State Climate Office. Climate Tools.
- Southern Wildfire Risk Assessment, 2018.
- State of North Carolina Hazard Mitigation Plan, February 2018.
- Triangle Regional Resilience Partnership. Resilience Assessment Technical Report. 2018.
- U.S. Army Corps of Engineers, National Inventory of Dams.
- U.S. Census Bureau. American Community Survey 2013-2017 5-Year Estimates.
- U.S. Census Bureau. 2010 Decennial Census.
- U.S. Census Bureau. 2000 Decennial Census.
- U.S. Department of Agriculture, Farm Service Agency, Disaster Designation Information, 2012-2018.
- U.S. Department of Agriculture, Risk Management Agency, Cause of Loss Historical Data Files, 2007-2018.
- U.S. Drought Monitor. February 5, 2019.
- U.S. Geological Survey Earthquake Hazards Program, Earthquake Catalog.
- U.S. Global Change Research Program, 2016: The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. http://dx.doi.org/10.7930/J0R49NQX
- USGCRP, 2017: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 470 pp., doi: 10.7930/J0J964J6.
- VAISALA, National Lightning Detection Network.
- Wake County Multi-Jurisdictional Hazard Mitigation Plan. January 2015.
- Wake County Open Data Portal.

RESOLUTION NO. 19-1217-35

RESOLUTION TO ADOPT THE
WAKE COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

WHEREAS, the TOWN OF APEX is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the TOWN OF APEX desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the TOWN OF APEX to protect its citizens and property from the effects of natural hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the TOWN OF APEX to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the TOWN OF APEX; and

WHEREAS, the TOWN OF APEX, in coordination with Wake County, Cary, Fuquay-Varina, Garner, Holly Springs, Knightdale, Morrisville, Raleigh, Rolesville, Wake Forest, Wendell, and Zebulon, has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Wake County Multi-Jurisdictional Hazard Mitigation Plan for legislative compliance and has approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the TOWN COUNCIL of the TOWN OF APEX hereby:

1. Adopts the Wake County Multi-Jurisdictional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on December 17, 2019.

_____
Jacques K. Gilbert, Mayor
Town of Apex

ATTEST:

_____
Donna B. Hosch, MMC, NCCMC, Town Clerk

TOWN OF APEX
POST OFFICE BOX 250
APEX, NORTH CAROLINA 27502
PHONE 919-249-3426

NOTICE OF PUBLIC HEARINGS

WAKE COUNTY
MULTI-JURISDICTIONAL
HAZARD MITIGATION PLAN

Notice is hereby given of public hearings before the Planning Board and Town Council of the Town of Apex for the purpose of soliciting comments relative to the potential adoption of the Wake County Multi-Jurisdictional Hazard Mitigation Plan.

Public Hearing Location: Apex Town Hall
73 Hunter Street, Apex, North Carolina
Council Chambers, 2nd Floor

Planning Board Public Hearing Date and Time: December 9, 2019 4:30 P.M.
Town Council Public Hearing Date and Time: **December 17, 2019 7:00 P.M.**

All interested parties may appear at the public hearing and be heard with respect to the Wake County Multi-Jurisdictional Hazard Mitigation Plan. The draft of the 2020 - 2025 Wake County Multi-Jurisdictional Hazard Mitigation Plan can be viewed on the Town of Apex website at:
https://www.apexnc.org/DocumentCenter/View/30015.
For more information, please call the Planning Department at 919-249-3426.

Dianne F. Khin, AICP
Planning Director

Published Date: November 22, 2019 – December 17, 2019

apexnc.org/DocumentCenter/View/30019/Hazar...
Paused
Apps Todoist AmazonSmile HR IDT UDO Apex Email iMaps Other bookmarks

TOWN OF APEX
POST OFFICE BOX 250
APEX, NORTH CAROLINA 27502
PHONE 919-249-3426

NOTICE OF PUBLIC HEARINGS

WAKE COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

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For more information, please call the Planning Department at 919-249-3426.

Dianne F. Khin, AICP
Planning Director

Published Date: November 22, 2019 – December 17, 2019

2:55 PM
11/22/2019

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: PUBLIC HEARING

Meeting Date: December 17, 2019

Item Details

Presenter(s): Dianne Khin, Planning Director

Department(s): Planning Department

Requested Motion

Public Hearing and possible motion to adopt an Ordinance on the Question of Annexation – Apex Town Council's intent to annex Tim and Lauren Medlin property containing 1.929 acres located at 6517 Roosondall Court, Annexation #681 into the Town's corporate limits.

Approval Recommended?

Yes, by the Planning Department

Item Details

The Town Clerk certifies to the investigation of said annexation.

Attachments

- Annexation Ordinance
- Annexation Petition
- Legal Description
- Preliminary Plat

PETITION FOR VOLUNTARY ANNEXATION

This document is a public record under the North Carolina Public Records Act and may be published on the Town's website or disclosed to third parties.

