

CITY COUNCIL WORK SESSION

City Council Chambers

Tuesday, September 26, 2023 at 3:00 PM

AGENDA

Call to Order

Department Head Reports

Discussion Items

- 1. Bessemer City Water and Sewer Master Plan**

City Manager's Report

Council General Discussion

- 2. Closed Session:** City Council will go in to closed session as permitted under N.C.G.S. §143-318.11(a)(6) to discuss a personnel matter.

Adjourn

Individuals requiring special accommodations at this public meeting should contact ADA Coordinator, Hydeia Hayes, at (704) 729-6509 or Countywide at (704) 866-3300 or State Relay Service at 1-800-375-8662.

WATER AND SEWER MASTER PLAN, 2023

BESSEMER CITY

GASTON COUNTY, NORTH CAROLINA



WATER AND SEWER MASTER PLAN, 2023

BESSEMER CITY

GASTON COUNTY, NORTH CAROLINA

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AUGUST 2023

PROJECT NO. 22.01136 / 22.01137

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Appendices

- Appendix A – Maps
- Appendix B – Sanitary Sewer Pump Station Capacity Evaluation
- Appendix C – Preliminary Opinions of Probable Cost

PROJECT PLANNING

Project Scope

The Scope of Services for the current project included the following:

- 1) Review previous reports and inventories of water and sewer lines, water and sewer pump stations, water tanks, and other water and sewer assets.
- 2) Review existing water and sewer system mapping and models considering pipe sizing and importance.
- 3) Meet with City staff to review proposed developments and growth projections.
- 4) Perform updates to the City's water model to evaluate water system needs and prepare scenarios of proposed upgrades.
- 5) Perform sewer system capacity calculations to determine needed upgrades to sewer lines and pump stations, if applicable
- 6) Prepare Preliminary Opinions of Probable Cost for water system upgrade and expansion projects.
- 7) Update the City's current 10-year Capital Improvement Plan (CIP) for the water and system.
- 8) Prepare summary of findings and recommendations.

1.0

EXISTING CONDITIONS

McGill reviewed previous reports and inventories of water and sewer lines, water and sewer pump stations, water tanks, and other system appurtenances, as well as distribution and collection system mapping and modeling to assess current system needs and capacities. Review of the water system considered water age and quality, pipe and pump station locations and capacities, and existing and anticipated demands. Review of the sewer system considered pump station capacities, tributary and allocated-but-not-yet-tributary wastewater flows, and pipe sizing and importance.

1.1 Location

The City of Bessemer City, hereinafter “Bessemer City” or “the City,” is a small, suburban city located in the western portion of Gaston County, North Carolina, north of I-85 and approximately 25 miles west of Charlotte. The City encompasses a land area of approximately 4.8 square miles and is home to 5,428 residents.

1.2 Water System Conditions

The City operates the J.V. Tarpley Water Treatment Plant – a 3.0 MGD conventional water treatment plant (WTP) located west of Bessemer City in Gaston County. The raw water supply for the plant is withdrawn from Long Creek on the northwestern side of the City. Raw water is either pumped to the City’s Arrowood Reservoir or the WTP reservoir (5-day on-site storage). The water system interconnects with both Kings Mountain and Gastonia, both of which allow the City to purchase water on an as-needed basis.

Table 1.1 - Bessemer City Water System Interconnections

Description	Contract Volume (MGD)	Average Daily Purchase (MGD)
Kings Mountain	3.50	0.14
Gastonia / Two Rivers Utilities	1.70	0.06

The City’s water distribution system contains approximately 44 miles of water line including asbestos cement, cast iron, ductile iron, galvanized iron, and polyvinyl chloride pipe. Figure 1-1 shows a map of the existing system; a full-scale map is included in Appendix A.

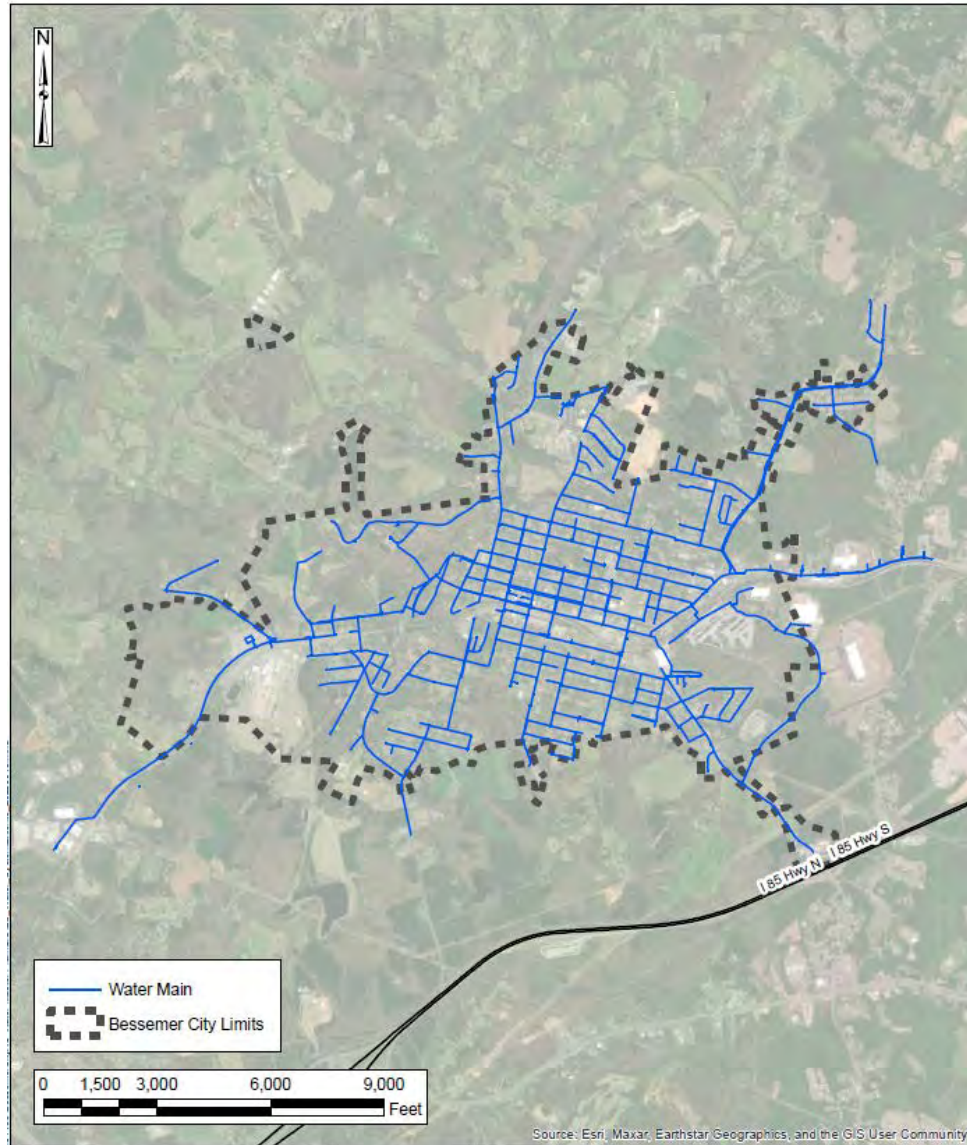


Figure 1.1 - Existing Bessemer City Water System

1.3 **Sewer System Conditions**

Bessemer City owns and maintains approximately 48 miles of gravity sewer including Vitrified Clay Pipe (VCP), Ductile Iron Pipe (DIP), Polyvinyl Chloride (PVC), Cast Iron Pipe (CIP), Reinforced Plastic Mortar (RPM), and others of unknown composition. Pipe sizes range from 4 inches to 18 inches and ages range from 0 to more than 95 years.

The City also maintains nine Sanitary Sewer Pump Stations as summarized in Table 1.2. Many of these pump stations are past or are nearing the end of their useful lives

Wastewater from the City discharges to Gastonia / Two Rivers Utilities for treatment via two connections to the south of the City. Figure 1-2 shows a map of the existing system; a full-scale map is included in Appendix A.

Table 1.2 – Pump Station Summary

Station Name	Pump Number	Type	Motor Size (hp)	Motor Speed (rpm)	Design TDH (ft)	Design Flow (gpm)	Drawdown TDH (ft)	Drawdown Flow (gpm)
Shopping Center	1	Centrifugal (Suction-Lift)	15	1950	93	130	99	70
	2	Centrifugal (Suction-Lift)	15	1950	93	130	99	72
Arc Street	1	Submersible	25	1760	165	180	165	188
	2	Submersible	25	1760	165	180	164	203
Ninth Street	1	Submersible	50	1775	121	705	122	715
	2	Submersible	50	1775	121	705	115	721
Winfield	1	Submersible	10	1750	75	100	75	106
	2	Submersible	10	1750	75	100	74	118
Vantine	1	Centrifugal (Suction-Lift)	15	1850	106	175	104	202
	2	Centrifugal (Suction-Lift)	15	1850	106	175	107	160
FMC-LC Road	1	Submersible	6	2885	70	50	69	52
	2	Submersible	6	2885	70	50	70	51
Pinchback	1	Centrifugal (Suction-Lift)	15	1800	100	175	96	234
	2	Centrifugal (Suction-Lift)	15	1800	100	175	102	172
Crowders	1	Centrifugal (Suction-Lift)	10	1250	48	175	50	140
	2	Centrifugal (Suction-Lift)	10	1250	48	175	50	137
Southeast	1	Centrifugal (Suction-Lift)	20	1750	94	175	92	203
	2	Centrifugal (Suction-Lift)	20	1750	94	175	94	188

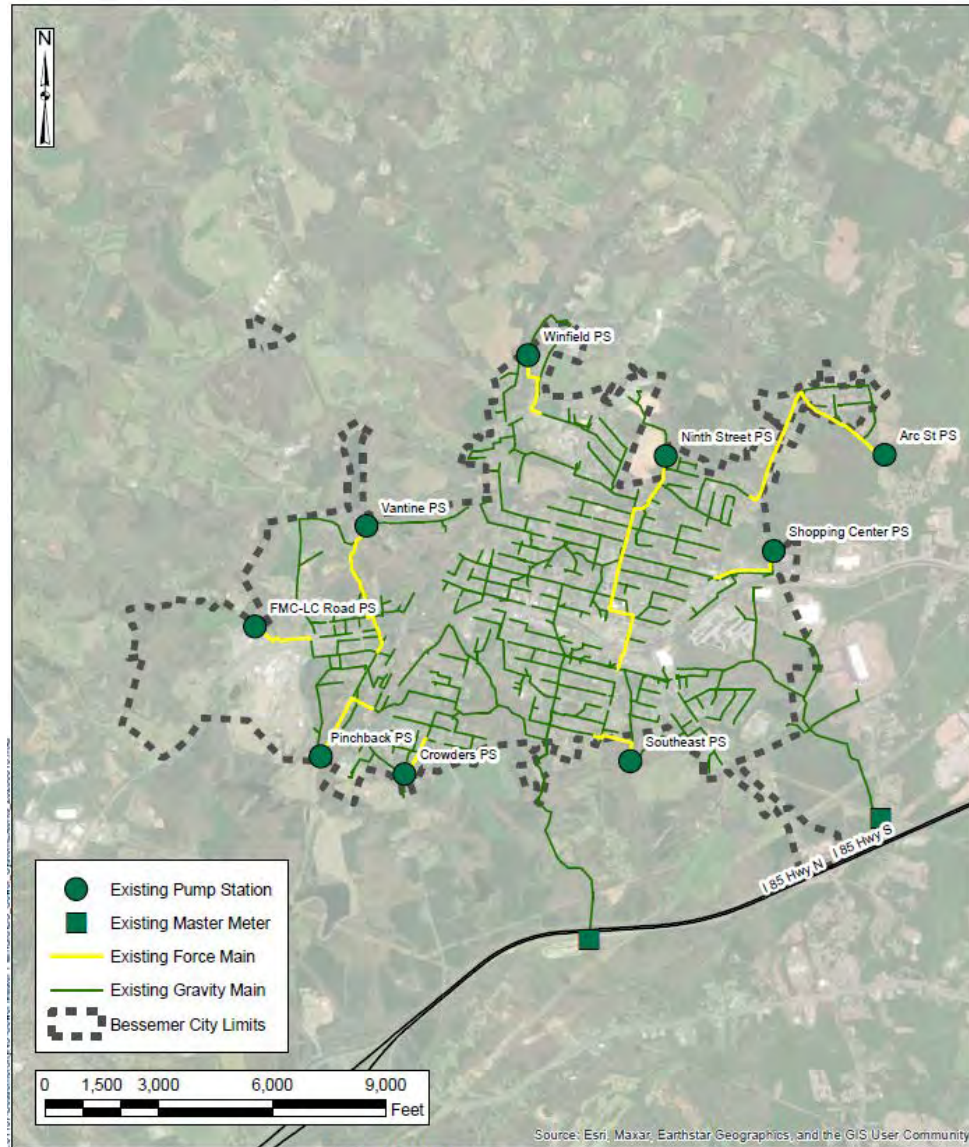


Figure 1.2 - Existing Bessemer City Sewer System

2.0 ANTICIPATED FUTURE CONDITIONS

McGill met with City staff to review proposed residential, commercial, and industrial developments. The central areas of the City are mature and developed with limited potential for infill construction. Future development is concentrated to the north, east, and south of the City Center; development potential to the west is limited by density restrictions within the Long Creek water supply watershed and the presence of FMC Lithium USA. WS-II water supply watershed regulations prohibit medium and high-density residential development.

Areas -- within the Bessemer City Limits -- to the north and northwest of the city center are, generally, zoned rural, neighborhood residential, or urban residential. Areas beyond the Bessemer City municipal limits where zoning is governed by the Gaston County Unified Development Ordinance are generally zoned for single-family residential development. Certain areas which are currently zoned rural or single-family residential may be good candidates for medium-to-high-density residential development but could require Planning and Zoning Commission approval to proceed.

The location of the Long Creek Water Supply Watershed Boundary is shown below on Figure 2-1. Bessemer City and Gaston County Zoning is shown on Figure 2-2. Full-size maps are included in Appendix A.

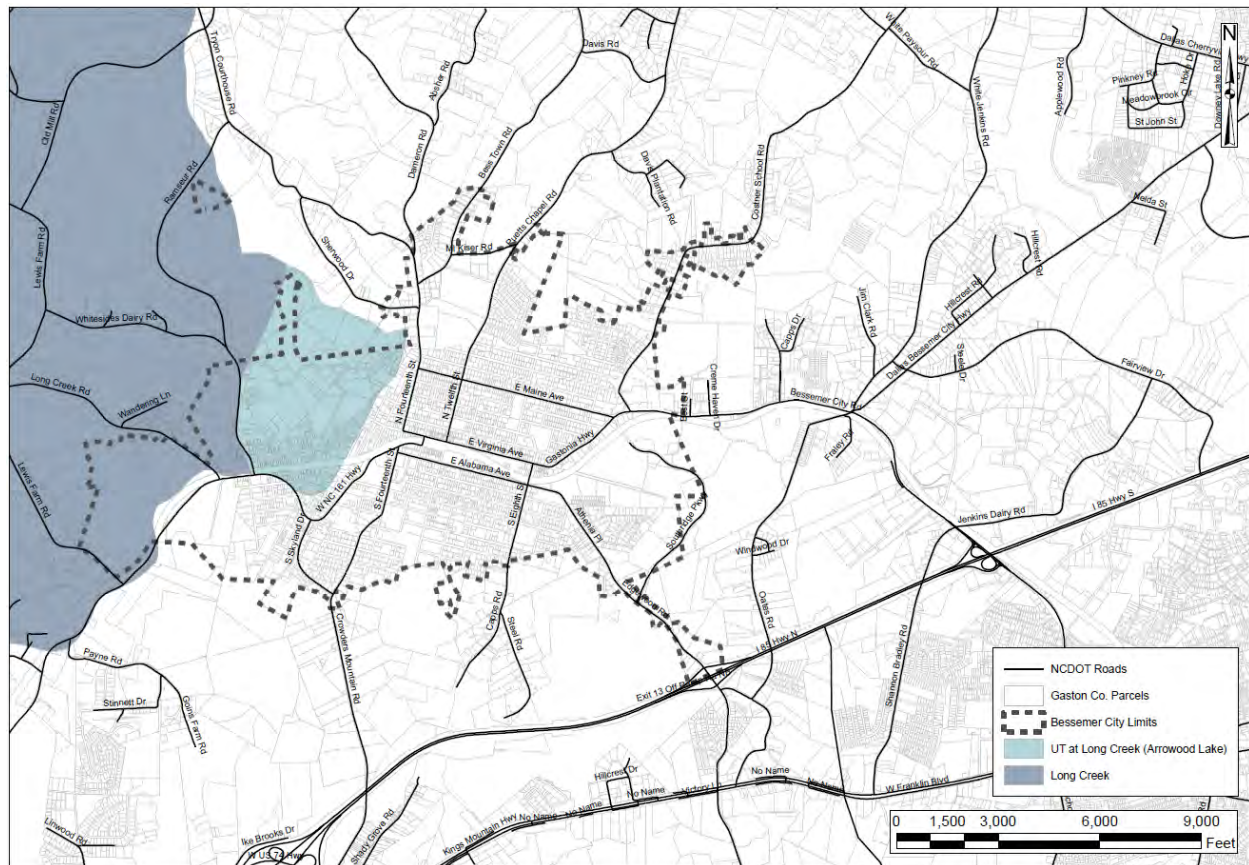


Figure 2.1 - Water Supply Water Sheds

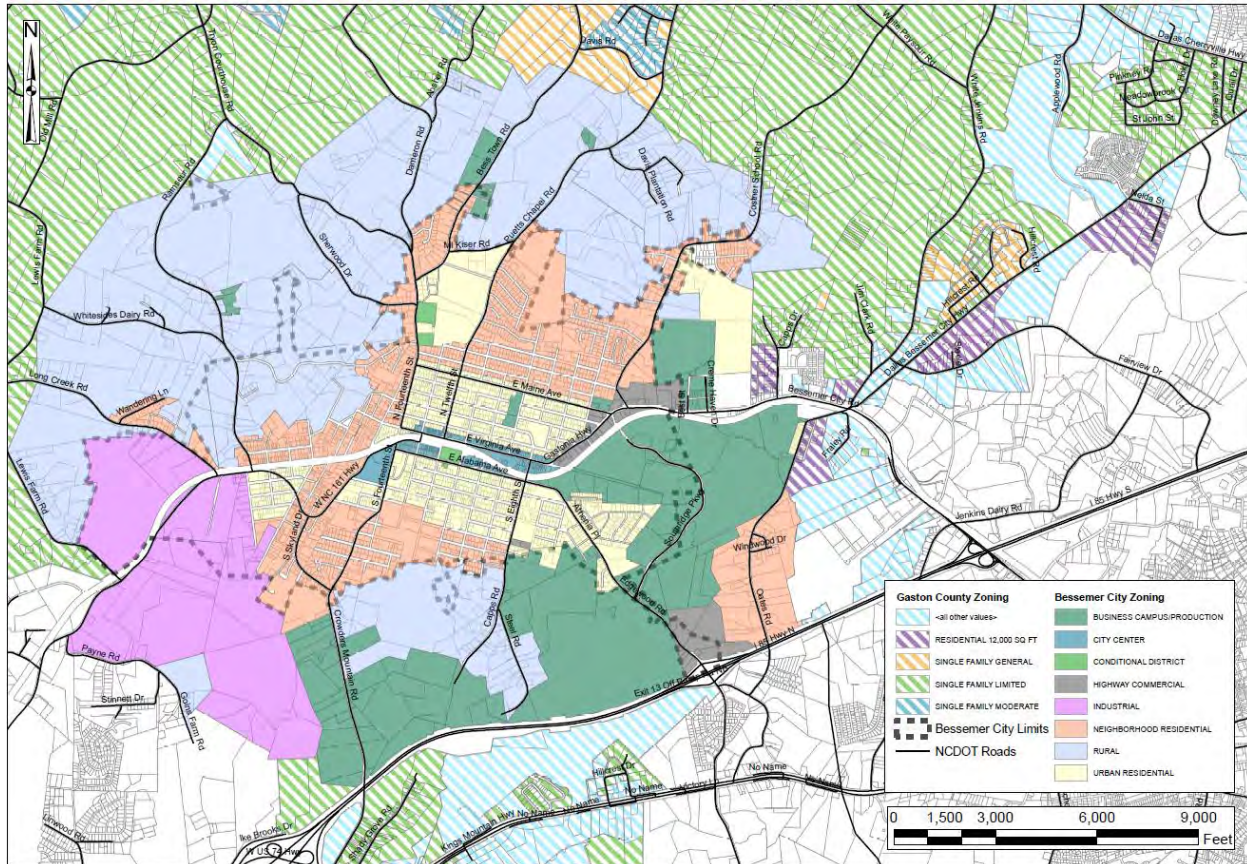


Figure 2.2 - Bessemer City and Gaston County Zoning

2.1 Residential Development

Anticipated residential development is concentrated along the northern periphery of the City. Five (5) residential developments totaling approximately 500 units are already in process. The City has also identified nine other undeveloped properties, totaling approximately 500 acres, as likely sites for future development.

These sites are summarized on Tables 2.1 and 2.2 and shown on Figure 2.3.