Application #: 681 Submittal Date: 11/1/19

Fee Paid $ 200 Check # 1004

TO THE TOWN COUNCIL APEX, NORTH CAROLINA

1. We, the undersigned owners of real property, respectfully request that the area described in Part 4 below be annexed to the Town of Apex, Wake County, North Carolina.
2. The area to be annexed is ☑ contiguous, ☐ non-contiguous (satellite) to the Town of Apex, North Carolina and the boundaries are as contained in the metes and bounds description attached hereto.
3. If contiguous, this annexation will include all intervening rights-of-way for streets, railroads and other areas as stated in G.S. 160A-31(f), unless otherwise stated in the annexation amendment.

Owner Information

TIMOTHY K. MEDLIN	0743.03-12-0883
Owner Name (Please Print)	Property PIN or Deed Book & Page #
919-622-5650	TKfireman@hotmail.com
Phone	E-mail Address
LAUREN L. MEDLIN	SAME
Owner Name (Please Print)	Property PIN or Deed Book & Page #
SAME	SAME
Phone	E-mail Address
Owner Name (Please Print)	Property PIN or Deed Book & Page #
Phone	E-mail Address

Surveyor Information

Surveyor: ROBINSON & PLANTE P.C. – BUDDY PLANTE

Phone: 919 859-6030 Fax: 919 859-6032

E-mail Address: buddy@robinsonplante.com

Annexation Summary Chart

Total Acreage to be annexed:	1.929	Reason for annexation: (select one)	
Population of acreage to be annexed:	4	Receive Town Services	✓
Existing # of housing units:	1	Other (please specify)	
Zoning District*:	RR		

*If the property to be annexed is not within the Town of Apex's Extraterritorial Jurisdiction, the applicant must also submit a rezoning application with the petition for voluntary annexation to establish an Apex zoning designation. Please contact the Planning Department for questions.

PETITION FOR VOLUNTARY ANNEXATION

Application #: 681 Submittal Date: 11/1/19

COMPLETE IF SIGNED BY INDIVIDUALS:

All individual owners must sign. (If additional signatures are necessary, please attach an additional sheet.)

Timothy Medlin	
Please Print	Signature
Lauren Medlin	
Please Print	Signature
Please Print	Signature
Please Print	Signature

STATE OF NORTH CAROLINA
COUNTY OF WAKE

Sworn and subscribed before me, Shenita G. Cunningham, a Notary Public for the above State and County, this the 31st day of, October, 20 19.

SHENITA G. CUNNINGHAM NOTARY PUBLIC WAKE COUNTY, NC SEAL

Shenita G. Cunningham
Notary Public

My Commission Expires: November 19, 2021

COMPLETE IF A CORPORATION:

In witness whereof, said corporation has caused this instrument to be executed by its President and attested by its Secretary by order of its Board of Directors, this the _____ day of _____, 20_____.

Corporate Name _____

SEAL

By: _____
President (Signature)

Attest:

_____
Secretary (Signature)

STATE OF NORTH CAROLINA
COUNTY OF WAKE

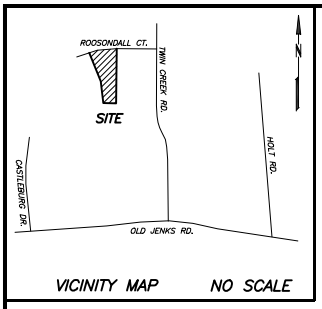
Sworn and subscribed before me, _____, a Notary Public for the above State and County, this the _____day of _____, 20____.

_____
Notary Public

SEAL

My Commission Expires: _____

Beginning at a point on the southern right of way of Roosondall Court (50' Public Right of Way) and being the northeastern property corner of Lot 1-A as shown on Book of Maps 1986, Page 259, thence from said Beginning point and leaving said right of way South 00°42'12" West 226.66 feet to an existing iron pipe, thence South 00°43'45" West 269.40 feet to an existing iron pipe, thence North 88°19'25" West 117.00 feet to a point, thence North 06°19'25" West 200.00 feet to a point, thence North 22°36'35" West 250.99 feet to a point on the southern right of way of Roosondall Court (50' Public Right of Way) thence leaving and crossing said right of way North 22°36'35" West 50.33 feet to a point on the northern right of way of Roosondall Court (50' Public Right of way), thence with said right of way, along a curve to the right, having a radius of 528.42 feet, an arc length of 70.50 feet and a chord bearing and distance of North 64°56'51" East 70.45 feet to a point, thence leaving and crossing said right of way South 23°52'10" East 50.06 feet to a point on the southern right of way of Roosondall Court (50' Public Right of Way), thence with said right of way, along a curve to the right, having a radius of 478.42 feet, an arc length of 180.84 feet, and a chord bearing and distance of North 79°52'26" East 179.76 feet to the point and place of Beginning containing 1.929 Acres more or less including 0.082 Acres in the contiguous right of way of Roosondall Court.



VICINITY MAP NO SCALE

ANNEXATION AREA
1.929 ACRES (TOTAL AREA TO BE ANNEXED INCLUDING AREA IN CONTINGUOUS R/W)

EXISTING APEX CORPORATE LIMITS B.M. 2006, PG. 1813 B.M. 2013, PG. 1161

ROOSONDALL COURT (50' PUBLIC R/W) B.M. 1986, PG. 259

ANNEXATION AREA IN CONTIGUOUS R/W 0.082 ACRES

C1 C2 S 23°52'10" E 50.08' N 22°36'35" W 50.33'

POB R/W 50' 6517 ROOSONDALL CT.

LOT 1A PROPERTY LINE

NEW APEX CORPORATE LIMITS

ANNEXATION AREA IN LOT 1.847 ACRES

N.C. GRID NORTH TAKEN FROM B.M. 1986, PG. 259

JAMES M. TAYLOR and wife ANNETTE R. TAYLOR D.B. 3451, PG. 296 LOT 9 B.M. 1975, PG. 184 PIN 0743.03-12-3971

S 00°42'12" W 226.66'

TIMOTHY K. MEDLIN and wife LAUREN L. MEDLIN TRACT ONE D.B. 15010, PG. 2340 PART OF LOT 1-A B.M. 1999, PG. 55 1.847 AC. LOT B.M. 1986, PG. 259 PIN 0743.03-12-0883

N 22°36'35" W 250.99'

ZONED RR

IPF

PRIVATE PARKING EASEMENT (FOR LOT 1A MEDLIN PROPERTY) B.M. 2017, PG. 1386

ANYHONY J. PEASE and wife ANITA W. PEASE D.B. 16872, PG. 80 LOT 7A B.M. 1995, PG. 678 B.M. 2017, PG. 1294 B.M. 2017, PG. 1386 PIN 0743.03-12-3761

EXISTING TWO STORY WOOD FRAME HOUSE

EXISTING APEX CORPORATE LIMITS B.M. 2017, PG. 1294

269.40'

JACOB LEWIS SUGG and wife KATHEL H. SUGG D.B. 3806, PG. 16 PART OF LOT 1-B B.M. 1999, PG. 55 0.289 AC. LOT B.M. 1986, PG. 259 PIN 0743.03-02-9713

NEW APEX CORPORATE LIMITS

N 06°19'25" W 200.00'

S 00°43'45" W

10' PRIVATE SANITARY SEWER EASEMENT B.M. 2017, PG. 1386

NEW APEX CORPORATE LIMITS

JESSE RANDALL NEWSOME and wife KAREN R. NEWSOME D.B. 6581, PG. 436 LOT 7 B.M. 2017, PG. 85 B.M. 1995, PG. 678 B.M. 1975, PG. 184 PIN 0743.03-12-3570

EXISTING WOOD SHED

EXISTING SHOP

TIMOTHY K. MEDLIN and wife LAUREN L. MEDLIN TRACT TWO D.B. 15010, PG. 2340 PART OF LOT 1-A 0.305 AC. LOT B.M. 1999, PG. 55 PIN 0743.03-12-1427

L1

ZONED MD-CU

EXISTING APEX CORPORATE LIMITS

20' 50'

TOWN OF APEX ZONE 3 BUFFER TAKEN FROM D.B. 16318, PG. 2773

JACOB LEWIS SUGG and wife KATHEL H. SUGG D.B. 8221, PG. 808 PART OF LOT 1-B 0.289 AC. LOT B.M. 1999, PG. 55 PIN 0743.03-02-9498

20' TOWN OF APEX SANITARY SEWER EASEMENT D.B. 16318, PG. 2773

50' RIPARIAN BUFFER TAKEN FROM D.B. 16318, PG. 2773

EXISTING APEX CORPORATE LIMITS

℄ OF CREEK IS PROPERTY LINE B.M. 1999, PG. 55

50'

LEGEND
(IPF)-IRON PIPE FOUND
(X)-CALCULATED POINT
(POB)-POINT OF BEGINNING
[XXX] -ADDRESS

LINE TABLE

LINE	BEARING	DISTANCE
L1	N 88°19'25" W	117.00'

CURVE TABLE

CURVE	DELTA	RADIUS	ARC	CHORD	TANGENT	CHORD BRG
C1	7°38'38"	528.42'	70.50'	70.45'	35.30'	N 64°56'51" E
C2	21°39'25"	478.42'	180.84'	179.76'	91.51'	N 79°52'26" E

ANNEXATION# _____

I, DONNA B. HOSCH, MMC, NCCMC, TOWN CLERK, APEX, NORTH CAROLINA CERTIFY THIS A TRUE AND EXACT MAP OF ANNEXATION ADOPTED THE _____DAY OF _____, _____, BY THE TOWN COUNCIL. I SET MY HAND AND SEAL OF THE TOWN OF APEX, _____/_____/_____ DAY MONTH YEAR