Table 2.1 – Future Residential Development in Process

Name	Description	Status	No. Units	Average Daily Demand (gpd)*
Creekside Cottages	Single-Family Detached	In-Process	162	48,600
Jack Circle	Single-Family Detached	In-Process	16	4,800
Stewart Property	Single-Family Detached	In-Process	95	28,500
14 th Street Townhomes	Townhomes	In-Process	100	30,000
Osage	Apartments	In-Process	139	41,700
Bess Town Road Site	Multi-Family	In-Process	228	38,300
			TOTAL	191,900

* Flow based on average 2.5 BR/ unit and 120 gpd/BR

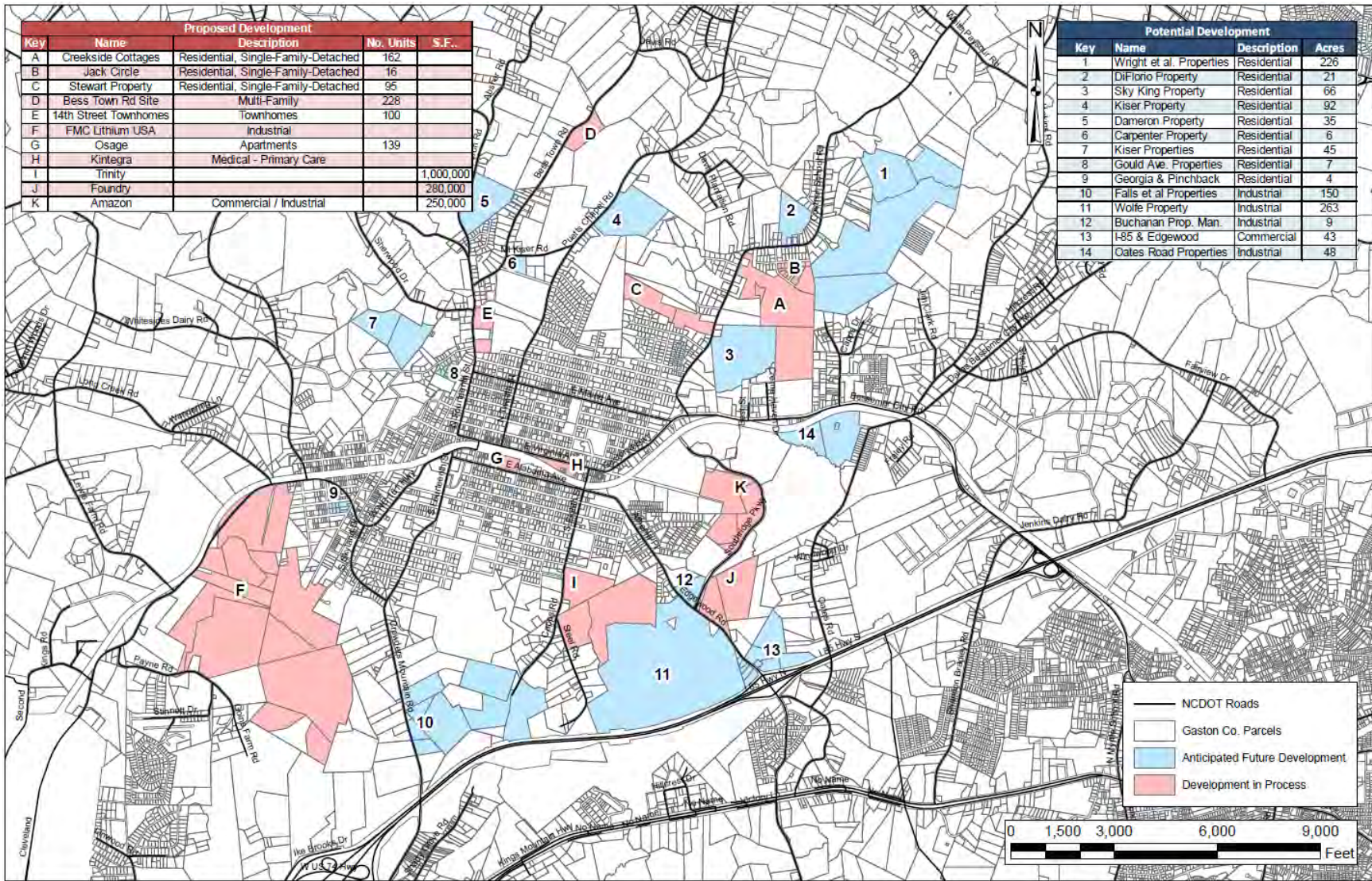


Figure 2.3 – Anticipated Future Development

Table 2.2 – Potential Future Residential Development

Name	Description	Acres	BR / ac	Total Bedrooms	Flow / BR (gpd)	Average Daily Demand (gpd)
Wright et al. Properties	Residential	226	5	1,130	120	135,600
DiFlorio Property	Residential	21	5	105	120	12,600
Sky King Property	Residential	66	5	330	120	39,600
Kiser Property	Residential	92	5	460	120	55,200
Dameron Property	Residential	35	5	175	120	21,000
Carpenter Property	Residential	6	5	30	120	3,600
Kiser Properties	Residential	45	5	225	120	27,000
Gould Ave. Properties	Residential	7	-	43	120	5,100
Georgia & Pinchback	Residential	4	-	23	120	2,700
TOTAL						302,400

Based upon data reported by the 2021 American Community Survey 5-Year Estimates, the average household size in Bessemer City can conservatively be estimated at 2.4 people per household. Assuming that this ratio is accurate and remains consistent as the City grows, anticipated population growth (from just the five residential developments for which the number of planned units is known) would total approximately 1,230 people. This equates to a population increase of 22% relative to the City's current population of 5,452 people.

2.2 Commercial and Industrial Development

Anticipated commercial and industrial development is concentrated among the southern outskirts of the City and consists of both increased usage among current customers as well as the development of as-yet-undeveloped properties. These developments are summarized on Tables 2.3 and 2.4 and shown on Figure 2.3.

Table 2.3 – Commercial / Industrial Development In-Process

Name	Description	s.f. Developed	Flow/ 1000 s.f. Developed (gpd)	Total Flow (gpd)
Trinity	Commercial	1,000,000	100	100,000
Foundry	Commercial	280,000	100	28,000
Amazon	Industrial	250,000	50	12,500
Lithium	Industrial	-	-	40,000
Osage	Commercial	20,000	100	2,000
Kintegra	Commercial	10,000	100	1,000
TOTAL				183,500

Table 2.4 – Potential Commercial Industrial Development

Name	Description	Acres	s.f. Developed / Acre	Total s.f. developed	Flow / 1000 s.f. developed (gpd)	Total Flow (gpd)
Falls et al Properties	Industrial	150	8,000	1,200,000	50	60,000
Wolfe Property	Industrial	263	8,000	2,104,000	50	105,200
Buchanan Prop. Man.	Industrial	9	8,000	72,000	50	3,600
I-85 & Edgewood	Commercial	43	4,000	172,000	100	17,200
Oates Road Properties	Industrial	48	8,000	384,000	50	19,200
TOTAL						205,200

Parcels identified for potential future commercial and/or industrial development are predominantly located in areas zoned “Business Campus/Production” or “Highway Commercial”. Depending upon the nature of the development certain of these parcels may require re-zoning as “Industrial” spaces. The only parcels currently zoned for industrial use are located in the southwestern outskirts of the City in the vicinity of LMC Lithium USA.

2.3 Pump Station Capacity

McGill examined each of the City’s nine sanitary sewer pump stations in terms of pump station capacity, current flow, planned development, and allocated-but-not-yet-tributary flows to determine which, if any, of the existing pump stations would need to be upgraded or replaced to permit the anticipated growth.

For the purposes of this analysis, pump station capacities were based on drawdown tests conducted by others¹. Results of these drawdown tests are summarized in Table 2.5 and discussed in greater detail in Sections 2.3.1 – 2.3.9.

¹Bessemer City Water and Wastewater Asset Management Plan, WithersRavenel, 2021.

Table 2.5 – Pump Station Summary

Station Name	Pump Number	Motor Size (hp)	Installation Date	Design TDH (ft)	Design Flow (gpm)	Drawdown TDH (ft)	Drawdown Flow (gpm)	% Design Flow
Shopping Center	1	15	2002	93	130	99	70	54%
	2	15	2004	93	130	99	72	55%
Arc Street	1	25	2003	165	180	165	188	100%
	2	25	2003	165	180	164	203	100%
Ninth Street	1	50	2009	121	705	122	715	100%
	2	50	2009	121	705	115	721	100%
Winfield	1	10	1990	75	100	75	106	100%
	2	10	1990	75	100	74	118	100%
Vantine	1	15	1994	106	175	104	202	100%
	2	15	1994	106	175	107	160	91%
FMC-LC Road	1	6	1997	70	50	69	52	100%
	2	6	1997	70	50	70	51	100%
Pinchback	1	15	2005	100	175	96	234	100%
	2	15	2003	100	175	102	172	98%
Crowders	1	10	2000	48	175	50	140	80%
	2	10	2000	48	175	50	137	78%
Southeast	1	20	2000	94	175	92	203	100%
	2	20	2000	94	175	94	188	100%

Per NCDEQ Sanitary Sewer Permitting Requirements (FTSE 10-18), available pump station capacity must be demonstrated for each, and every, pump station located between the connection point of a proposed sewer system expansion project and the downstream wastewater treatment plant. A planning assessment addendum is required for each pump station where the available capacity is ≤ 0 .

Based on those same regulations, “the firm capacity (design flow) of any pump station is defined as the maximum pumped flow that can be achieved with the largest pump taken out of service. Design average daily flow is the firm capacity of the pump station divided by a peaking factor (pf) not less than 2.5, per §2.02(A)(4)(c) of the Minimum Design Criteria².” Average Daily Flow (ADF) and Maximum Daily Flow were calculated from pump runtime data for the period January 01, 2022 – May 31, 2022.

² Minimum Design Criteria for the Permitting of Pump Stations and Force Mains, North Carolina Department of Environment and Natural Resources, Division of Water Quality, 2000.

Table 2.6 – Available Pump Station Capacity

PS Name	Design Firm Capacity (GPD)	Design ADF (2.5x PF, GPD)	Current ADF (GPD)	Allocated, Not-Yet Tributary Daily Flow* (GPD)	ADF + ANYT (GPD)	Available Capacity (GPD)
Shopping Center	187,000	74,800	13,200	0	13,200	27,200
Arc Street	259,000	103,600	6,700	84,300	91,000	17,400
Ninth Street	1,015,000	406,000	224,000	91,980	315,980	96,020
Winfield	144,000	57,600	7,700	21,000	28,700	32,500
Vantine	252,000	100,800	46,800	27,000	73,800	18,200
FMC-LC Road	72,000	28,800	140	0	140	29,060
Pinchback	252,000	100,800	47,400	42,700	90,100	9,100
Crowders	252,000	100,800	19,800	0	19,800	59,000
Southeast	252,000	100,800	22,800	0	22,800	85,600

*Includes planned and anticipated future development

2.3.1 Shopping Center Pump Station

Shopping Center Pump Station was designed as a 130 gpm duplex suction-lift pump station discharging into a 4-inch cast iron force main. Drawdown tests indicate that neither pump operates at the intended design point. Firm capacity of the pump station is 70 gpm. In order to provide a conservative perspective, the observed operating point of 70 gpm was used to analyze available capacity.

Firm Capacity:	70 gpm / 101,000 gpd
Design ADF:	40,000 gpd
Current ADF:	13,166 gpd
Max. Daily Flow:	63,492 gpd
Current ANYT ³ :	0 gpd
Available Capacity:	26,834 gpd

The Shopping Center Pump Station does not receive flow from any other sub-basins and would not receive flow from any of the anticipated developments. The capacity of the existing pump station should be sufficient to accommodate anticipated growth within the Shopping Center sub-basin through at least 2033.

Additional information concerning current and future flows is included in Appendix B.

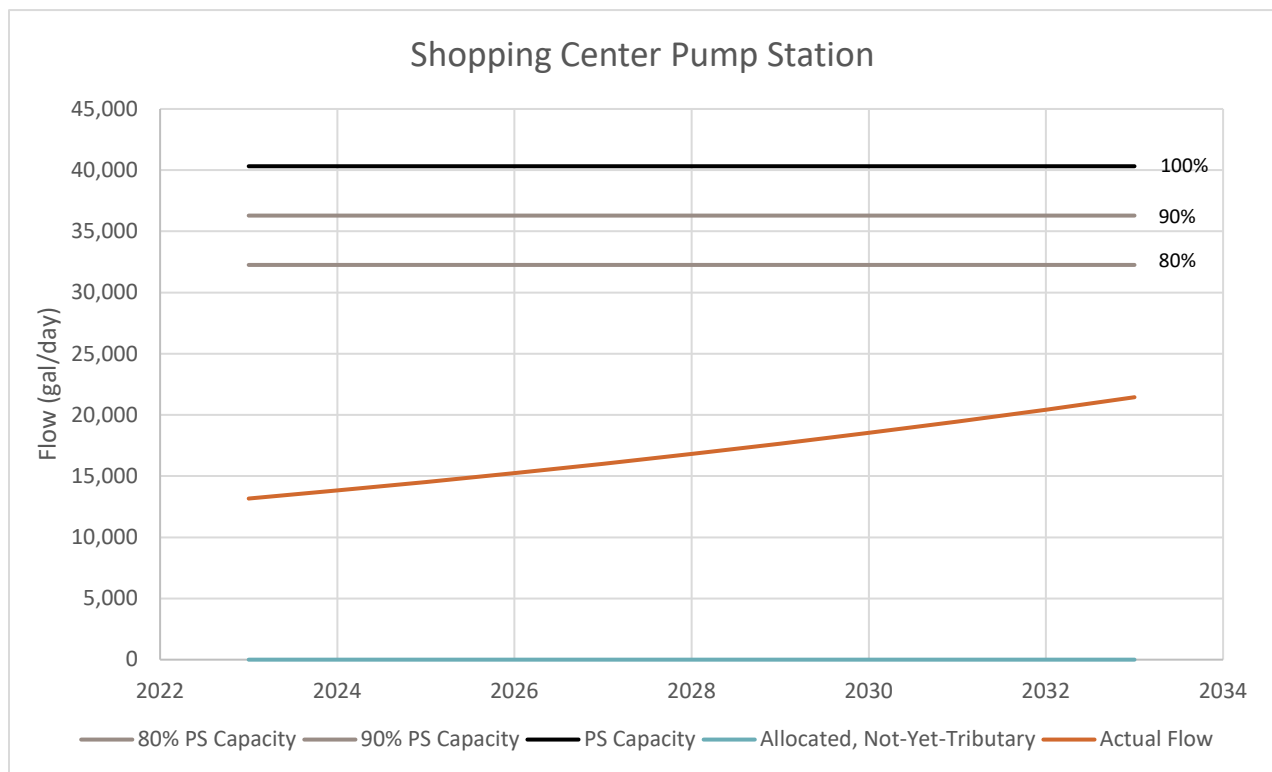


Figure 2.4 – Shopping Center Pump Station Flow Projections

³ Allocated, Not Yet Tributary Daily Flow

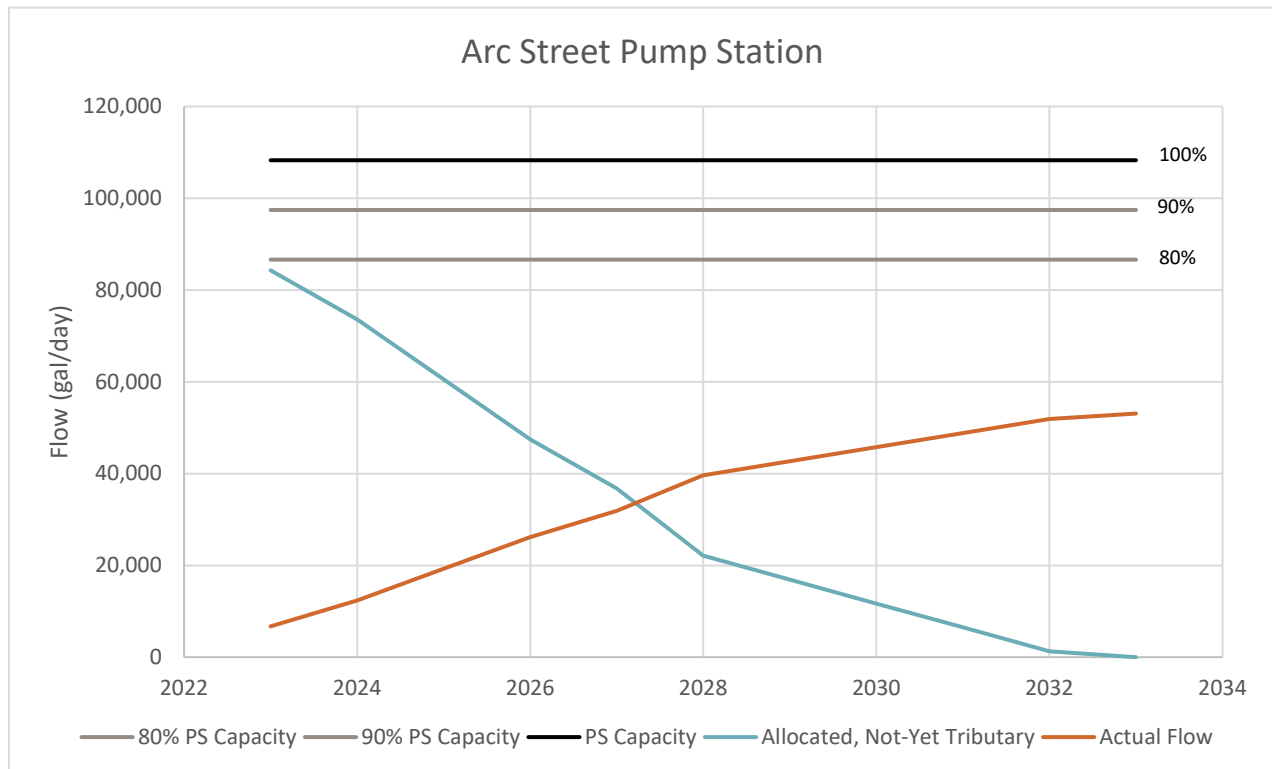
2.3.2 Arc Street Pump Station

Arc Street Pump Station was designed as a 180 gpm duplex submersible pump station discharging into a 6-inch PVC and ductile iron force main. Drawdown tests indicate that both pumps deliver more than the intended flow rate. Firm capacity of the pump station is 188 gpm. In order to provide a conservative perspective, the original design point of 180 gpm was used to analyze available capacity.

Firm Capacity:	180 gpm / 259,000 gpd
Design ADF:	104,000 gpd
Current ADF:	6,717 gpd
Max. Daily Flow:	21,204 gpd
Current ANYT:	84,300 gpd
Available Capacity:	12,983 gpd

Arc Street Pump Station does not receive flow from any other sub-basins. It would receive flow from three anticipated developments: Sky King Property, Creekside Cottages, and DiFlorio Property.

Additional information concerning current and future flows is included in Appendix B.



2.3.3 Ninth Street Pump Station

Ninth Street Pump Station was designed as a 705 gpm duplex submersible pump station discharging into a 12-inch PVC and ductile iron force main. Drawdown tests indicate that both pumps deliver more than the intended flow rate. Firm capacity of the pump station is 715 gpm. In order to provide a conservative perspective, the original design point of 705 gpm was used to analyze available capacity.

Firm Capacity:	705 gpm / 1,015,000 gpd
Design ADF:	406,000 gpd
Current ADF:	223,717 gpd
Max. Daily Flow:	1,628,280 gpd
Current ANYT:	91,980 gpd
Available Capacity:	96,020 gpd

The Ninth Street Pump Station receives flow from the Arc Street, Shopping Center, and Winfield Pump Stations and would receive flow from the 14th Street Townhomes, Bess Town Road Site, Carpenter Property, and Gould Avenue Properties developments.

Additional information concerning current and future flows is included in Appendix B.

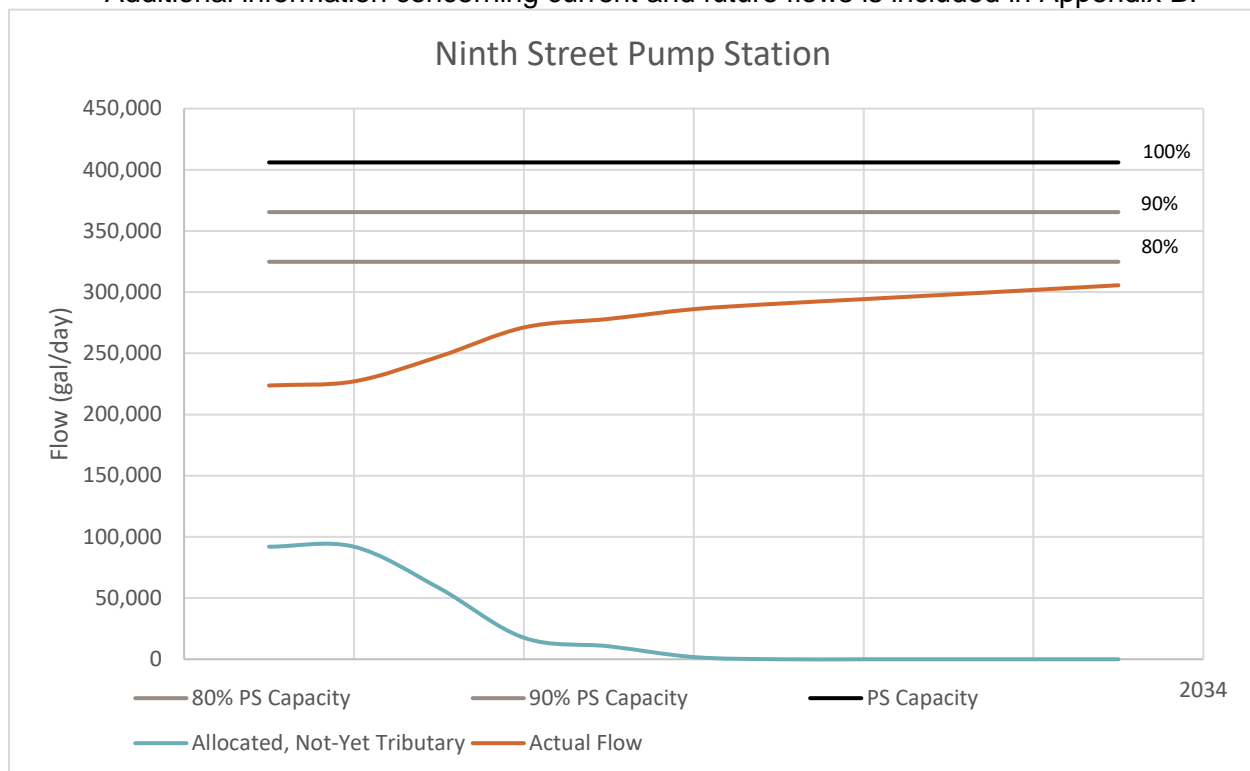


Figure 2.6 – Ninth Street Pump Station Flow Projections

2.3.4 Winfield Pump Station

Winfield Pump Station was designed as a 100 gpm duplex submersible pump station discharging into a 4-inch PVC force main. Drawdown tests indicate that both pumps deliver more than the intended flow rate. Firm capacity of the pump station is 106 gpm. In order to provide a conservative perspective, the original design point of 100 gpm was used to analyze available capacity.

Firm Capacity:	100 gpm / 144,000 gpd
Design ADF:	58,000 gpd
Current ADF:	7,713 gpd
Max. Daily Flow:	26,796 gpd
Current ANYT:	21,000 gpd
Available Capacity:	29,287 gpd

The Winfield Pump Station does not receive flow from any other sub-basins but would receive flow from the Dameron Property development.

Additional information concerning current and future flows is included in Appendix B.

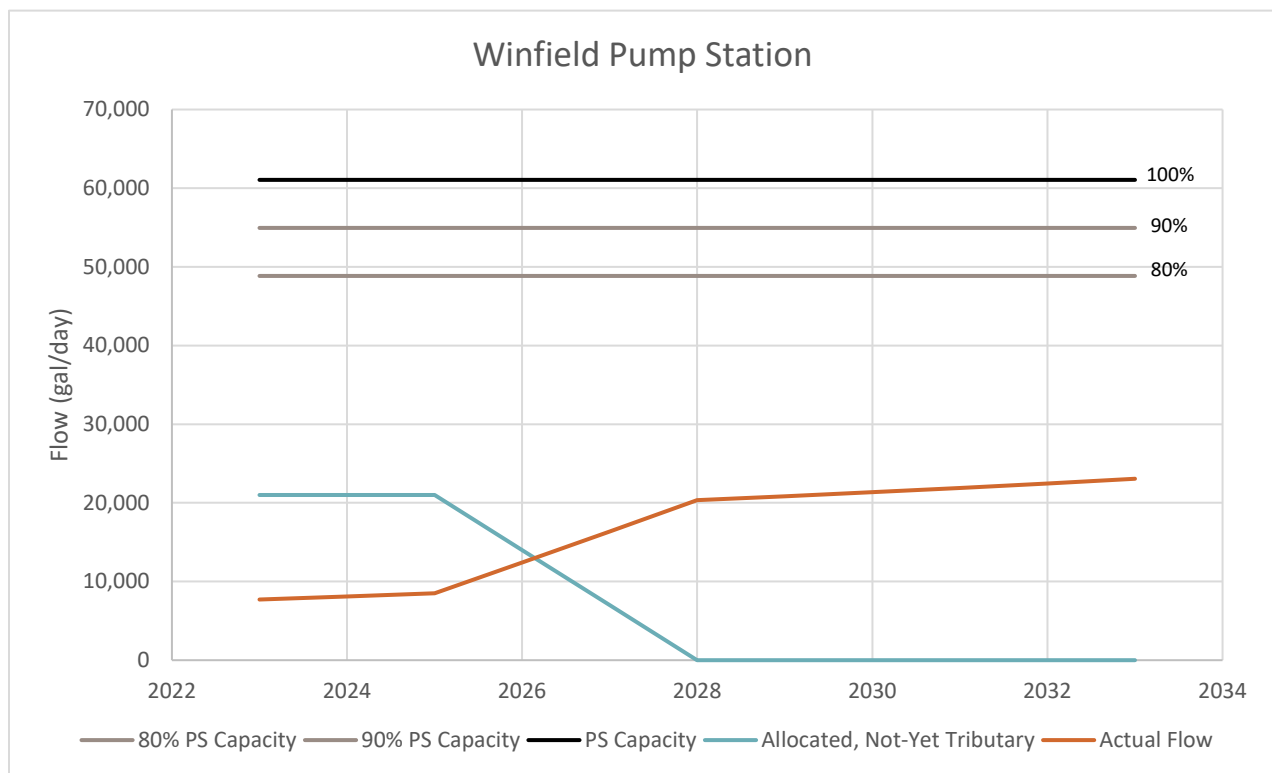


Figure 2.7 – Winfield Pump Station Flow Projections

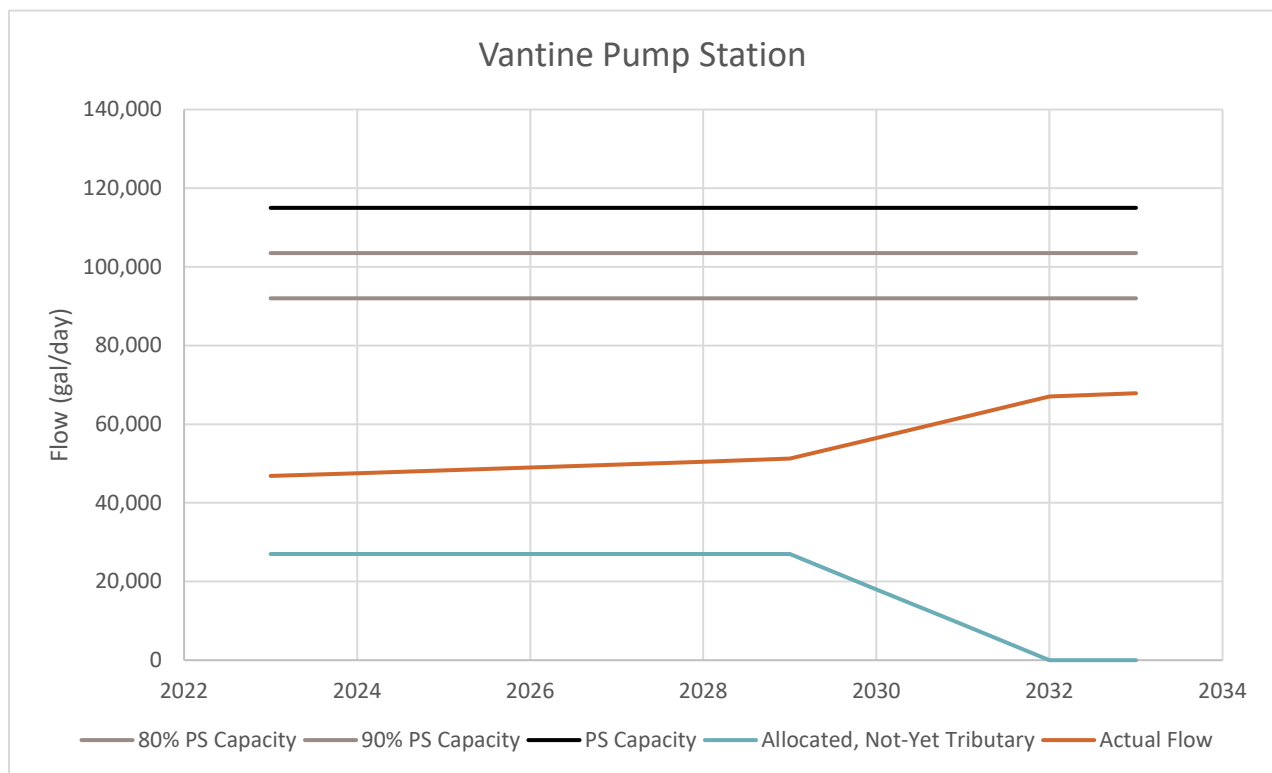
2.3.5 Vantine Pump Station

Vantine Pump Station was designed as a 175 gpm duplex suction-lift pump station discharging into a 6-inch cast iron force main. Plans are underway to expand this pump station to 200 gpm. The anticipated future operating point of 200 gpm was used to analyze available capacity.

Firm Capacity:	200 gpm / 288,000 gpd
Design ADF:	115,000 gpd
Current ADF:	46,846 gpd
Max. Daily Flow:	151,704 gpd
Current ANYT:	27,000 gpd
Available Capacity:	41,154 gpd

Vantine Pump Station does not receive flow from any other sub-basins but would receive flow from the Kiser Properties Development.

Additional information concerning current and future flows is included in Appendix B.



2.3.6 FMC-LC Road Pump Station

FMC-LC Road Pump Station was designed as a 50 gpm duplex submersible pump station discharging into a 4-inch PVC and ductile iron force main. Drawdown tests indicate that both pumps deliver more than the intended flow rate. Firm capacity of the pump station is 51 gpm. In order to provide a conservative perspective, the original design point of 50 gpm was used to analyze available capacity.

Firm Capacity:	50 gpm / 72,000 gpd
Design ADF:	29,000 gpd
Current ADF:	136 gpd
Max. Daily Flow:	936 gpd
Current ANYT:	0 gpd
Available Capacity:	28,864 gpd

The FMC-LC Pump Station does not receive flow from any other sub-basins and would not receive flow from any of the anticipated developments.

Additional information concerning current and future flows is included in Appendix B.

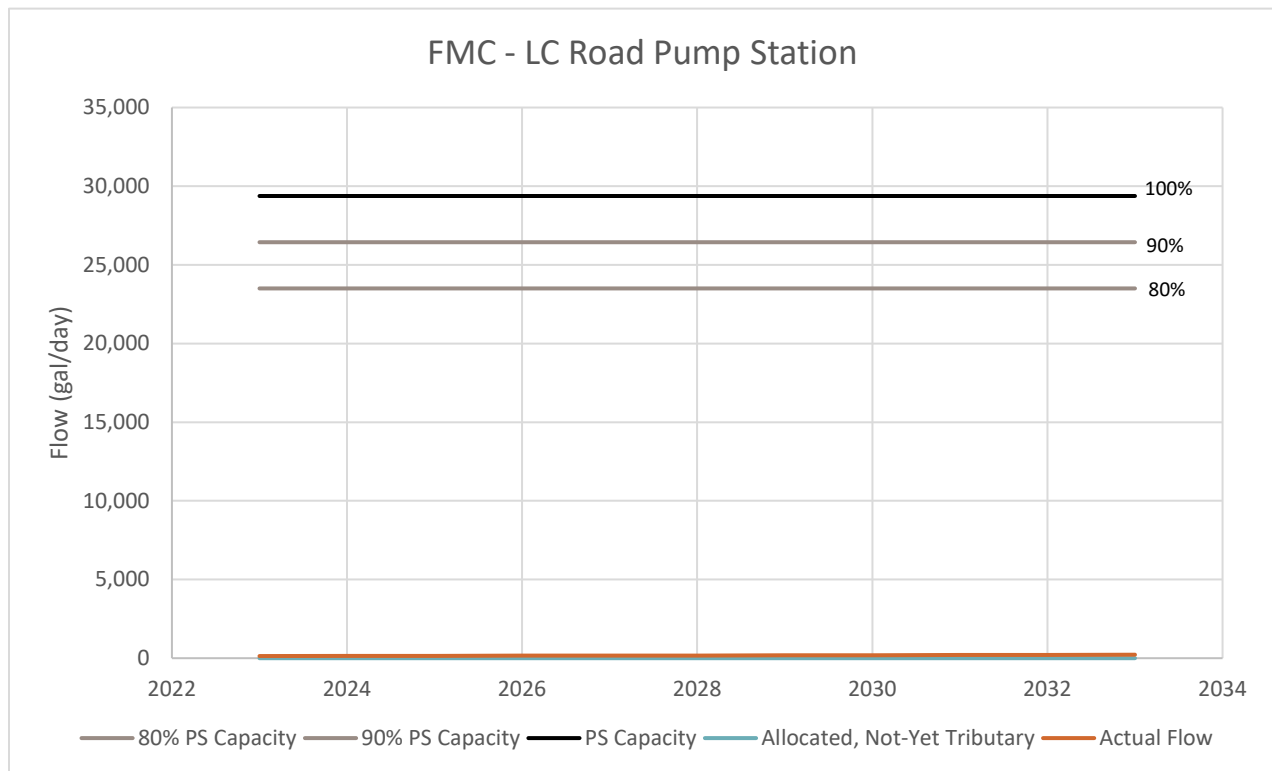


Figure 2.9 – FMC–LC Road Pump Station Flow Projections

2.3.7 Pinchback Pump Station

Pinchback Pump Station is a 175 gpm duplex suction-lift pump station discharging into a 6-inch cast iron force main. Drawdown tests indicate that Pump 1 delivers substantially more than the intended flow rate, while Pump 2 delivers slightly less than the intended flow rate. Firm capacity of the pump station is 172 gpm. In order to provide a conservative perspective, the observed operating point of 172 gpm was used to analyze available capacity.

Firm Capacity:	172 gpm / 248,000 gpd
Design ADF:	99,000 gpd
Current ADF:	47,418 gpd
Max. Daily Flow:	168,072 gpd
Current ANYT:	42,700 gpd
Available Capacity:	8,882 gpd

The Pinchback Pump Station currently receives flow from the Long Creek and Vantine Pump Stations. A project is underway to extend the Vantine Force Main so that it would no longer discharge to the Pinchback sub-basin; for this reason planned developments tributary to the Vantine PS have not been allocated to the Pinchback Pump Station. Pinchback Pump Station would receive flow from the Georgia and Pinchback and FMC Lithium USA developments.

Additional information concerning current and future flows is included in Appendix B.

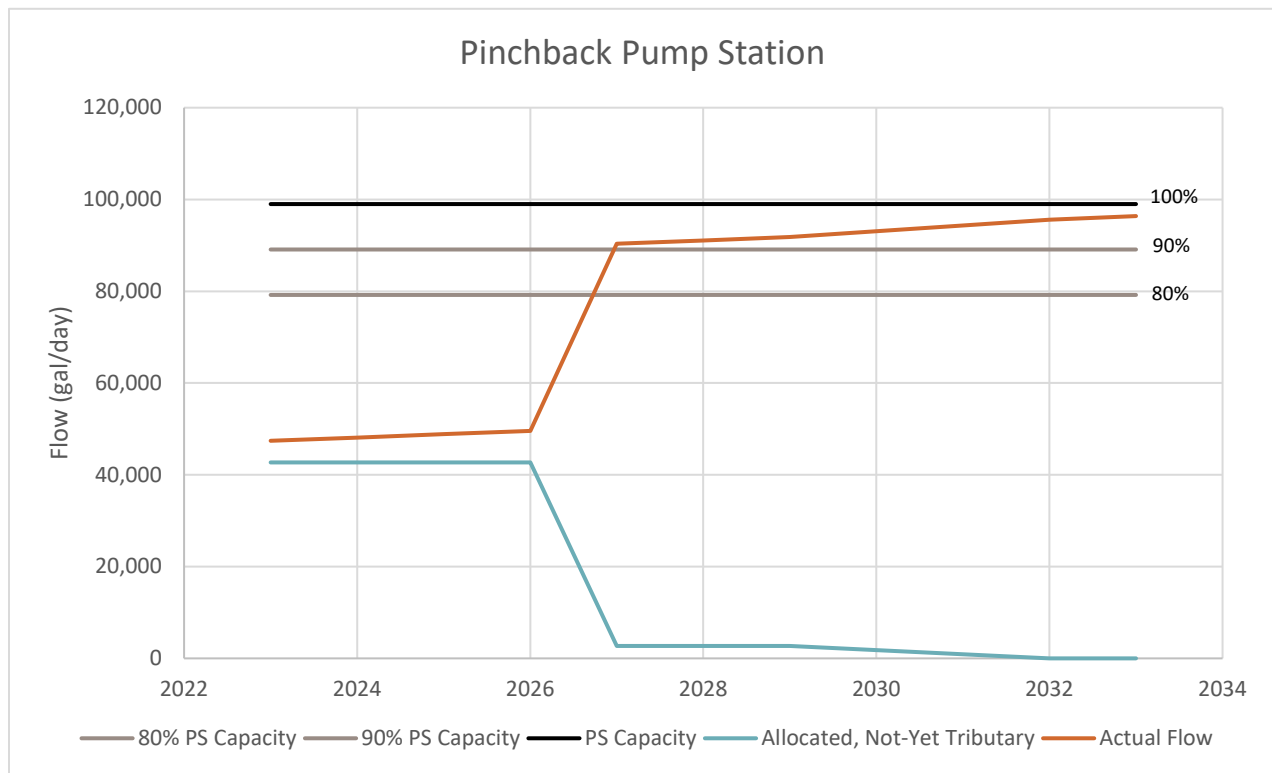


Figure 2.10 – Pinchback Pump Station Flow Projections

Based on the above flow allocation analysis, 98.8% of the flow through the Pinchback Pump Station is attributable to the Vantine Pump Station. Before the Pinchback Pump Station can accept the anticipated additional 40,000 gpd from FMC Lithium USA either the Vantine Force Main must be re-routed, or the Pinchback Pump Station be upgraded.

2.3.8 Crowders Pump Station

Crowders Pump Station was designed as a 175 gpm duplex suction-lift pump station discharging into a 6-inch cast iron force main. Drawdown tests indicate that neither pump operates at the intended design point. Firm capacity of the pump station is 137 gpm. In order to provide a conservative perspective, the observed operating point of 137 gpm was used to analyze available capacity.

Firm Capacity:	137 gpm / 197,000 gpd
Design ADF:	79,000 gpd
Current ADF:	19,805 gpd
Max. Daily Flow:	99,954 gpd
Current ANYT:	0 gpd
Available Capacity:	59,195 gpd

The Crowders Pump Station does not receive flow from any other sub-basins and would not receive flow from any of the anticipated developments.

Additional information concerning current and future flows is included in Appendix B.

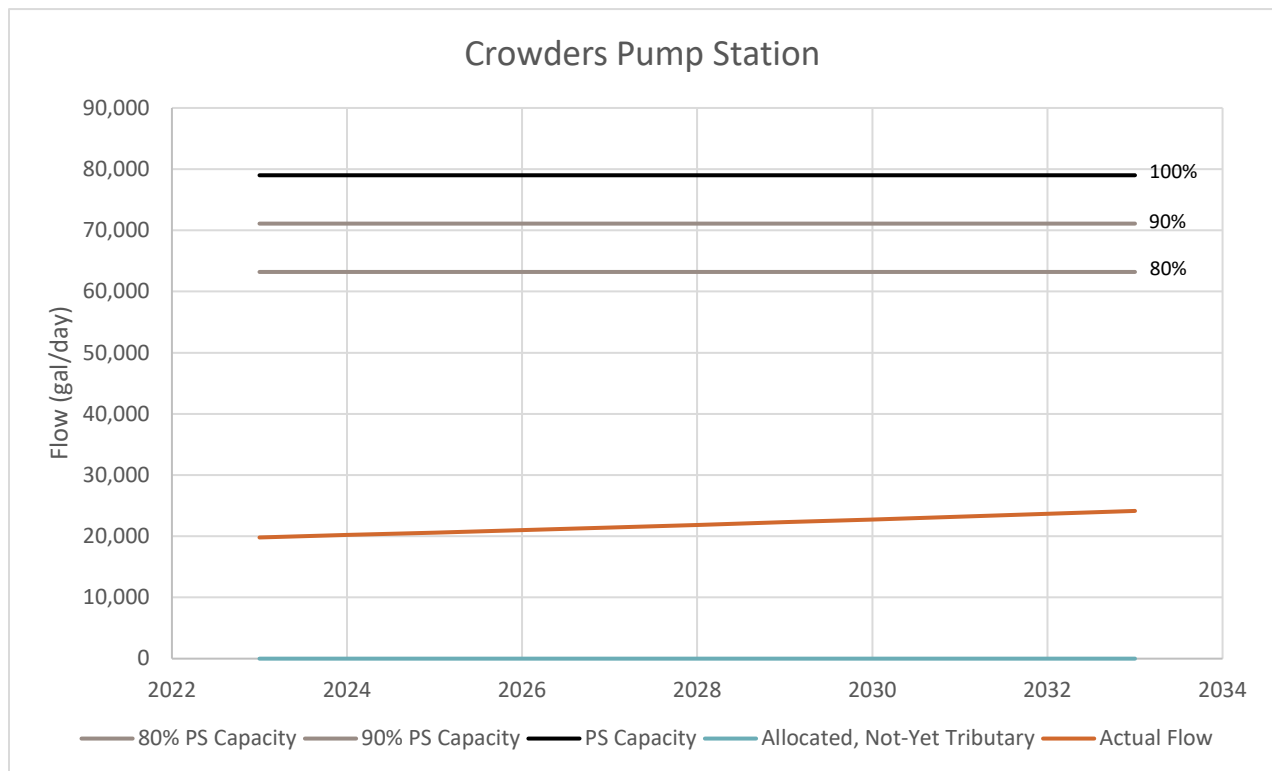


Figure 2.11 – Crowders Pump Station Flow Projections

2.3.9 Southeast Pump Station

Southeast Pump Station was designed as a 175 gpm duplex suction-lift pump station discharging into a 6-inch cast iron force main. Drawdown tests indicate that both pumps deliver more than the intended flow rate. Firm capacity of the pump station is 188 gpm. In order to provide a conservative perspective, the original design point of 175 gpm was used to analyze available capacity.

Firm Capacity:	175 gpm / 252,000 gpd
Design ADF:	101,000 gpd
Current ADF:	22,822 gpd
Max. Daily Flow:	74,892 gpd
Current ANYT:	0 gpd
Available Capacity:	78,178 gpd

The Southeast Pump Station does not receive flow from any other sub-basins but would receive flow from the Trinity development.

Additional information concerning current and future flows is included in Appendix B.

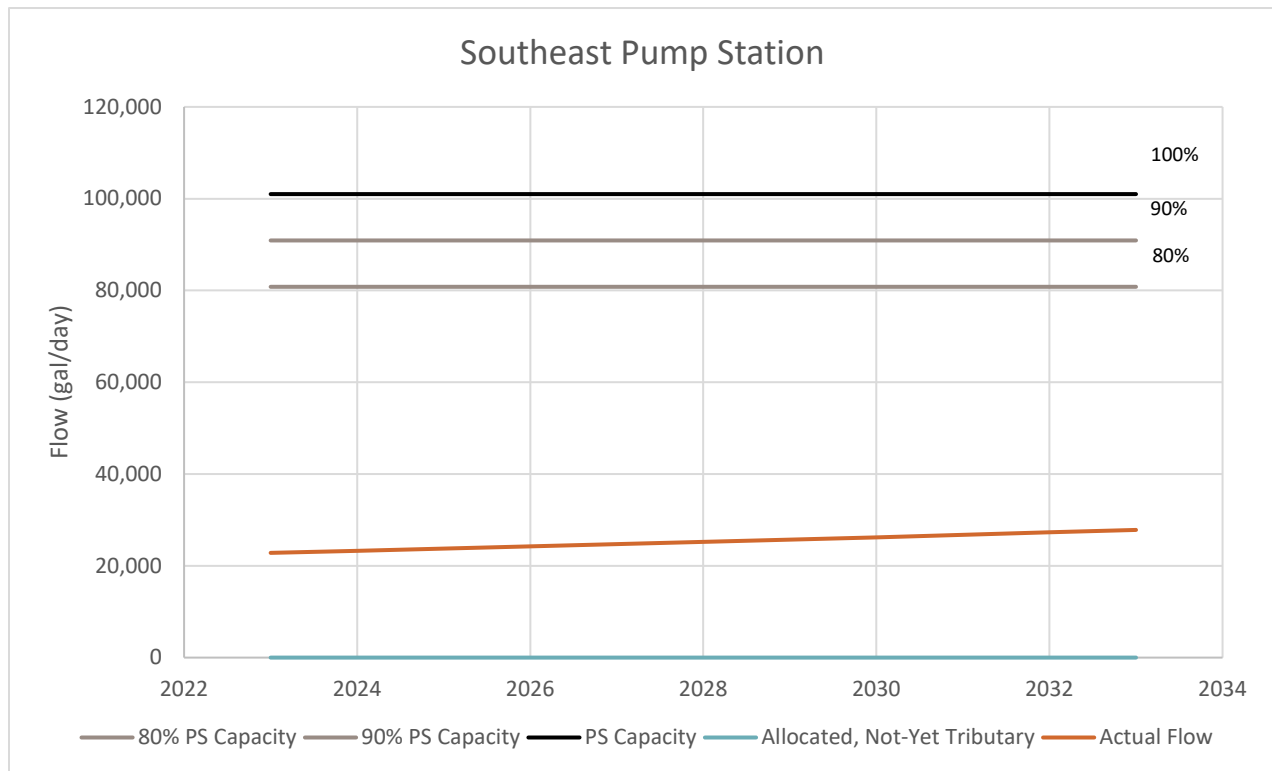


Figure 2.12 – Southeast Pump Station Flow Projections

3.0 CONCLUSIONS AND RECOMMENDATIONS

For the year 2021, the City's average daily withdrawal from the Arrowood Reservoir was 1.37 MGD. Anticipated demand from potential future development projects is summarized in Table 3.1.