_____
DONNA B. HOSCH, MMC, NCCMC, TOWN CLERK
-SEAL-

REFERENCES:
1. RESTRICTIONS
   D.B. 3646, PG. 420 (TRACT ONE)
   D.B. 3790, PG. 616 (TRACT ONE)
2. B.M. 1985, PG. 1346
3. TOWN OF APEX ANNEXATION MAPS
   B.M. 2006, PG. 1813
   B.M. 2013, PG. 1161
   B.M. 2017, PG. 1294

NOTES:
1. PROPERTY WAS NOT SURVEYED BY ROBINSON & PLANTE, P.C. AT THIS TIME. BOUNDARY LINES SHOWN ARE DASHED AND TAKEN FROM B.M. 1999, PG. 55, B.M. 2006, PG. 1813, AND B.M. 2013, PG. 1161.
2. PROPERTY IS SUBJECT TO ALL EASEMENTS AND RESTRICTIONS OF RECORD. NO TITLE SEARCH HAS BEEN DONE BY ROBINSON & PLANTE, P.C..
3. PROPERTY IS NOT IN THE 100 YEAR FLOOD BY FEMA FIRM MAP NO. 3720074300J PANEL 0743, EFFECTIVE DATE MAY 2, 2006.
4. NO N.C. GRID MONUMENT FOUND WITHIN 2,000' OF SUBJECT PROPERTY SURVEYED.
5. EXISTING APEX CORPORATE LIMITS AS SHOWN ON CORPORATE LIMITS AND EXTRATERRITORIAL MAP OF TOWN OF APEX, NORTH CAROLINA PRINTED FROM TOWN OF APEX WEBSITE ON 10/13/19 AND ASSOCIATED ANNEXATION MAPS SHOWN UNDER REFERENCE 3. PROPERTY IS IN THE TOWN OF APEX ETJ PER TOWN OF APEX MAP.

☐C. 1. THAT THE SURVEY IS OF AN EXISTING PARCEL OR PARCELS OF LAND OR ONE OR MORE EXISTING EASEMENTS AND DOES NOT CREATE A NEW STREET OR CHANGE AN EXISTING STREET. FOR THE PURPOSES OF THIS SUBSECTION, AN "EXISTING PARCEL" OR "EXISTING EASEMENT" IS AN AREA OF LAND DESCRIBED IN A SINGLE, LEGAL DESCRIPTION OR LEGALLY RECORDED SUBDIVISION THAT HAS BEEN OR MAY BE LEGALLY CONVEYED TO A NEW OWNER BY DEED IN ITS EXISTING CONFIGURATION.

☐D. THAT THE SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT-ORDERED SURVEY, OR OTHER EXEMPTION OR EXCEPTION TO THE DEFINITION OF SUBDIVISION.

NORTH CAROLINA
WAKE COUNTY

I STUART E. PLANTE III CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION, DESCRIPTION RECORDED IN REFERENCES AS SHOWN, THAT THE BOUNDARIES NOT SURVEYED ARE DASHED AND DRAWN FROM REFERENCES AS SHOWN; THAT THE RATIO OF PRECISION OR POSITIONAL ACCURACY AS CALCULATED IS 1: 41,205 +; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER AND SEAL THIS 1st DAY OF NOVEMBER, 2019 A.D.