Table 3.1 – Anticipated Future Water & Wastewater Demand

Description	Estimated ADF Allocation* (gpd)	Estimated Actual ADF* (gpd)
Residential, In-Process	191,900	95,950
Residential, Potential	302,400	151,200
Commercial/Industrial, In-Process	183,500	91,750
Commercial/Industrial, Potential	205,200	102,600
Total	883,000	441,500
Current ADF (2021)	1,370,000	
Anticipated Future ADF	2,253,000	1,811,500
WTP Permit Capacity	3,000,000	
Future ADF as % of Permit Capacity	75.10%	60.38%
WW Discharge Contract Maximum	1,610,000	
Future ADF as % of Contract Maximum	139.94%	112.52%

* Estimated ADF based on North Carolina 02T Rules for Waste Not Discharged to Surface Waters and Engineer's professional experience.

Based on McGill's analysis, existing capacity at the J.V. Tarpley Water Treatment Facility is sufficient to accommodate anticipated growth. However, the existing wastewater discharge agreement with Two Rivers Utilities, with its 48Mgal per month contract maximum, will likely be insufficient to accommodate anticipated wastewater discharge. Publicly available information indicates that TRU operates three (3) wastewater treatment facilities (Long Creek, Crowders Creek, and Eagle Road) with an average daily flow of 9.74 MGD and a combined permit capacity of 26 MGD. It is likely that TRU will be able to accommodate increased demand from Bessemer City, however, this should not be assumed. As Bessemer City continues planning for future growth, it is McGill's recommendation that TRU be involved in the conversation.

In addition to contract negotiations with TRU, McGill recommends seven (7) water system improvement projects and nine (9) sewer system improvement projects to improve system functionality and provide water and/or sewer utility service to areas planned for development. McGill's recommendation is that the City staff and elected officials develop processes and systems through which developers contribute to the cost and construction of infrastructure to serve their developments. Economic developers at the local, county, and regional levels should also be consulted in order to plan infrastructure projects around sustainable economic development and job creation.

An additional project, which is beyond the scope of the current master planning effort, but which should be accounted for in the City's capital improvement planning is the decommissioning of the existing basins at the abandoned Abernathy Creek Wastewater Treatment Plant. Recommended improvement projects are summarized in Table 3.2 and Table 3.3 below and discussed in detail in Section 3.1 and Section 3.2.

Table 3.2 – Recommended Water System Improvements

	Description	POPC
1	Holland Memorial Church Road Water Line Extension	\$658,000
2	North Side Loop Closures	\$527,000
3	Sunset Tank Connectivity Improvements	\$1,913,000
4	Southeast Water Tank	\$4,950,000
5	Southridge Parkway Phase 1 Water Line Extensions	\$75,500
6	Ramseur Road and Sunset Drive Water Line Extension	\$1,291,000
7	Southridge Parkway Phase 2 Water Line	\$3,508,000
	Water Sub-Total	\$12,922,500

Table 3.3 – Recommended Sanitary Sewer System Improvements

	Description	POPC
1	Long Creek Outfall Sewer, Phase 1	\$5,380,000
2	Long Creek Outfall - Arc Street Pump Station Gravity Sewer Extension	\$2,423,000
3	Southeast Pump Station Gravity Sewer Extension	\$4,002,000
4	Ninth Street Pump Station Upgrades	\$38,000
5	Shopping Center Pump Station Gravity Sewer Extension	\$1,982,000
6	Exit 13 Gravity Sewer Extension	\$1,523,000
7	Long Creek Outfall Sewer, Phase 2	\$5,779,000
8	Long Creek Outfall - Ninth Street Pump Station Gravity Sewer Extension	\$4,235,000
9	Oates Road Pump Station and Force Main	\$1,745,000
	Sewer Sub-Total	\$27,107,000

Additional Sanitary Sewer Improvement – Emptying and decommissioning of existing basins at the abandoned Wastewater Treatment Facility

3.1 Proposed Water Distribution System Development Projects

3.1.1 Holland Memorial Church Road Water Line Extension

The Holland Memorial Church Road Water Line Extension Project would install approximately 2,700 LF of 6-inch water line along with associated valves, fire hydrants, and other appurtenances beginning from an existing 12-inch water line at the intersection of Holland Memorial Church Road and NC-274 / Bessemer City Road and extending generally north along Holland Memorial Church Road to connect to an existing 6-inch water line on Arc Street. This project would provide service to existing homes along Holland Memorial Church Road, improve system connectivity and water quality by eliminating existing dead-ends, and reduce water losses by eliminating the need for blow-offs on the aforementioned dead-ends.



Figure 3.1 – Holland Memorial Church Road Water Line Extension Location Map

A map showing the proposed water main alignment is included in Appendix A. The preliminary opinion of probable cost for the Holland Memorial Church Road Water Line Extension Project is \$677,000. A detailed cost estimate is included in Appendix C.

3.1.2 North Side Loop Closures

The North Side Loop Closures Project would install approximately 400 LF of 8-inch water line along ML Kiser Road and 1,300 LF of 6-inch water line along Yellow Jacket Lane and Heather Court. The new water line would improve system connectivity and water quality by eliminating existing dead-ends and reduce water losses by eliminating the need for blow-offs on the aforementioned dead-ends. Valves, fire hydrants, and other appurtenances are included.

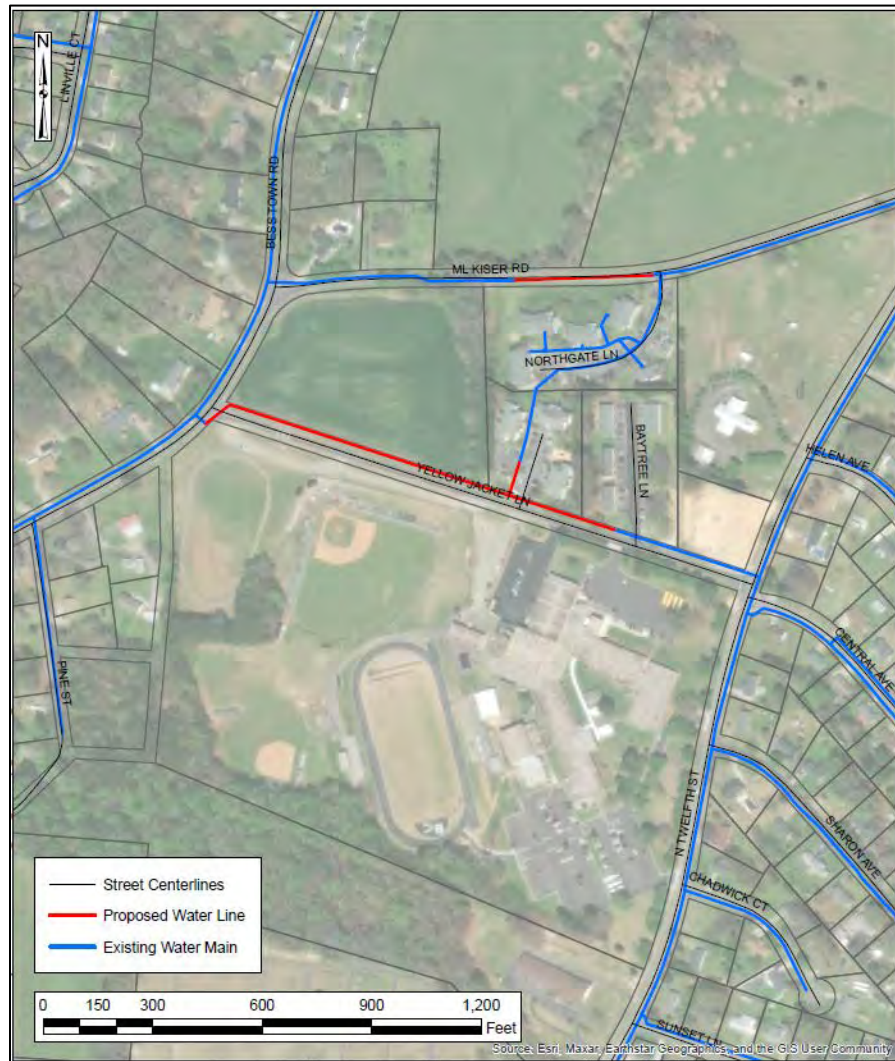


Figure 3.2 – North Side Loop Closures Location Map

A full-size map showing the proposed water main alignment is included in Appendix A. The preliminary opinion of probable cost for the North Side Loop Closures Project is \$544,000. A detailed cost estimate is included in Appendix C.

3.1.3 Skyland Drive Tank Connectivity Improvements

The Skyland Drive Tank Connectivity Improvements Project would install approximately 3,800 LF of 12-inch water line linking the existing Skyland Drive Tank to an existing 12-inch water line on E. Alabama Avenue. This extension would create a complete 12-inch connection between the existing Skyland Drive Tank and the proposed Southeast Tank; future water system extension projects could then complete a 12-inch southern loop along the planned Southridge Parkway. The proposed project would also include all necessary valves, hydrants, and other appurtenances, as well as an approximately 300 LF bored and jacked crossing of the existing railroad tracks.



Figure 3.3 – Skyland Drive Tank Drive Connectivity Improvements Location Map

A map showing the proposed water main alignment is included in Appendix A. The preliminary opinion of probable cost for the Skyland Drive Tank Connectivity Improvements Project is \$1,971,000. A detailed cost estimate is included in Appendix C.

3.1.4 Southeast Water Tank

The Southeast Water Tower Project would construct a new 750,000 gallon elevated steel water tank on the site of the proposed Trinity development (refer to Figure 3.4). The project would also include the installation of approximately 2,300 LF of 12-inch waterline connecting the proposed tank to existing water lines on Downey Lane and Edgewood Road.



Figure 3.4 – Southeast Water Tank Location Map

A map showing the proposed location of the water tank location and water main alignment is included in Appendix A. The preliminary opinion of probable cost for the Southeast Water Tower Project is \$5,098,000. A detailed cost estimate is included in Appendix C.

3.1.5 Southridge Parkway Phase 1 Water Line Extensions

The Southridge Parkway Phase 1 Water Line Extensions Project would install approximately 50 LF of 12-inch water line to complete a 12-inch water connection from Edgewood Road to NC-274 generally along the Southridge Parkway Phase 1 alignment. The project includes an approximately 50 LF run of pipe near the intersection of Davis Street and NC-274 as shown in Figure 3.5.

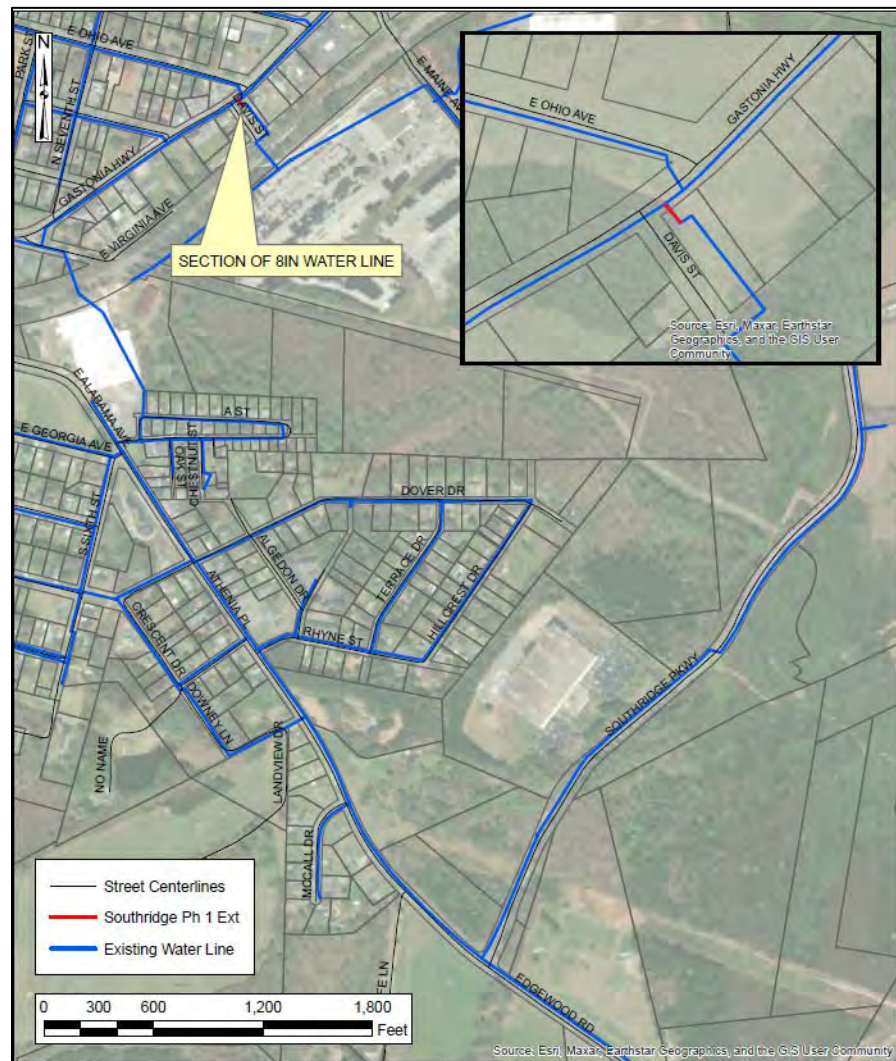


Figure 3.5 – Southridge Parkway Phase 1 Water Line Extensions Location Map

A map showing the proposed water main alignment is included in Appendix A. The preliminary opinion of probable cost for the Southridge Parkway Phase 1 Water Line Extensions Project is \$75,500. A detailed cost estimate is included in Appendix C.

3.1.6 Ramseur Road and Sunset Drive Water Line Extension

The Ramseur Road and Sunset Drive Water Line Extension Project would install approximately 4,100 LF of 8-inch water line along Ramseur Road and Sunset Drive. The new water line would tie into an existing 12-inch water line near the intersection of Ramseur Road and NC-161 and an existing 6-inch water line on West Virginia Avenue and then extend generally north along Ramseur Road and east along Sunset Drive to connect to an existing 8-inch water line on Sunset Drive. Valves, fire hydrants, and other appurtenances are included. The project would extend service to existing residents, improve system connectivity and water quality by eliminating existing dead-ends, and reduce water losses by eliminating the need for blow-offs on the aforementioned dead-ends.

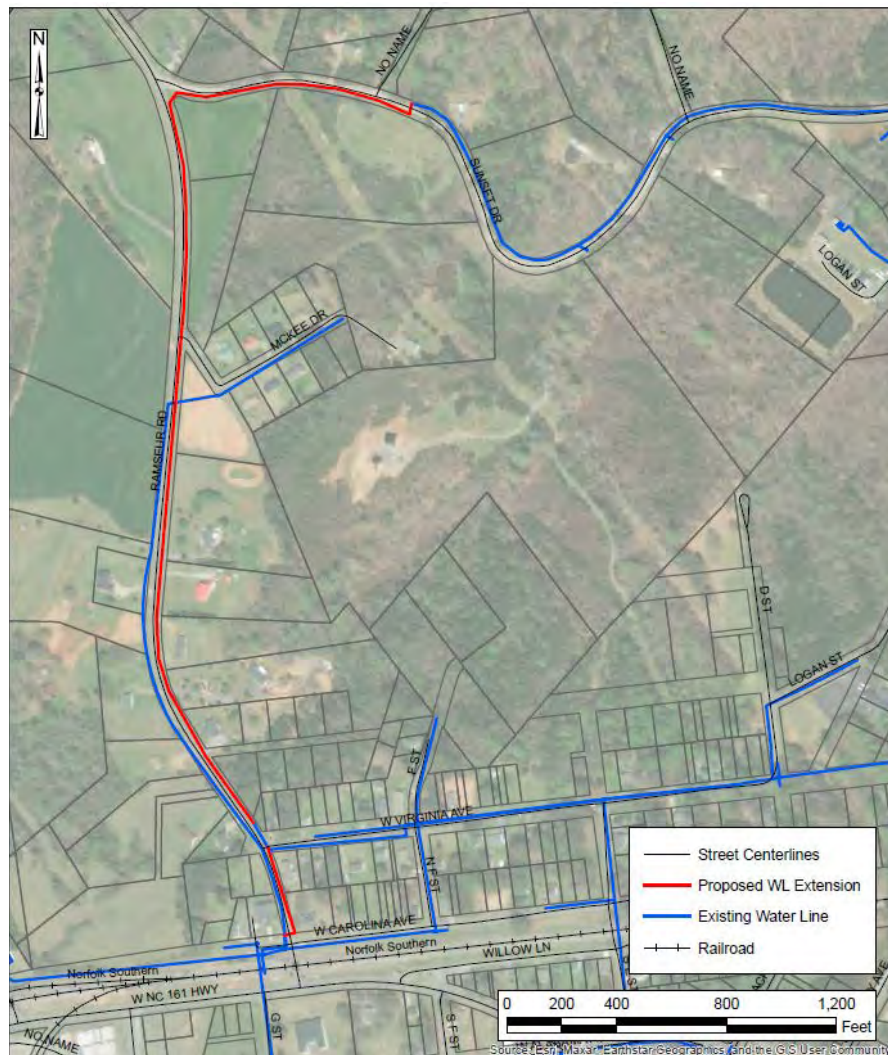


Figure 3.6 – Ramseur Road and Sunset Drive Water Line Extension Location Map

A map showing the proposed water main alignment is included in Appendix A. The preliminary opinion of probable cost for the Ramseur Road and Sunset Drive Water Line Extension Project is \$1,329,000. A detailed cost estimate is included in Appendix C.

3.1.7 Southridge Parkway Phase 2 Water Line

The Southridge Parkway Water Line Project would install approximately 10,500 LF of new 12-inch water line along with valves, fire hydrants, and other appurtenances following roughly the same alignment as the proposed Phase 2 of Southridge Parkway beginning from an existing water line on Crowders Mountain Road and extending generally eastward to an existing water line near the intersection of Southridge Parkway and Edgewood Road. This project would be dependent upon construction of the proposed Southridge Parkway Extension.

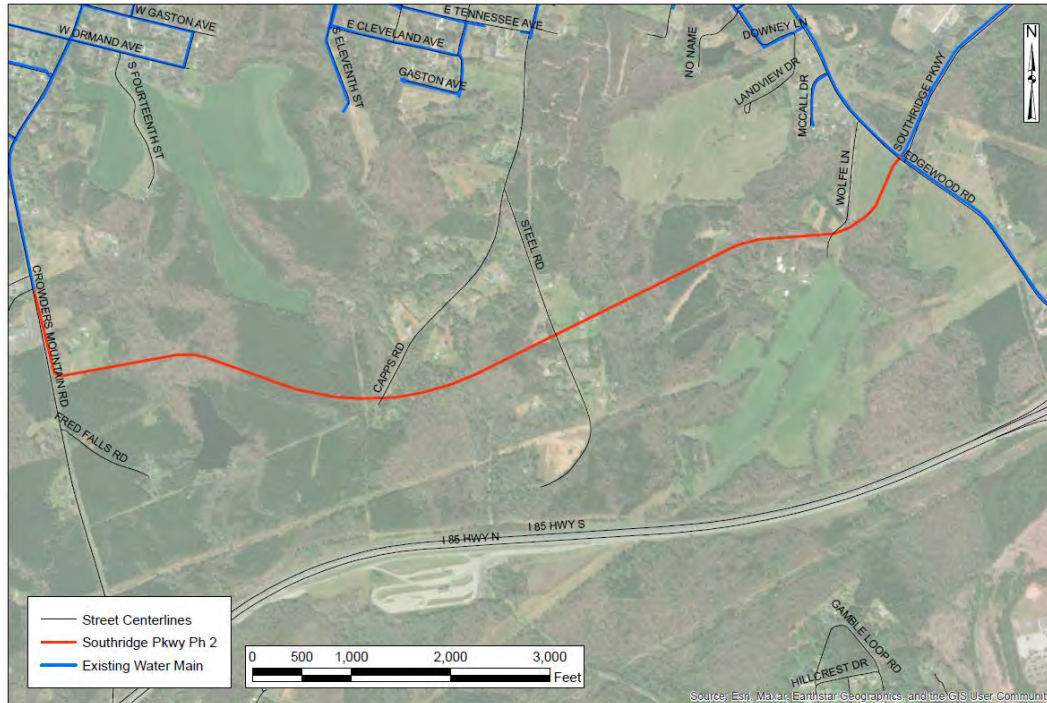


Figure 3.7 – Southridge Parkway Phase 2 Waterline Location Map

A map showing the proposed water main alignment is included in Appendix A. The preliminary opinion of probable cost for the Southridge Parkway Water Line Project is \$3,615,000. A detailed cost estimate is included in Appendix C.

3.2 Proposed Wastewater Collection System Development Projects

3.2.1 Long Creek Outfall Sewer, Phase 1 + Phase 2

Phase 1 of the Long Creek Outfall Sewer Project would install approximately 6,900 LF of 24-inch gravity sewer along Long Creek beginning from an existing TRU sanitary sewer manhole and extend upstream to the confluence of Long Creek and an unnamed tributary at which point it would tie-in with the proposed Coster School Road / Arc Street Gravity Sewer Extension.

Phase 2 of the Long Creek Outfall Sewer Project would install approximately 7,750 LF of 24-inch gravity sewer along Long Creek beginning at the upstream extent of the Phase 1 project and continuing upstream to the confluence of Long Creek and an unnamed tributary at which point it would tie-in with the proposed Ninth Street Pump Station Gravity Sewer Extension.