_____ PROFESSIONAL LAND SURVEYOR
LICENSE NO. L-4432

PRELIMINARY PLAT-NOT FOR RECORDATION, CONVEYANCES, OR SALES

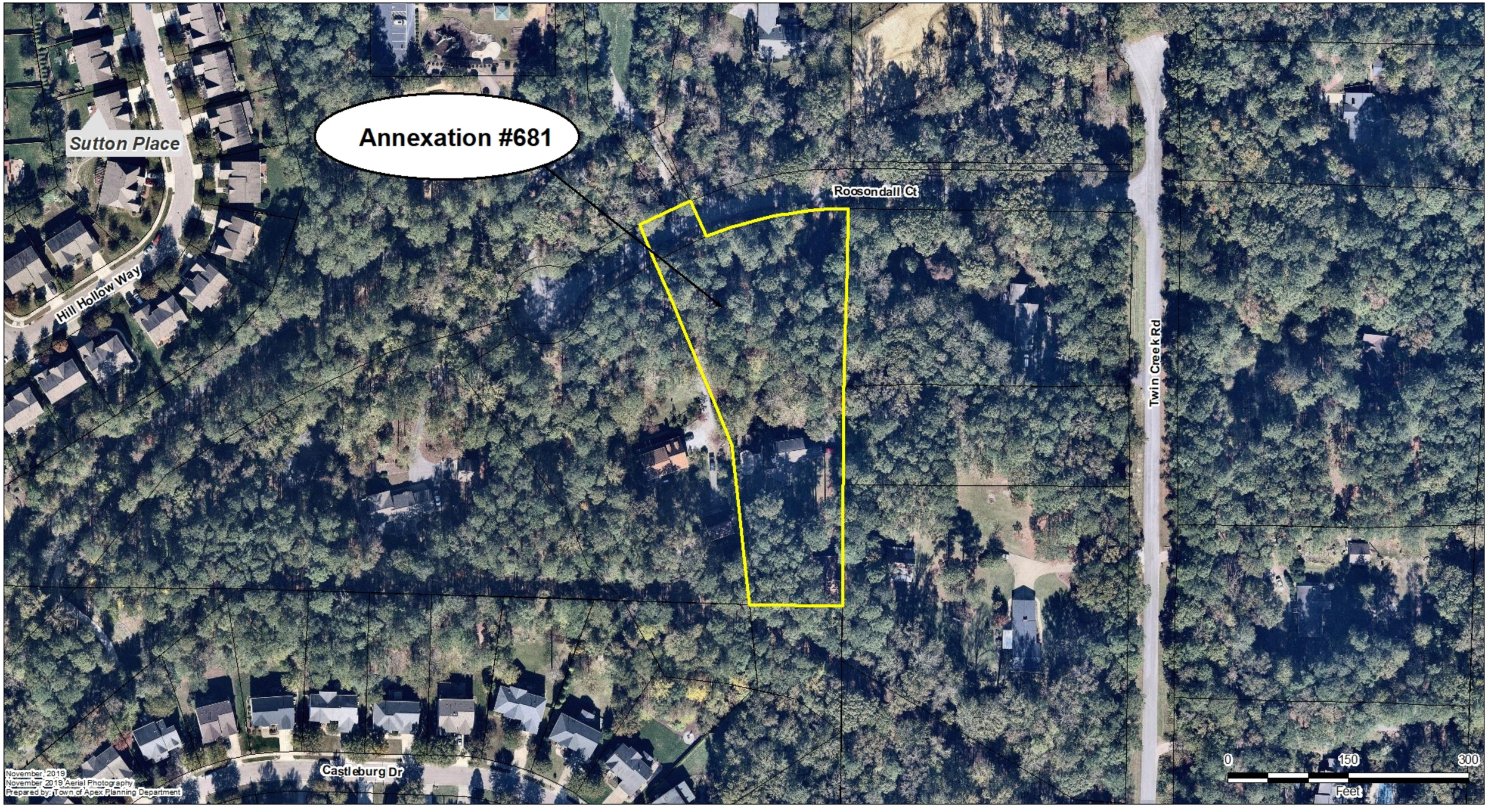
NOTE:
MISCLOSURE WAS DISTRIBUTED BY THE COMPASS METHOD. THE DISTANCES ON THIS MAP ARE ADJUSTED HORIZONTAL GROUND DISTANCES UNLESS OTHERWISE NOTED. ALL AREA CALCULATED BY COORDINATE COMPUTATION.

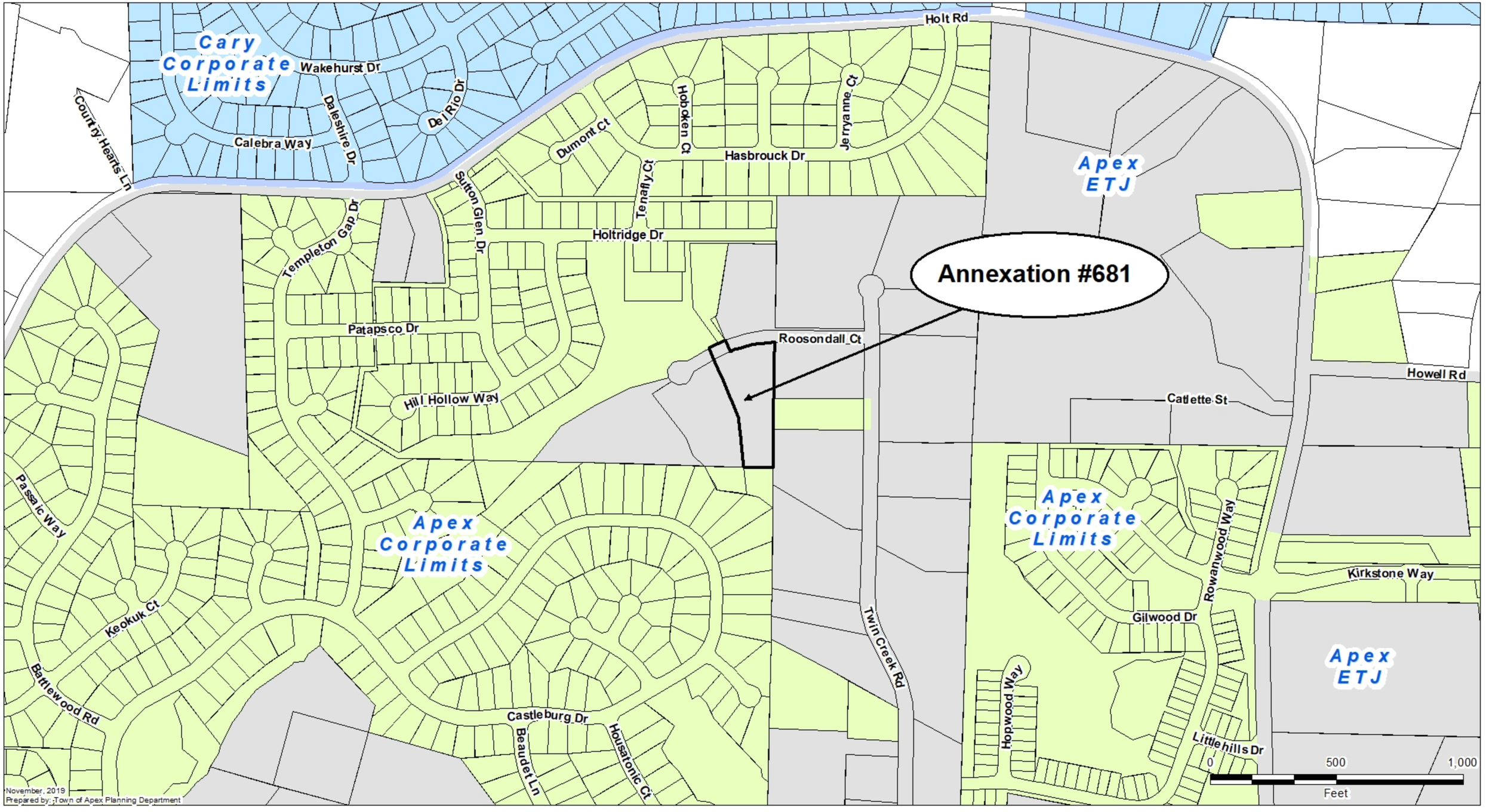
0 40 80 120
SCALE IN FEET

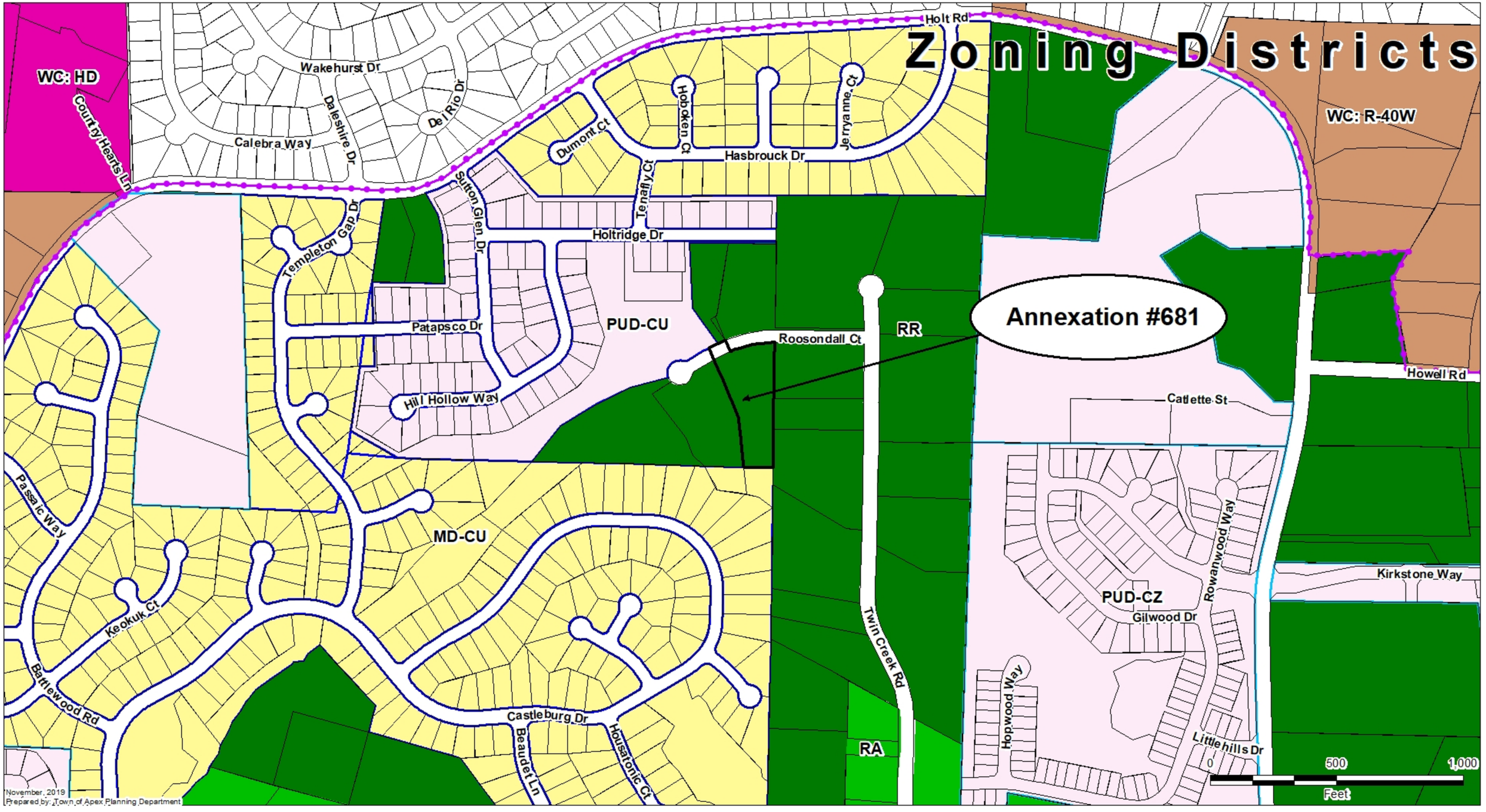
THE SOLE PURPOSE OF THIS MAP IS FOR ANNEXATION PURPOSES ONLY. NOT ALL EASEMENTS, RESTRICTIONS, AND STRUCTURES MAY BE SHOWN.