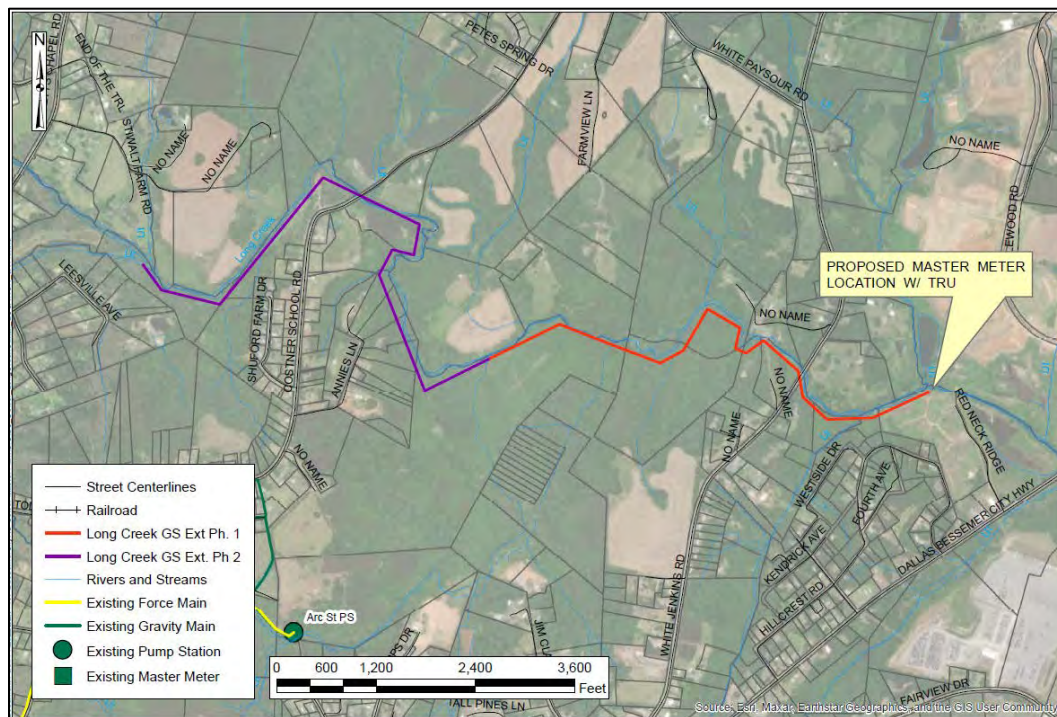


Figure 3.8 – Long Creek Outfall Sewer Phase 1 & Phase 2 Location Map

A map showing the proposed sanitary sewer alignment is included in Appendix A. The preliminary opinion of probable cost for Phase 1 of this project is \$5,542,000. The preliminary opinion of probable cost for Phase 2 of this project is \$5,952,000. Detailed cost estimates for both phases are included in Appendix C.

3.2.2 Long Creek Outfall - Arc Street Pump Station Gravity Sewer Extension

The Long Creek Outfall - Arc Street Pump Station Gravity Sewer Extension Project would install approximately 6,250 LF of 15-inch gravity sewer along an unnamed tributary of Long Creek beginning from the terminus of Phase 1 of the Long Creek Outfall Gravity Sewer Extension Project and extending upstream as far as the existing Arc Street Pump Station. Following the installation of the proposed gravity sewer, the existing Arc Street Pump Station would be removed from service.

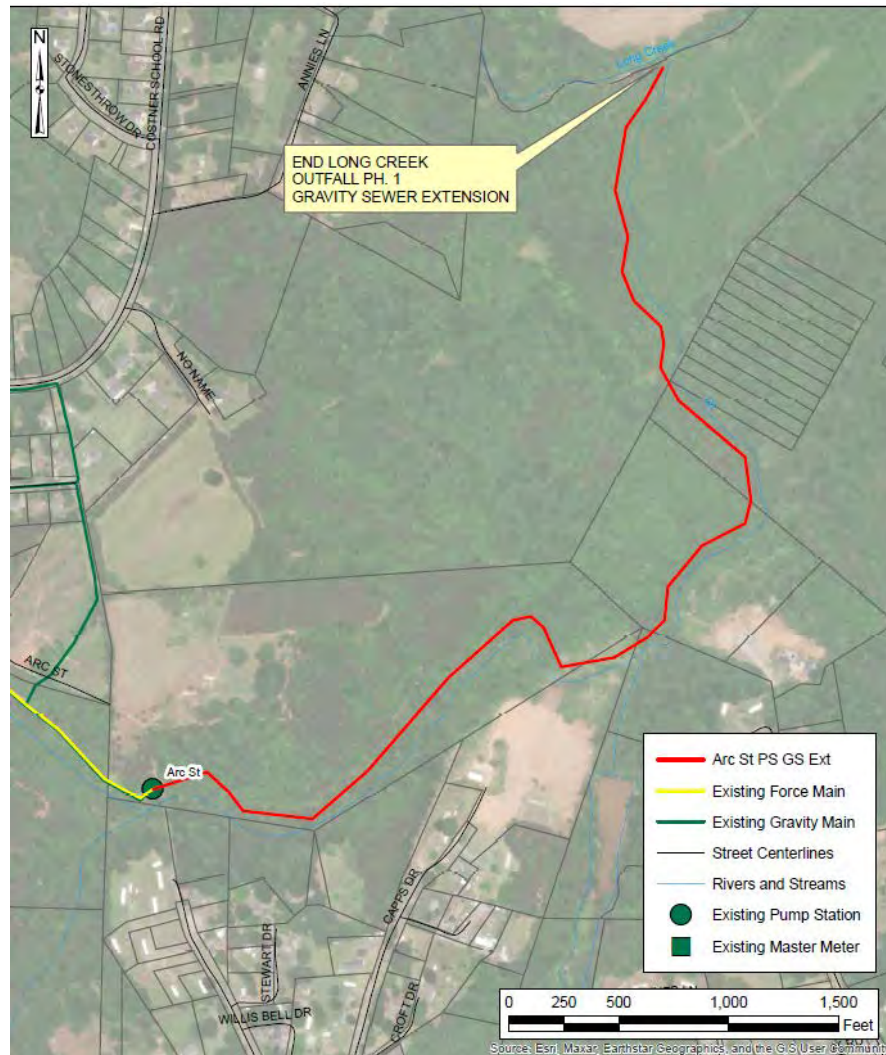


Figure 3.9 – Long Creek Outfall – Arc Street PS Gravity Sewer Extension Location Map

A map showing the proposed sanitary sewer alignment is included in Appendix A. The preliminary opinion of probable cost for the Arc Street Pump Station Gravity Sewer Extension Project is \$2,495,000. A detailed cost estimate is included in Appendix C.

3.2.3 Southeast Pump Station Gravity Sewer Extension

The Southeast Pump Station Gravity Sewer Extension Project would install approximately 7,000 LF of 12-inch gravity sewer along an unnamed tributary of Abernethy Creek beginning from an existing TRU sanitary sewer manhole and extending upstream as far as the existing Southeast Pump Station. Following the installation of the proposed gravity sewer, the existing Southeast Pump Station would be removed from service.

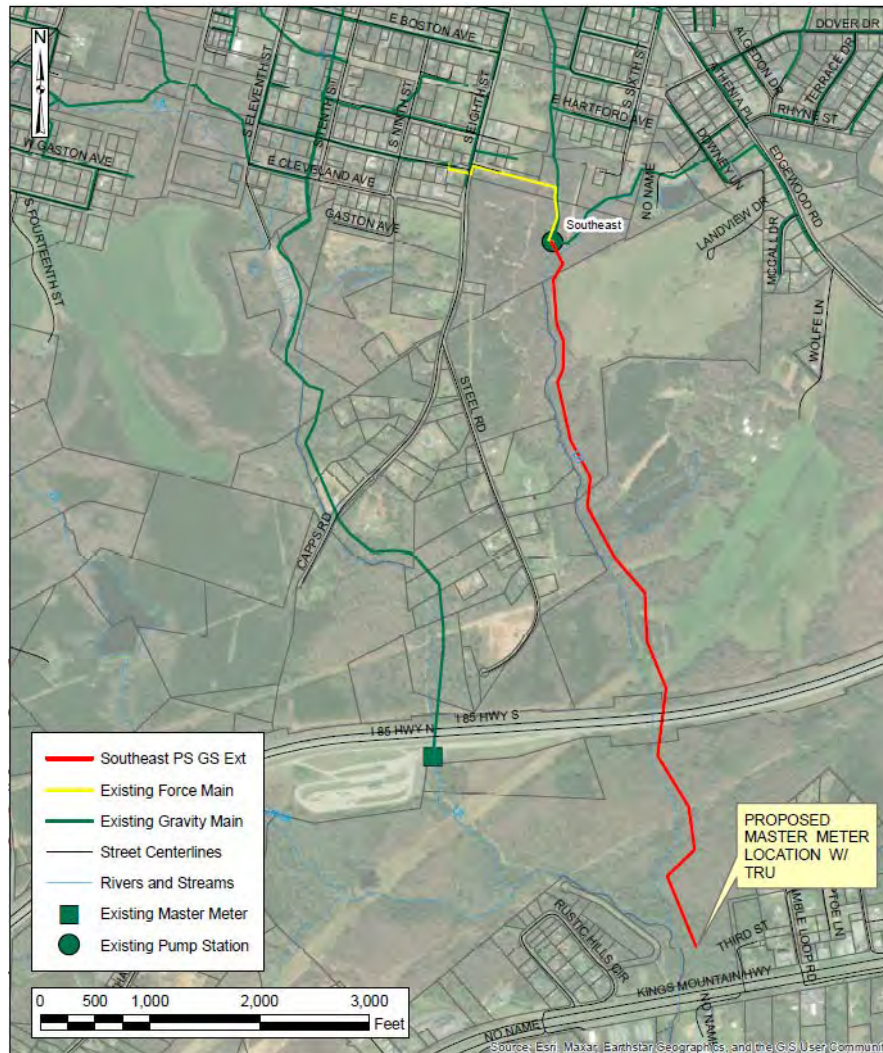


Figure 3.10 – Southeast Pump Station Gravity Sewer Extension Location Map

A map showing the proposed sanitary sewer alignment is included in Appendix A. The preliminary opinion of probable cost for the Southeast Pump Station Gravity Sewer Extension Project is \$4,047,000. A detailed cost estimate is included in Appendix C.

3.2.4 Ninth Street Pump Station Upgrades

The Ninth Street Pump Station Upgrades Project would make incremental improvements to the pumps to increase pumping capacity. The pumps would be upgraded by replacing the existing impellers with new larger impellers. These improvements would be expected to increase the firm pumping capacity of the station from 705 gpm to 815 – 850 gpm. Upgraded pump station capacity would be dependent upon the condition and elevation profile of the existing force main which is not planned for replacement.

This project is proposed to accommodate additional flows generated by anticipated development projects (most notably the Bess Town Road Apartments), and prioritization would be dependent upon the construction timelines of those projects.



Figure 3.11 – Ninth Street Pump Station Location Map

A map showing the location of the existing Ninth Street Pump Station is included in Appendix A. The preliminary opinion of probable cost for the Ninth Street Pump Station Upgrades Project is \$38,000. A detailed cost estimate is included in Appendix C.

3.2.5 Shopping Center Pump Station Gravity Sewer Extension

The Shopping Center Gravity Sewer Extension Project would install approximately 4,350 LF of 12-inch gravity sewer along an unnamed tributary of Long Creek beginning from the terminus of the proposed Costner School Road / Arc Street Gravity Sewer Extension Project and extending upstream as far as the existing Shopping Center Pump Station. Following the installation of the proposed gravity sewer, the existing Shopping Center Pump Station would be removed from service.

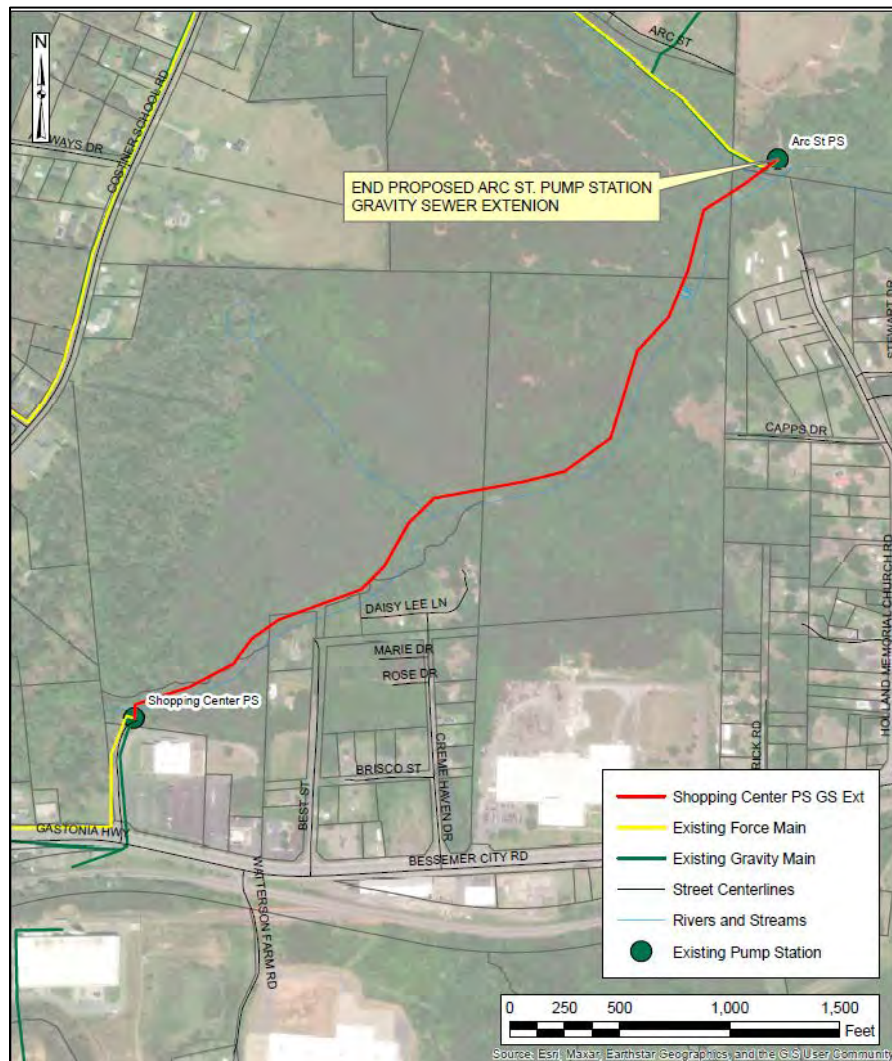


Figure 3.12 – Shopping Center Pump Station Gravity Sewer Extension Location Map

A map showing the proposed sanitary sewer alignment is included in Appendix A. The preliminary opinion of probable cost for the Shopping Center Pump Station Gravity Sewer Extension Project is \$1,967,000. A detailed cost estimate is included in Appendix C.

3.2.6 Exit 13 Gravity Sewer Extension

The Exit 13 Gravity Sewer Extension Project would install approximately 2,800 LF of 8-inch gravity sewer along an unnamed tributary of Crowders Creek beginning from an existing TRU sanitary sewer manhole. The northern extent of the project would be at a yet-to-be-determined point on the Wolfe Property (see Figure 3.13), which is planned for future industrial development.

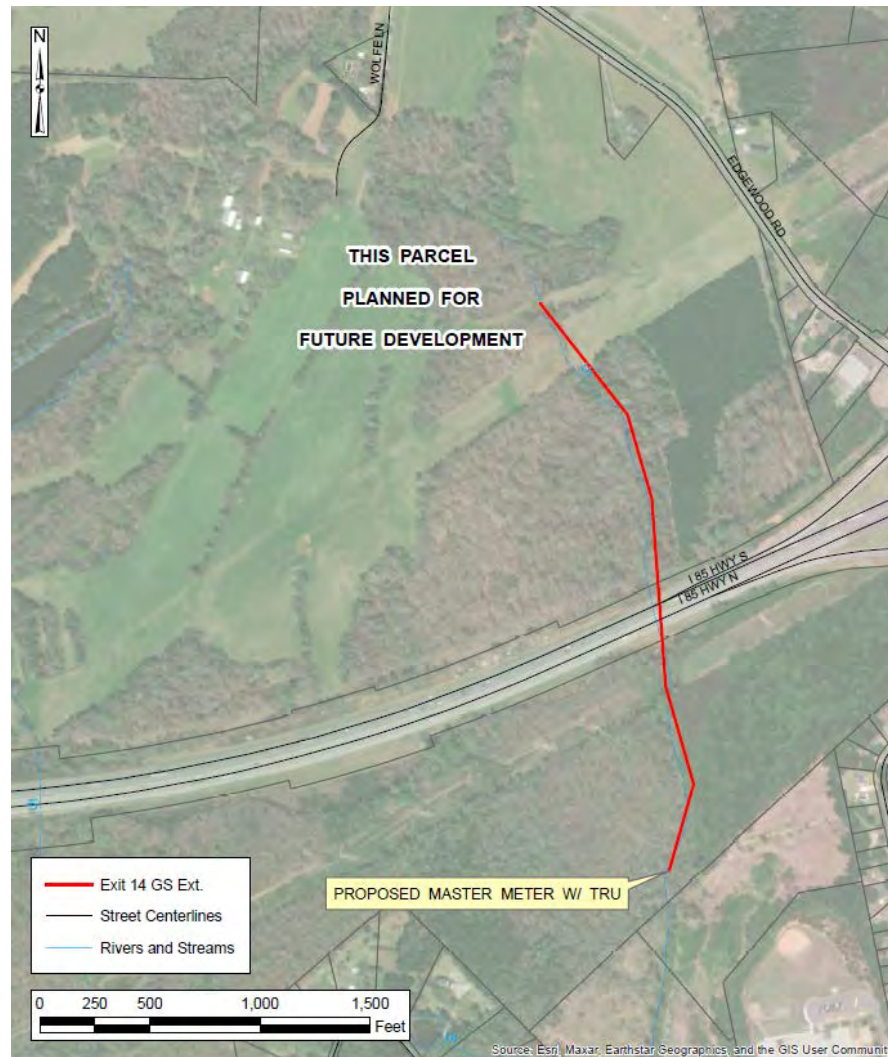


Figure 3.13 – Exit 13 Gravity Sewer Extension Location Map

A map showing the proposed sanitary sewer alignment is included in Appendix A. The preliminary opinion of probable cost for the Exit 13 Gravity Sewer Extension Project is \$1,569,000. A detailed cost estimate is included in Appendix C.

3.2.7 Long Creek Outfall – Ninth Street Pump Station Gravity Sewer Extension

The Long Creek Outfall - Ninth Street Pump Station Gravity Sewer Extension Project would install approximately 7,000 LF of 20-inch gravity sewer along an unnamed tributary of Long Creek beginning from the terminus of Phase 2 of the Long Creek Outfall Sewer Project and extending up stream as far as the existing Ninth Street Pump Station. Following installation of the proposed gravity sewer, the existing Ninth Street Pump Station would be removed from service.

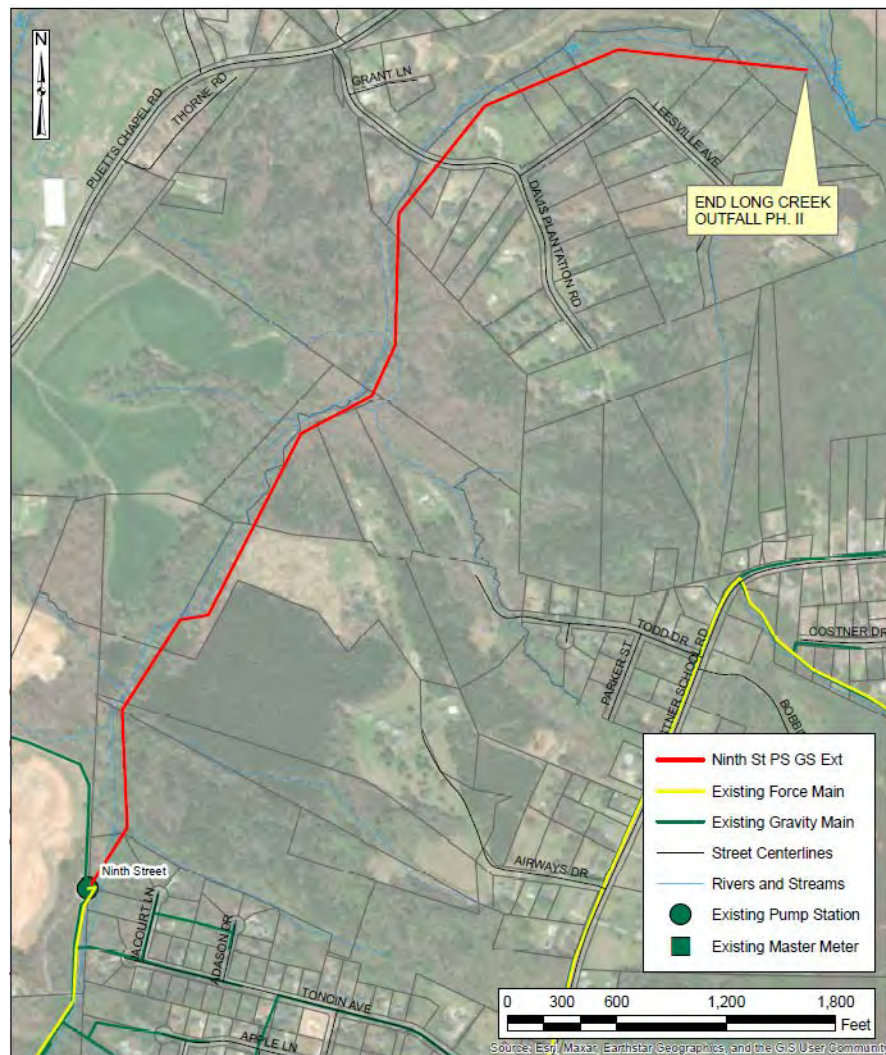


Figure 3.14 – Long Creel Outfall – Ninth Street PS Gravity Sewer Extension Location Map

A map showing the proposed sanitary sewer alignment is included in Appendix A. The preliminary opinion of probable cost for the Ninth Street Pump Station Gravity Sewer Extension Project is \$4,365,000. A detailed cost estimate is included in Appendix C.

3.2.8 Oates Road Pump Station and Force Main

The Oates Road Pump Station and Force Main Project would construct a new 200 gpm duplex submersible pump station at a location just off of Oates Road in the southeastern part of the City. This pump station would receive flow from the proposed Oates Road Properties development and the surrounding area and discharge through a 3,500 LF force main to an existing sanitary sewer manhole on Southridge Parkway.

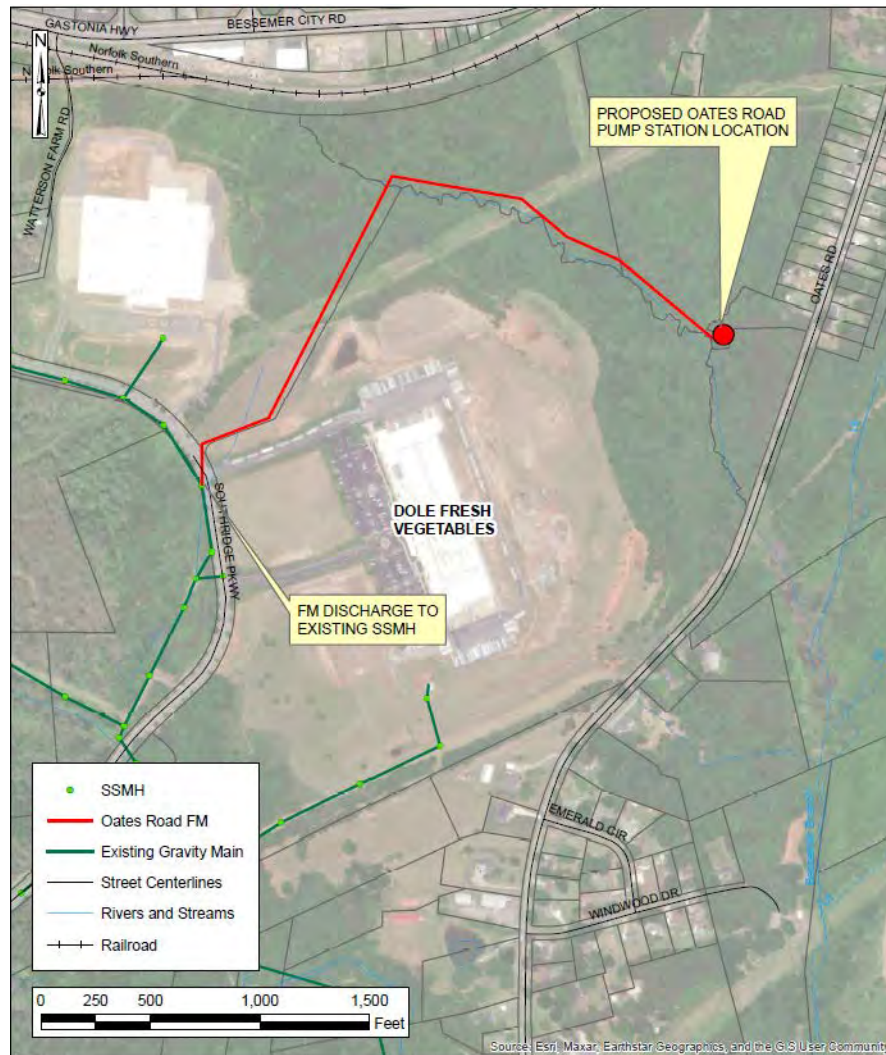


Figure 3.15 – Oates Road Pump Station and Force Main Location Map

A map showing the proposed pump station location and force main alignment is included in Appendix A. The preliminary opinion of probable cost for the Oates Road Pump Station Project is \$1,800,000. A detailed cost estimate is included in Appendix C.

4.0 10-YEAR CIP + YEARS 11 & BEYOND

McGill Associates recommends the incorporation of the recommended improvement projects into the City's existing 10-year Capital Improvements Plan. The current 10-year CIP summary table, which was developed by others in 2021, is included as Figure 4.1, and the full report included by reference.⁴

A recommended timeline for the construction of the recommended Water and Sewer System Expansion Projects is included as Table 4.1. Funding for these projects may be available through a mix of the Clean Water State Revolving Fund, and the Drinking Water State Revolving Fund. Utility expansion projects intended to serve or attract commercial and/or industrial development may also be eligible for funding through various economic development funds.

It should be noted that project prioritization and sequencing, as depicted in Table 4.1, is based on a combination of technical considerations and anticipated development. These projects are predominantly development-driven and as such the order in which they are realized must reflect actual and anticipated development in and around Bessemer City.

⁴ *Bessemer City Water and Wastewater Asset Management Plan*, May 2024, WithersRavenel.

Table 4.1 – Capital Improvements Plan, Recommended Water and Sewer System Expansion Projects

	Project Name	POPC (2023 Dollars)	FYE 2024	FYE 2025	FYE 2026	FYE 2027	FYE 2028	FYE 2029	FYE 2030	FYE 2031	FYE 2032	FYE 2033	FYE 2034+
Water Distribution													
1	Holland Memorial Church Road Water Line Extension	\$677,000	\$704,000										
2	North Side Loop Closures	\$62,000		\$67,000									
3	Sunset Tank Connectivity Improvements	\$1,971,000				\$2,306,000							
4	Southeast Water Tank	\$5,098,000							\$6,709,000				
5	Southridge Parkway Phase 1 Water Line Extensions	\$75,500									\$107,000		
6	Ramseur Road and Sunset Drive Water Line Extension	\$1,329,000										\$1,967,000	
7	Southridge Parkway Phase 2 Water Line	\$3,615,000											\$3,615,000
Sewer Collection													
1	Long Creek Outfall Sewer, Phase 1	\$5,542,000			\$6,234,000								
2	Long Creek Outfall - Arc Street Pump Station Gravity Sewer Extension	\$2,495,000					\$3,036,000						
3	Southeast Pump Station Gravity Sewer Extension	\$4,047,000						\$5,121,000					
4	9th Street Pump Station Upgrades	\$38,000		\$41,000									
5	Shopping Center Pump Station Gravity Sewer Extension	\$1,967,000								\$2,692,000			
6	Exit 14 Gravity Sewer Extension	\$1,569,000								\$2,147,000			
7	Long Creek Outfall Sewer, Phase 2	\$5,952,000									\$8,472,000		
8	Long Creek Outfall - Ninth Street Pump Station Gravity Sewer Extension	\$4,365,000										\$6,461,000	
9	Oates Road Pump Station and Force Main	\$1,800,000											\$1,800,000
	TOTAL	\$40,602,500	\$704,000	\$108,000	\$6,234,000	\$2,306,000	\$3,036,000	\$5,121,000	\$6,709,000	\$4,839,000	\$8,579,000	\$8,428,000	\$5,415,000

*Estimated Annual Rate of Inflation = 4.00%

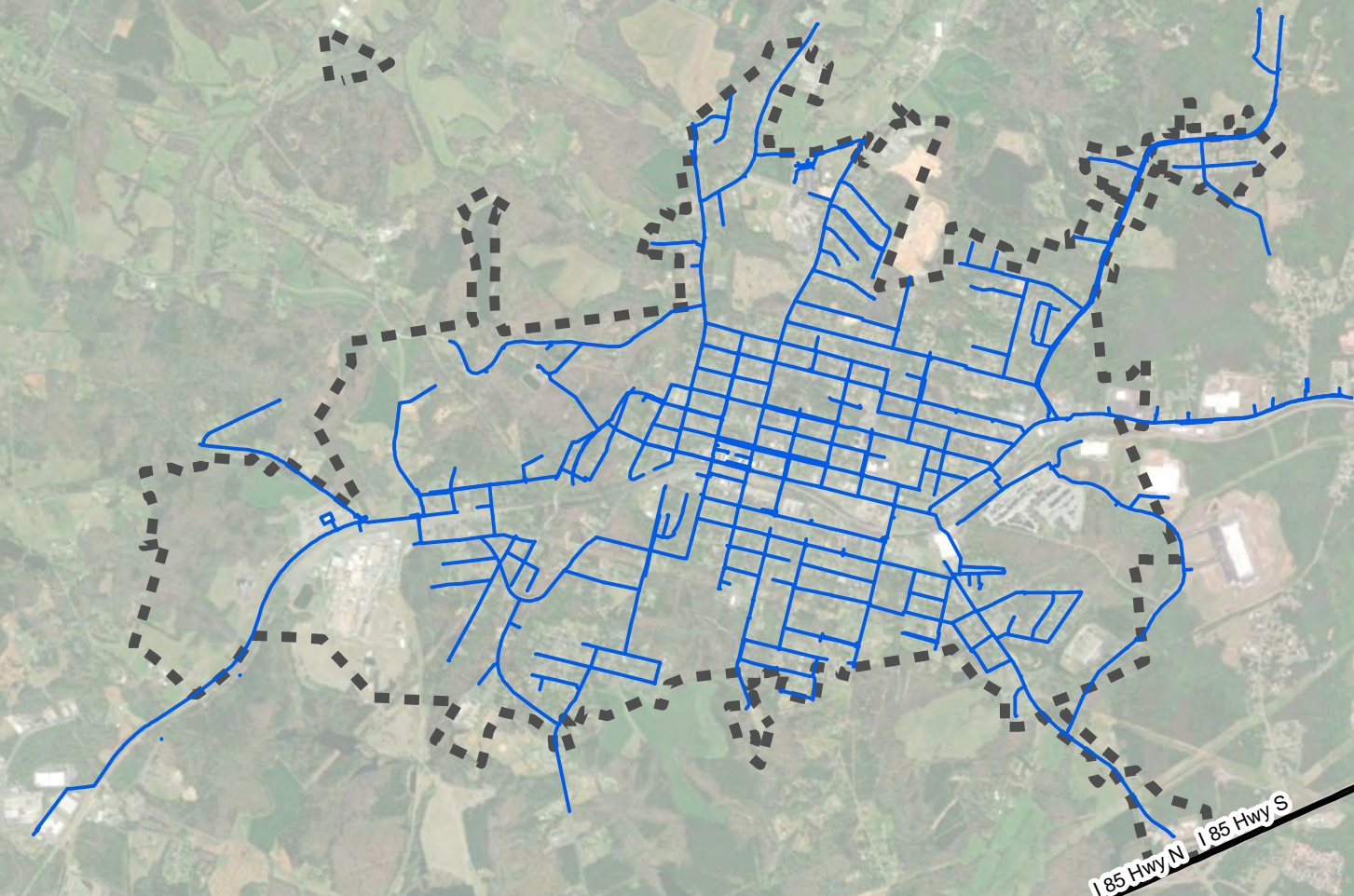
Project Name	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2031	2031+
Sewer Collection							
High Risk Gravity Main Rehabilitation	\$ 304,805	\$ 304,805	\$ 304,805				
Significant Risk Gravity Main Rehabilitation				\$ 316,044	\$ 316,044	\$ 1,535,072	\$ 6,862,676
Medium Risk Gravity Main Rehabilitation							\$ 16,087,162
Low Risk Gravity Main Rehabilitation							\$ 13,069,632
Lift Station							
General Lift Station Repairs and Replacements	\$ 310,000						
Phase I Lift Station Upgrades			\$ 650,000				
Phase II Lift Station Upgrades					\$ 550,000		
TOTAL	\$ 614,805	\$ 304,805	\$ 954,805	\$ 316,044	\$ 866,044	\$ 1,535,072	\$36,019,470

Project Name	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2031	2031+
Hydrants and Valves							
Install Additional Water Main Valves	\$ 214,000	\$ 214,000	\$ 214,000	\$ 214,000	\$ 214,000		
Water Distribution							
Extreme Risk Water Main Rehabilitation	\$ 226,466	\$ 226,466	\$ 226,466	\$ 226,466	\$ 226,466		
High Risk Water Main Rehabilitation						\$ 6,051,412	
Significant Risk Main Rehabilitation							\$ 7,465,381
Medium Risk Water Main Rehabilitation							\$ 16,115,350
Low Risk Water Main Rehabilitation							\$ 18,954,736
Specific Pipeline Improvements							
Upsize to 6-inch	\$ 250,000						
M.L. Kiser Rd		\$ 10,000					
NE and SE St		\$ 140,000					
W Virginia Ave				\$ 370,000			
TOTAL	\$ 690,466	\$ 590,466	\$ 440,466	\$ 810,466	\$ 440,466	\$ 6,051,412	\$42,535,466

Figure 4.1 – Bessemer City Capital Improvements Plan, 2021-2031 (By Others)

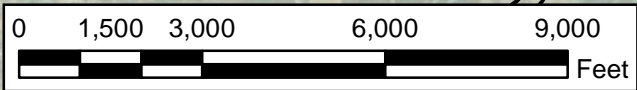
APPENDIX A:

MAPS

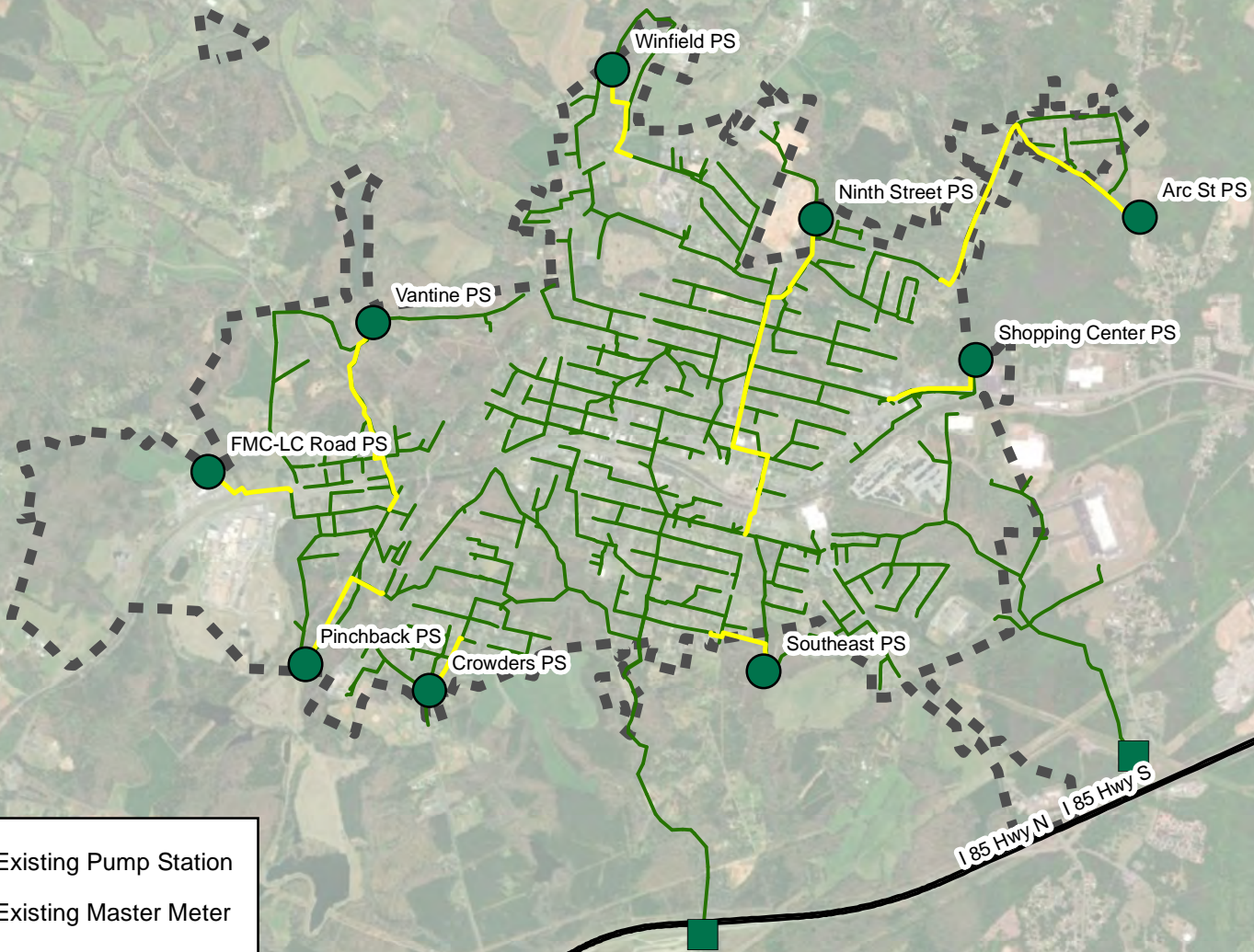


Water Main

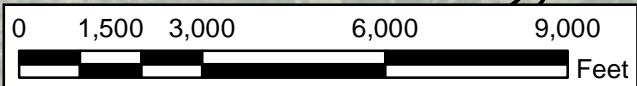
Bessemer City Limits



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Existing Pump Station
- Existing Master Meter
- Existing Force Main
- Existing Gravity Main
- Bessemer City Limits



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

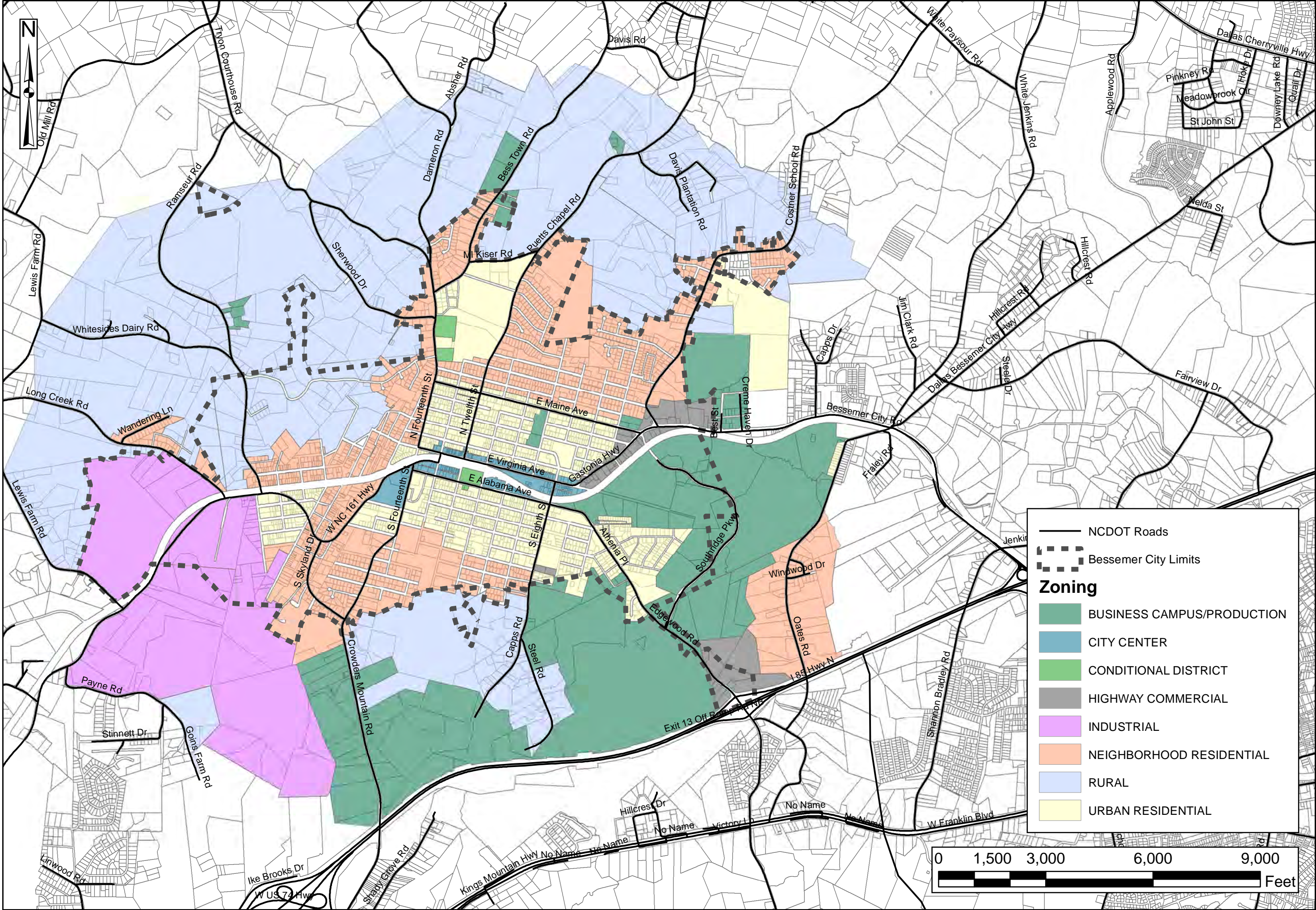


1240 19th Street Lane NW
Hickory, NC 28601
828.328.2024
NC Firm License # C-0459
mcgillassociates.com

Date: August 2023	
Project # 22.01137	
Off. Man. DGC	Designer KBL
Proj. Man. JAW	Reviewer DGC

Water and Sewer Master Planning
BESSEMER CITY
Gaston County, North Carolina

**EXISTING
SEWER
SYSTEM**



Item 1.

BESSEMER CITY ZONING

Water and Sewer Master Planning

BESSEMER CITY

Gaston County, North Carolina

Date: Feb. 2023

Project# 22.01136/37

Office Manager
DGC

Designer
KBL

Proj. Manager
DGC

Reviewer
DGC

1240 19th Street Lane NW
Hickory, NC 28601
828.328.2024
NC Firm License # C-0459
mcgillassociates.com



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Proposed Development				
Key	Name	Description	No. Units	S.F..
A	Creekside Cottages	Residential, Single-Family-Detached	162	
B	Jack Circle	Residential, Single-Family-Detached	16	
C	Stewart Property	Residential, Single-Family-Detached	95	
D	Bess Town Rd Site	Multi-Family	228	
E	14th Street Townhomes	Townhomes	100	
F	FMC Lithium USA	Industrial		
G	Osage	Apartments	139	
H	Kintegra	Medical - Primary Care		
I	Trinity			1,000,000
J	Foundry			280,000
K	Amazon	Commercial / Industrial		250,000

1	Wright et al. Properties	Residential	21
2	D'Amorio Property	Residential	21
3	Sky King Property	Residential	66
4	Kiser Property	Residential	92
5	Dameron Property	Residential	35
6	Carpenter Property	Residential	6
7	Kiser Properties	Residential	45
8	Gould Ave. Properties	Residential	7
9	Georgia & Finchback	Residential	4
10	Falls et al Properties	Industrial	150
11	Wolfe Property	Industrial	263
12	Buchanan Prop. Man.	Industrial	9
13	I-85 & Edgewood	Commercial	43
14	Oates Road Properties	Industrial	48

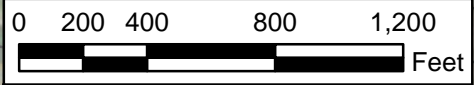
- NCDOT Roads
- Gaston Co. Parcels
- Anticipated Future Development
- Development in Process



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- Street Centerlines
- Proposed Water Line Extension
- Existing Water Main



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



1240 19th Street Lane NW
Hickory, NC 28601
828.328.2024
NC Firm License # C-0459
mcgillassociates.com

Date: August 2023	
Project # 22.01136	
Off. Man. DGC	Designer KBL
Proj. Man. DGC	Reviewer DGC

Water and Sewer Master Planning

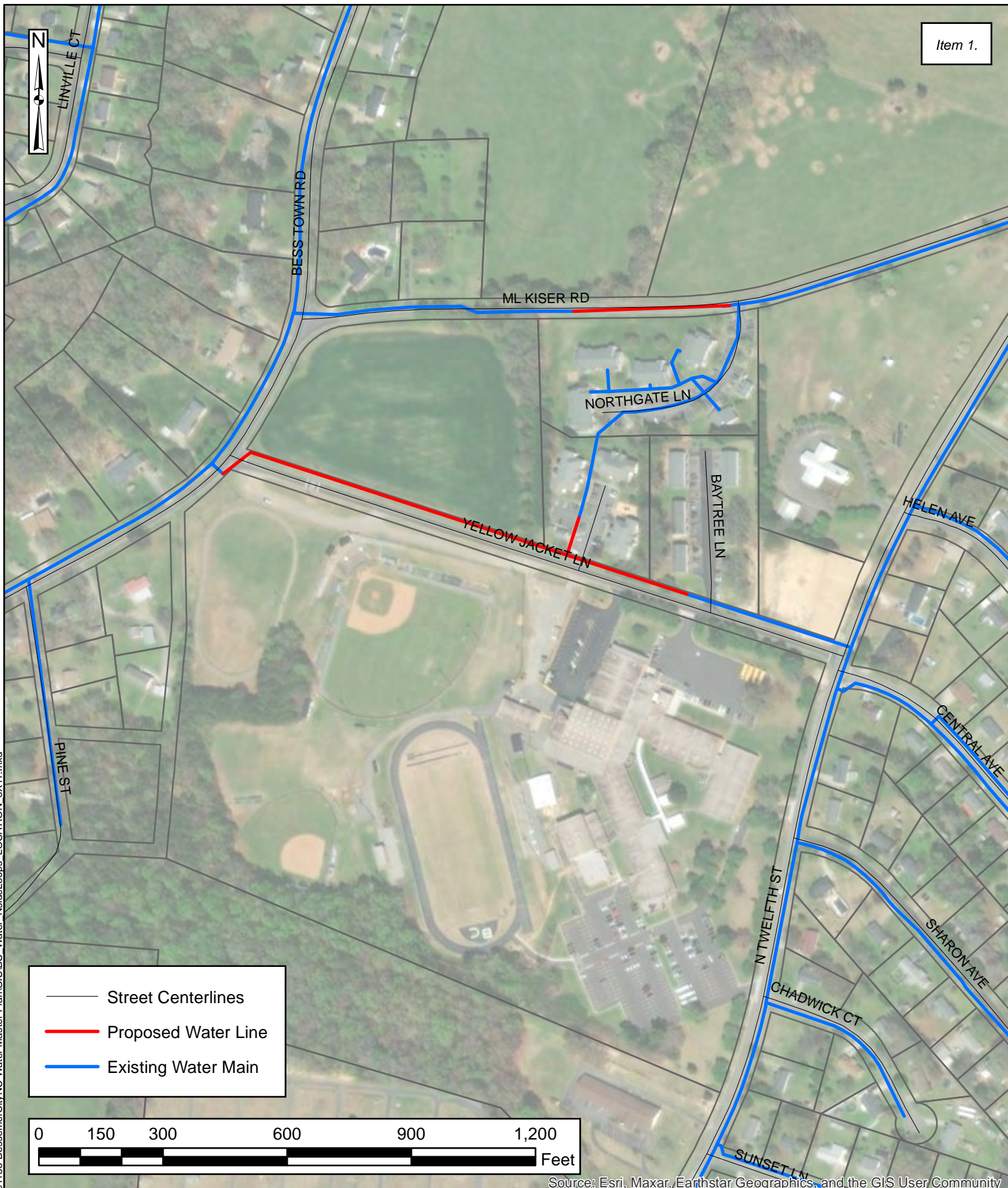
BESSEMER CITY

Gaston County, North Carolina

**HOLLAND MEM.
CH. ROAD
WATER
EXTENS**

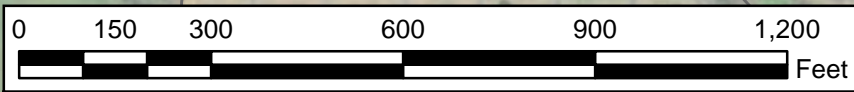
53

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Item 1.