OWNERS:
TIMOTHY K. MEDLIN
LAUREN L. MEDLIN
6517 ROOSONDALL CT.
APEX, NC 27523

REVISIONS	CONTIGUOUS ANNEXATION MAP FOR THE TOWN OF APEX	ROBINSON & PLANTE, P.C. LAND SURVEYING C-2687 970 TRINITY ROAD RALEIGH, NC 27607 PHONE: (919)859.6030 FAX: (919)859-6032	
	TOWNSHIP: WHITE OAK COUNTY: WAKE	SURVEY DATE: 10-23-19	SURVEYED BY: CB
	STATE: NORTH CAROLINA	SCALE: 1"=40'	DRAWN BY: KW
	ZONE: RR P.I.N.: 0743.03-12-0883	CHECKED & CLOSURE BY: SEP	FILE: MEDLINANNEX


Annexation #681
Sutton Place
Hill Hollow Way
Roosondall Ct
Twin Creek Rd
Castleburg Dr
November, 2019
November, 2019 Aerial Photography
Prepared by: Town of Apex Planning Department
0
150
300
Feet


Annexation #681
Cary Corporate Limits
Apex ETJ
Apex Corporate Limits
Apex Corporate Limits
Apex ETJ
Holt Rd
Wakehurst Dr
Daleshire Dr
Del Rio Dr
Calebra Way
Country Hearts Ln
Dumont Ct
Hoboken Ct
Jerryanne Ct
Hasbrouck Dr
Tenafly Ct
Holtridge Dr
Sutton Glen Dr
Templeton Gap Dr
Patapsco Dr
Hill Hollow Way
Roosondall Ct
Howell Rd
Catlette St
Passaic Way
Keokuk Ct
Battlewood Rd
Castleburg Dr
Beaudet Ln
Housatonic Ct
Twin Creek Rd
Rowanwood Way
Kirkstone Way
Gilwood Dr
Hopwood Way
Littlehills Dr
0
500
1,000
Feet
November, 2019
Prepared by: Town of Apex Planning Department


Zoning Districts
WC: HD
Courtney Hearts Ln
Wakehurst Dr
Daleshire Dr
Del Rio Dr
Calebra Way
Holt Rd
Dumont Ct
Hoboken Ct
Jerryanne Ct
Hasbrouck Dr
Tenafly Ct
Sutton Glen Dr
Templeton Gap Dr
Holtridge Dr
WC: R-40W
Annexation #681
PUD-CU
Patapsco Dr
Hill Hollow Way
Roosondall Ct
RR
Howell Rd
Catlette St
Passaic Way
MD-CU
Keokuk Ct
Battlewood Rd
Castleburg Dr
Beaudet Ln
Housatonic Ct
Twin Creek Rd
RA
PUD-CZ
Gilwood Dr
Rowanwood Way
Kirkstone Way
Hopwood Way
Littlehills Dr
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500
1,000
Feet
November, 2019
Prepared by: Town of Apex Planning Department

TOWN OF APEX, NORTH CAROLINA
Municipality No. 333

After recording, please return to:
Donna Hosch, MMC, NCCMC, Town Clerk
Town of Apex
P.O. Box 250
Apex, NC 27502

ORDINANCE NO. 2019-1203-33
ANNEXATION PETITION NO. #681
6517 Roosondall Court

AN ORDINANCE TO EXTEND THE CORPORATE LIMITS
OF THE TOWN OF APEX, NORTH CAROLINA
P.O. Box 250, Apex, North Carolina 27502

WHEREAS, the Apex Town Council has been petitioned under G.S.§160A-31, as amended, to annex the area described herein; and

WHEREAS, the Apex Town Council has by Resolution directed the Town Clerk to investigate the sufficiency of said petition; and

WHEREAS, the Town Clerk has certified the sufficiency of said petition and a public hearing on the question of this annexation was held at Apex Town Hall at 7:00 p.m. on December 17, 2019, after due notice by posting to the Town of Apex website, http://www.apexnc.org/news/public-notices-legal-ads; and

WHEREAS, the Apex Town Council does hereby find as a fact that said petition meets the requirements of G.S.§160A-31, as amended.