- Street Centerlines
- Proposed Water Line
- Existing Water Main



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



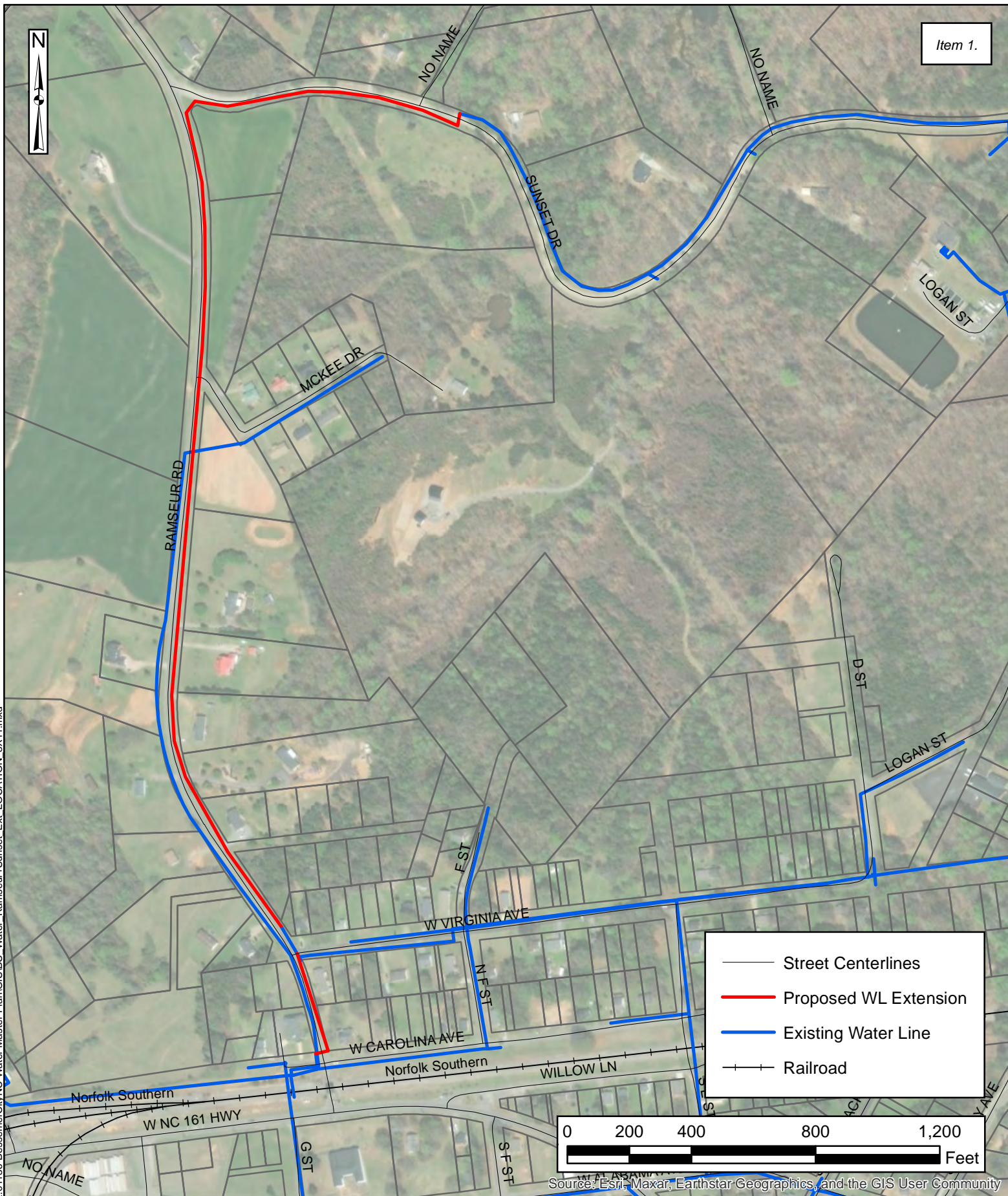
1240 19th Street Lane NW
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NC Firm License # C-0459
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Date: August 2023	
Project # 22.01136	
Off. Man. DGC	Designer KBL
Proj. Man. DGC	Reviewer DGC

Water and Sewer Master Planning
BESSEMER CITY
Gaston County, North Carolina

**NORTHSIDE
LOOP
CLOSURE** 54

Document Path: P:\2022\22.01136-Bessemer\City\NC-Water Master Plan\GIS\BC-Water_Ramseur+Sunset_Ext_LOCATION_8X11.mxd



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Date: MAY 2023	
Project # 22.01136	
Off. Man. DGC	Designer KBL
Proj. Man. DGC	Reviewer DGC

Water and Sewer Master Planning
BESSEMER CITY
Gaston County, North Carolina

**RAMSEUR RD.
&
SUNSET DRIVE
WATER**



Document Path: P:\2022\22.01136-Bessemer\City\NC-Water Master Plan\GIS\BC_Water_SoutheastTank_LOCATION_8X11.mxd



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



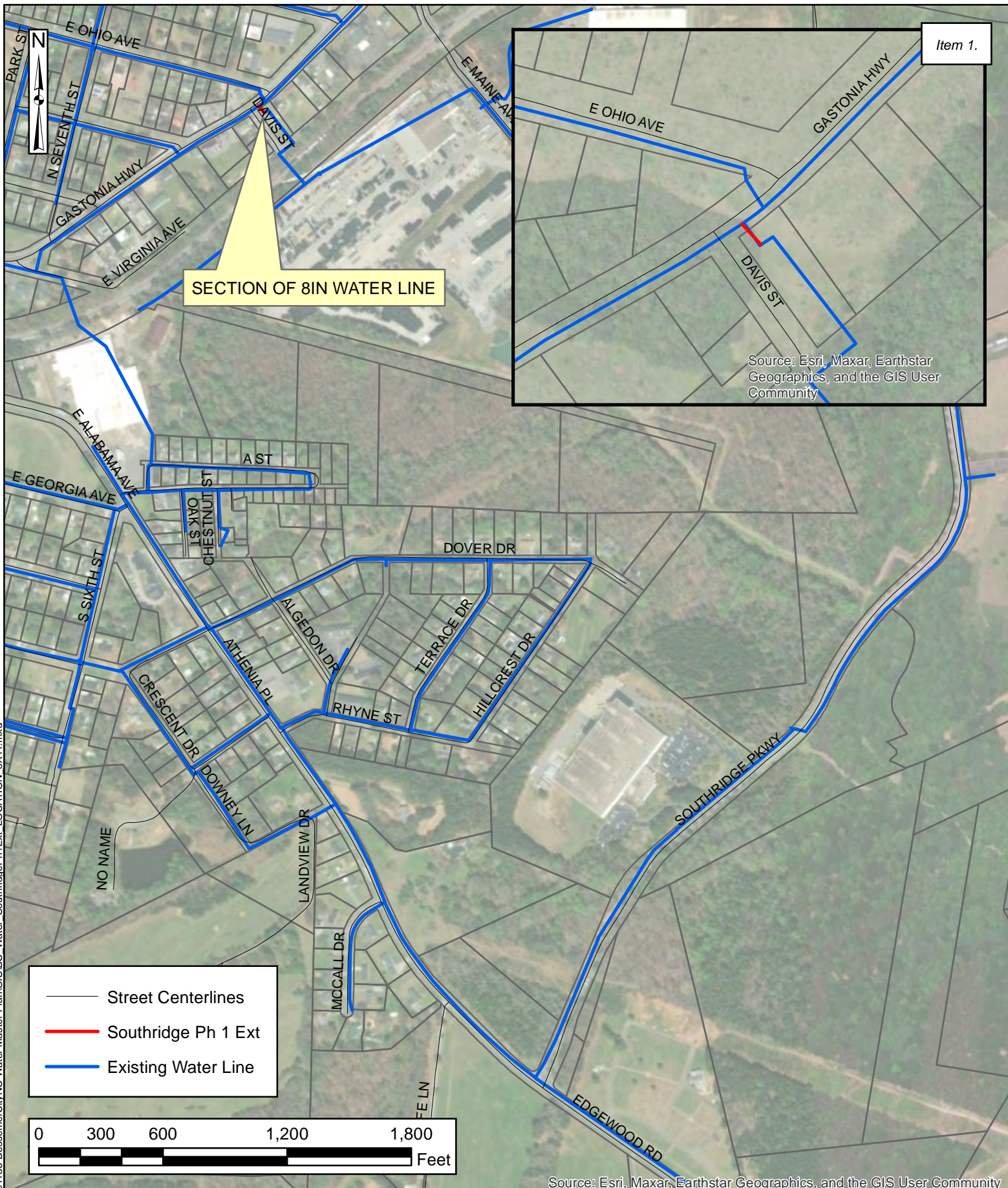
1240 19th Street Lane NW
Hickory, NC 28601
828.328.2024
NC Firm License # C-0459
mcgillassociates.com

Date: August 2023	
Project # 22.01136	
Off. Man. DGC	Designer KBL
Proj. Man. DGC	Reviewer DGC

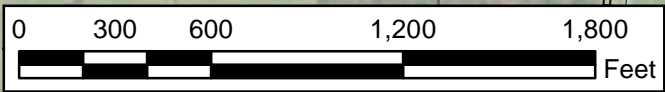
Water and Sewer Master Planning
BESSEMER CITY
Gaston County, North Carolina

**SOUTHEAST
WATER TANK
LOCAT** 57

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- Street Centerlines
- Southridge Ph 1 Ext
- Existing Water Line





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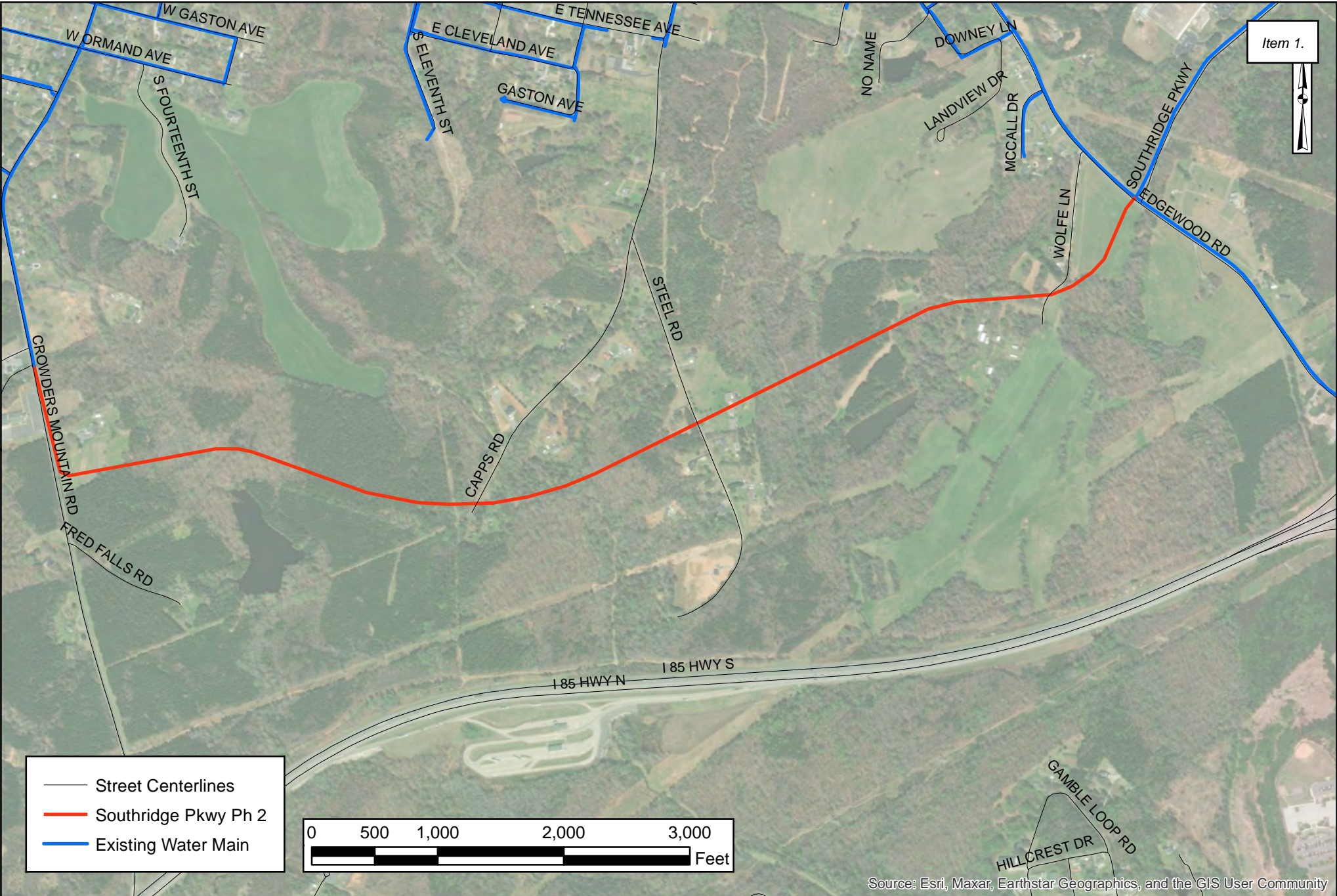
Date: August 2023	
Project # 22.01136	
Off. Man. DGC	Designer KBL
Proj. Man. DGC	Reviewer DGC

Water and Sewer Master Planning
BESSEMER CITY
Gaston County, North Carolina

**SOUTHRIDGE
PKWY. PH. I
WATER
EXTENS**

58

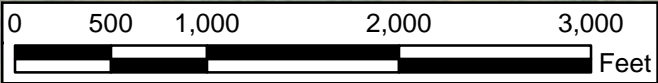
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— Street Centerlines

— Southridge Pkwy Ph 2

— Existing Water Main



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



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Date: MAY 2023

Project # 22.01136/37

Office Manager
DGC

Office Manager
KBL

Project Manager
DGC

Reviewer
DGC

Water and Sewer Master Planning

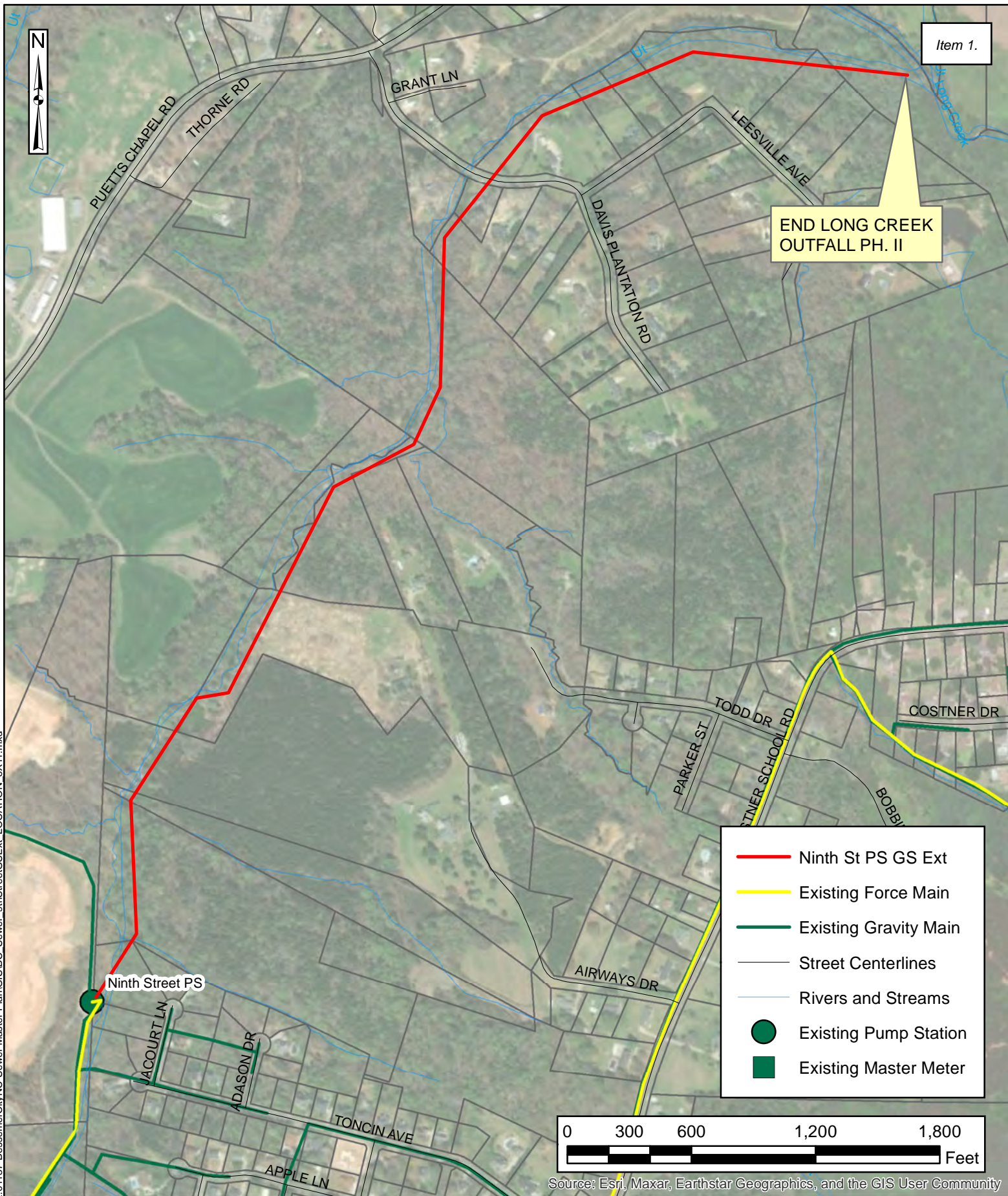
BESSEMER CITY

Gaston County, North Carolina

**SOUTHRIDGE PARKWAY
PHASE II WATER LINE
EXTENSION**

59

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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