NOW, THEREFORE, BE IT ORDAINED by the Town Council of Apex, North Carolina:

Section 1. By virtue of the authority granted by G.S.§160A-31, as amended, the territory described in the attached property description and also shown as "Annexation Area" on the below identified survey plat is hereby annexed and made part of the Town of Apex, North Carolina, as of the date of adoption of this Ordinance on December 17, 2019. The survey plat that describes the annexed territory is that certain survey plat entitled "Contiguous Annexation Map for the Town of Apex, Robinson & Plante, P.C., Land Surveying, dated 10-23-19" and recorded in Book of Maps book number 2019 and page number _____, Wake County Registry.

Section 2. Upon and after the adoption of this ordinance, the territory described herein and its citizens and property shall be subject to all debts, laws, ordinances and regulations in force in the Town of Apex, North Carolina, and shall be entitled to the same privileges and benefits as other parts of the Town of Apex. Said territory shall be subject to municipal taxes according to G.S.§160A-58.10, as amended.

Section 3. The Clerk of the Town of Apex, North Carolina shall cause to be recorded in the Office of the Register of Deeds of Wake County and in the Office of the Secretary of State at Raleigh, North Carolina and in the Office of the Wake County Board of Elections an accurate map of the annexed territory, described in Section 1 hereof, together with a duly certified copy of this Ordinance.

Adopted this the 17th day of December 2019.

_____
Jacques K. Gilbert
Mayor

ATTEST:

_____
Donna B. Hosch, MMC, NCCMC
Town Clerk

APPROVED AS TO FORM:

_____
Laurie L. Hohe
Town Attorney

Legal Description

Beginning at a point on the southern right of way of Roosondall Court (50' Public Right of Way) and being the northeastern property corner of Lot 1-A as shown on Book of Maps 1986, Page 259, thence from said Beginning point and leaving said right of way South 00°42'12" West 226.66 feet to an existing iron pipe, thence South 00°43'45" West 269.40 feet to an existing iron pipe, thence North 88°19'25" West 117.00 feet to a point, thence North 06°19'25" West 200.00 feet to a point, thence North 22°36'35" West 250.99 feet to a point on the southern right of way of Roosondall Court (50' Public Right of Way) thence leaving and crossing said right of way North 22°36'35" West 50.33 feet to a point on the northern right of way of Roosondall Court (50' Public Right of way), thence with said right of way, along a curve to the right, having a radius of 528.42 feet, an arc length of 70.50 feet and a chord bearing and distance of North 64°56'51" East 70.45 feet to a point, thence leaving and crossing said right of way South 23°52'10" East 50.06 feet to a point on the southern right of way of Roosondall Court (50' Public Right of Way), thence with said right of way, along a curve to the right, having a radius of 478.42 feet, an arc length of 180.84 feet, and a chord bearing and distance of North 79°52'26" East 179.76 feet to the point and place of Beginning containing 1.929 Acres more or less including 0.082 Acres in the contiguous right of way of Roosondall Court.

STATE OF NORTH CAROLINA

COUNTY OF WAKE

CLERK'S CERTIFICATION

I, Donna B. Hosch, MMC, NCCMC, Town Clerk, Town of Apex, North Carolina, do hereby certify the foregoing is a true and correct copy of Annexation Ordinance No. 2019-1217-33, adopted at a meeting of the Town Council, on the 17th day of December 17, 2019, the original of which will be on file in the Office of the Town Clerk of Apex, North Carolina.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official Seal of the Town of Apex, North Carolina, this the 17th day of December 2019.

_____

Donna B. Hosch, MMC, NCCMC
Town Clerk

(SEAL)

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: PUBLIC HEARING

Meeting Date: December 17, 2019

Item Details

Presenter(s): Shawn Purvis, Assistant Town Manager

Department(s): Administration

Requested Motion

Public Hearing to receive citizen input regarding the formulation of the Fiscal Year 2020-2021 Annual Budget.

Approval Recommended?

Yes

Item Details

It has been the custom of the Apex Town Council to hold a Public Hearing in advance of the preparation of the proposed Annual Budget so that comments and suggestions of citizens can be considered while the budget document is formulated. This Pre-Budget Hearing will be advertised on the Town's website, social media and posted in the lobby at Town Hall.

Any written comments received by USPS or through the advertised special email address, annual.budget@apexnc.org, will be forwarded to Town Council.

Attachments

- None