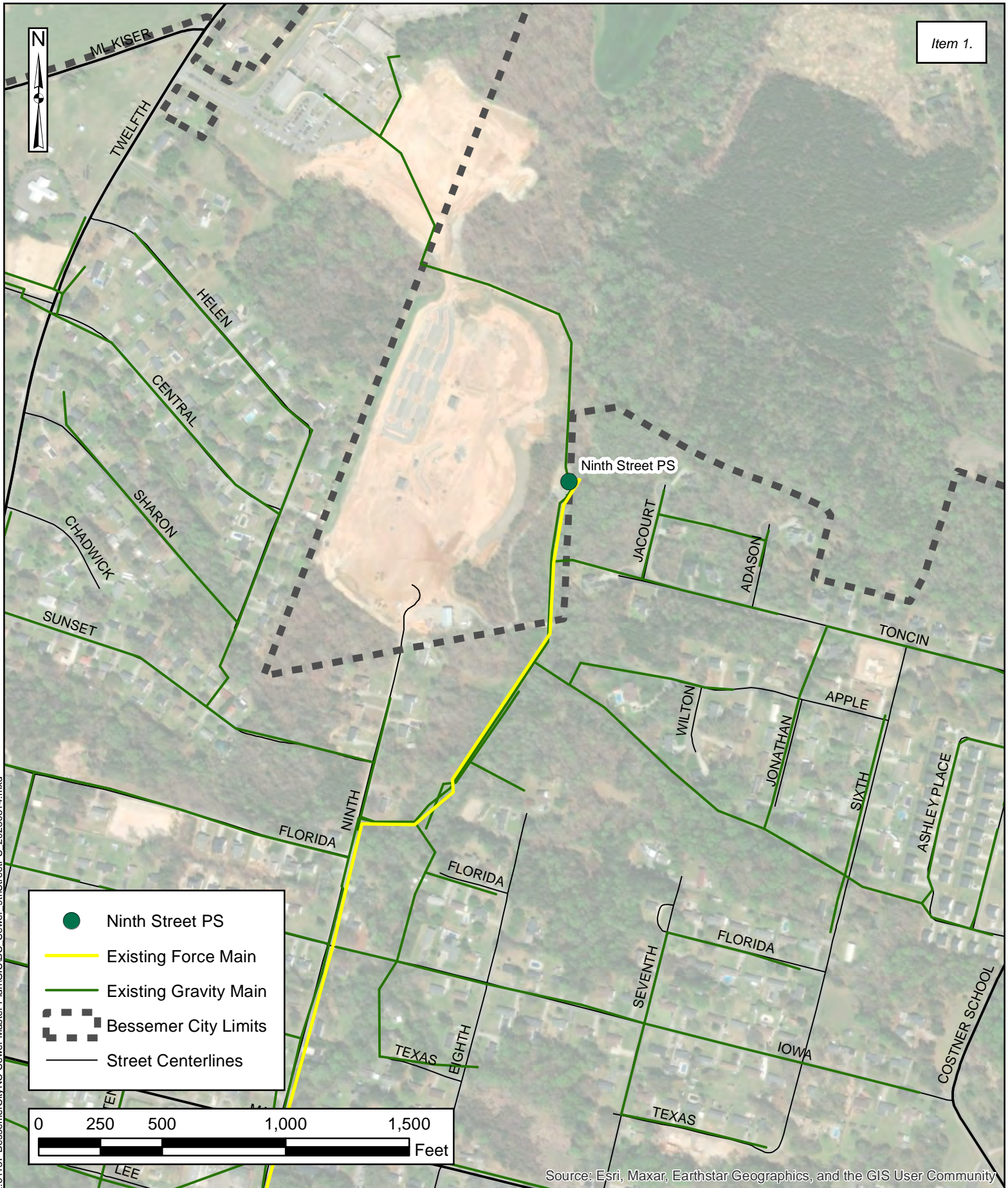


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Date: August 2023	
Project # 22.01137	
Off. Man. DGC	Designer KBL
Proj. Man. DGC	Reviewer DGC

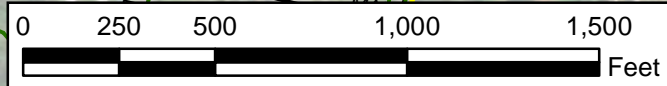
Water and Sewer Master Planning
BESSEMER CITY
Gaston County, North Carolina

**NINTH ST. PS
GRAVITY
SEWER
EXTENS**



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- Ninth Street PS
- Existing Force Main
- Existing Gravity Main
- Bessemer City Limits
- Street Centerlines



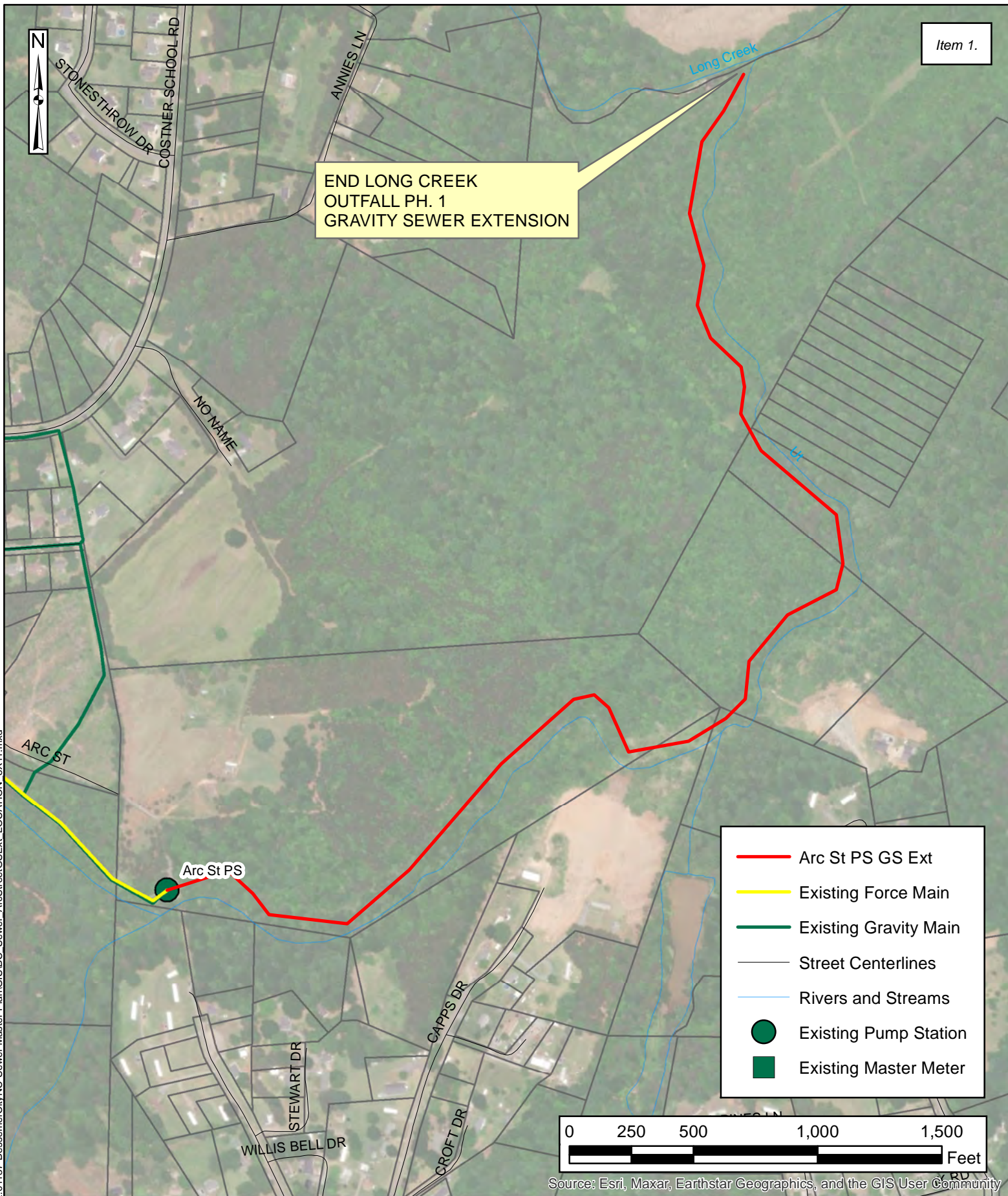
1240 19th Street Lane NW
Hickory, NC 28601
828.328.2024
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Date: August 2023	
Project # 22.01137	
Off. Man. DGC	Designer KBL
Proj. Man. JAW	Reviewer DGC

Water and Sewer Master Planning
BESSEMER CITY
Gaston County, North Carolina

**NINTH ST.
PUMP
STATION
LOCATION** 61

Document Path: P:\2022\22.01137-Bessemer\City\NC-Sewer Master Plan\GIS\BSC_Sewer ArcStreetGSExt LOCATION 8X11.mxd



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Date: August 2023	
Project # 22.01137	
Off. Man. DGC	Designer KBL
Proj. Man. DGC	Reviewer DGC

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BESSEMER CITY
Gaston County, North Carolina

**ARC ST. PS
GRAVITY
SEWER
EXTENSION**

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Item 1.



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Date: August 2023	
Project # 22.01137	
Off. Man. DGC	Designer KBL
Proj. Man. DGC	Reviewer DGC

Water and Sewer Master Planning

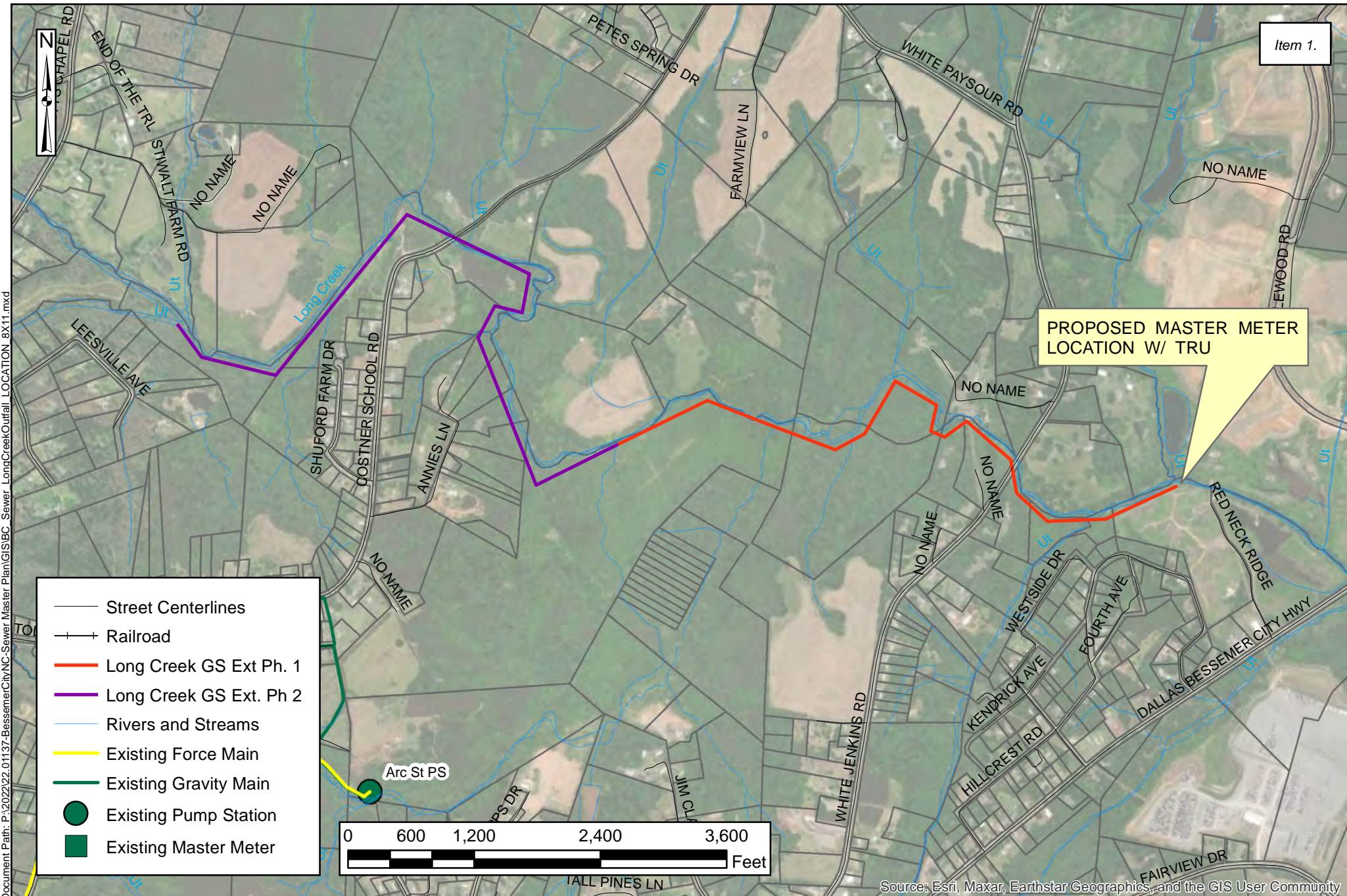
BESSEMER CITY

Gaston County, North Carolina

**EXIT 14
GRAVITY
SEWER
EXTENSION**

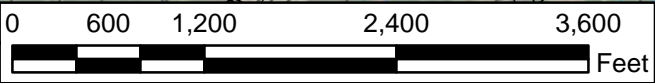
63

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Item 1.

- Street Centerlines
- Railroad
- Long Creek GS Ext. Ph. 1
- Long Creek GS Ext. Ph. 2
- Rivers and Streams
- Existing Force Main
- Existing Gravity Main
- Existing Pump Station
- Existing Master Meter



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



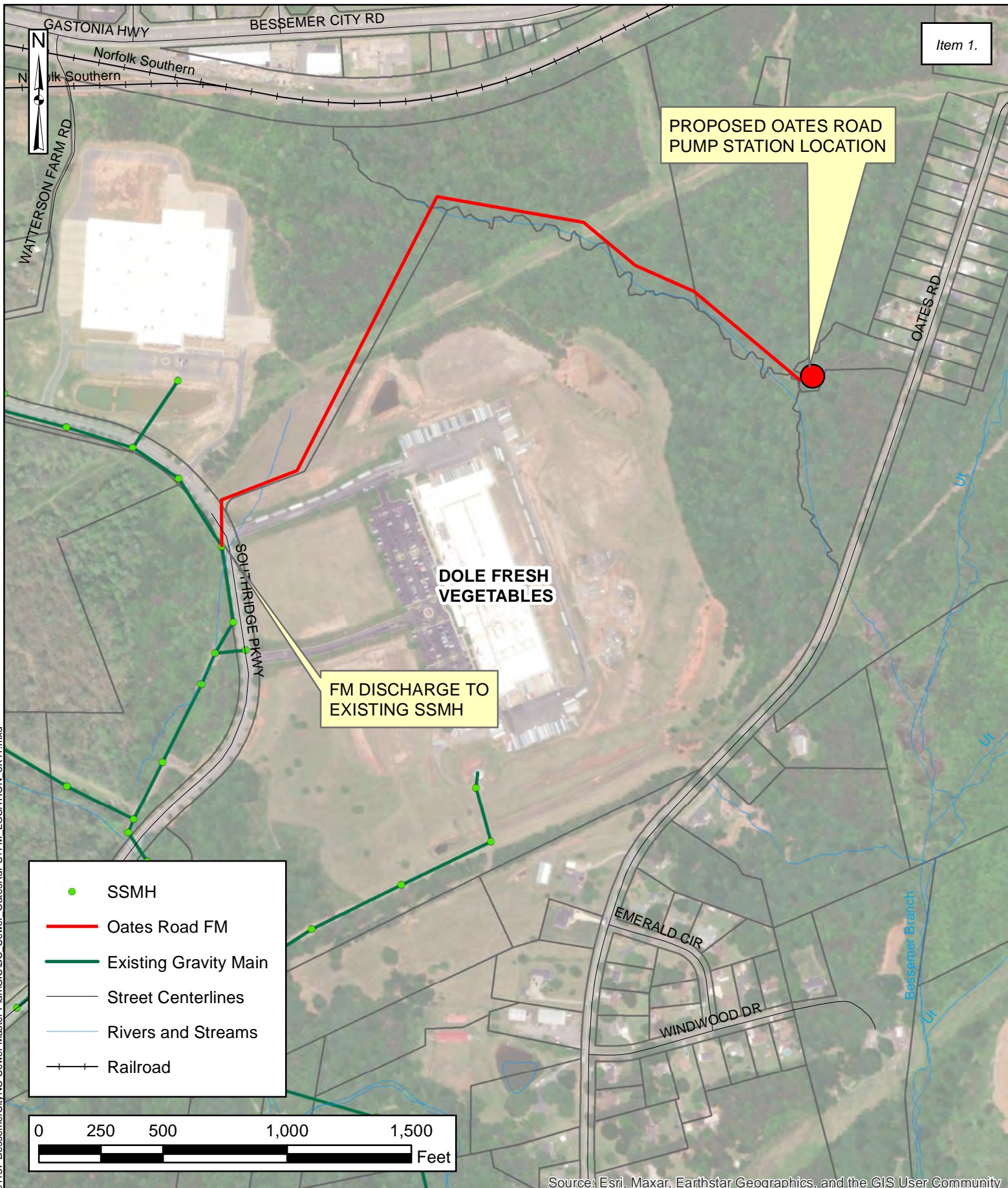
1240 19th Street Lane NW
Hickory, NC 28601
828.328.2024
NC Firm License # C-0459
mcgillassociates.com

Date: AUGUST 2023	
Project # 22.01137	
Office Manager DGC	Designer KBL
Project Manager DGC	Reviewer DGC

Water and Sewer Master Planning
BESSEMER CITY
Gaston County, North Carolina

LONG CREEK OUTFALL SEWER
PHASE I & PHASE II

Document Path: P:\2022\22.01137-Bessemer\City\NC-Sewer Master Plan\GIS\BSC_Sewer_OatesRdPS+FM_LOCATION_8X11.mxd



Item 1.





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Date: August 2023	
Project # 22.01137	
Off. Man. DGC	Designer KBL
Proj. Man. DGC	Reviewer DGC

Water and Sewer Master Planning

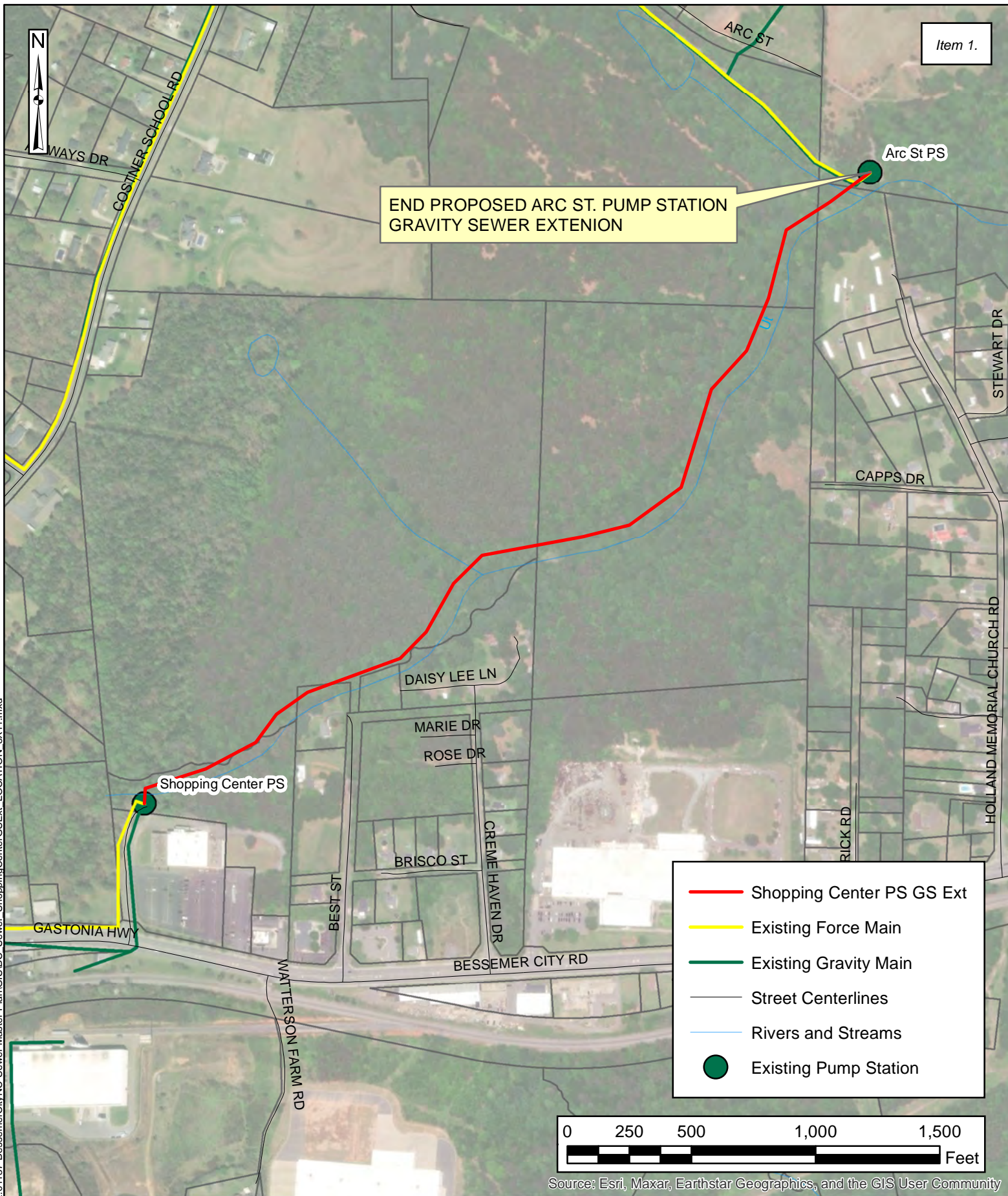
BESSEMER CITY

Gaston County, North Carolina

**OATES ROAD
PUMP STATION
&
FORCE MAIN**

65

Document Path: P:\2022\22.01137-Bessemer\City\NC-Sewer Master Plan\GIS\BC Sewer ShoppingCenter\GSExt LOCATION 8X11.mxd





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Project # 22.01137	
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Water and Sewer Master Planning

BESSEMER CITY

Gaston County, North Carolina

SHOPPING CENTER PS

GRAV. SEWER EXTENSION

66

APPENDIX B:
SANITARY SEWER PUMP STATION
CAPACITY EVALUATION

Shopping Center Pump Station Capacity Evaluation

Firm Capacity	70	gpm	101,000	gpd
Design ADF (Firm Capacity / 2.5 PF)	40,000	gpd		
Current Average Daily Flow	13,166	gpd		
Max Daily Flow	63,492	gpd		
Current Allocated, Not-Yet Tributary	0	gpd		
Available Capacity	26,834	gpd		

		PS Capacity (gpd)			Current Flows (2022), gpd		Planned Development		Total	
							Name of Development			
					Allocated, Not-Yet Tributary		Allocated, Not-Yet Tributary		Allocated, Not-Yet Tributary	
Year	Calendar Year	80%	90%	100%		Actual				Actual
0	2023	32,000	36,000	40,000		13,166	0	0	0	13,166
1	2024	32,000	36,000	40,000		13,363	0	0	0	13,363
2	2025	32,000	36,000	40,000		13,564	0	0	0	13,564
3	2026	32,000	36,000	40,000		13,767	0	0	0	13,767
4	2027	32,000	36,000	40,000		13,974	0	0	0	13,974
5	2028	32,000	36,000	40,000		14,183	0	0	0	14,183
6	2029	32,000	36,000	40,000		14,396	0	0	0	14,396
7	2030	32,000	36,000	40,000		14,612	0	0	0	14,612
8	2031	32,000	36,000	40,000		14,831	0	0	0	14,831
9	2032	32,000	36,000	40,000		15,054	0	0	0	15,054
10	2033	32,000	36,000	40,000		15,279	0	0	0	15,279
Annual Growth Rate						1.5%				

Arc Street Pump Station Capacity Evaluation

Firm Capacity	180	gpm	259,000	gpd
Design ADF (Firm Capacity / 2.5 PF)	104,000	gpd		
Current Average Daily Flow	6,717	gpd		
Max Daily Flow	21,204	gpd		
Current Allocated, Not-Yet Tributary Available Capacity	84,300	gpd		
	12,983	gpd		

							Planned Development		Planned Development		Planned Development		Planned Development			
							Sky King Property		Jack Circle		Creekside Cottages		DiFlorio Property			
							Acres	66	Acres		Acres	-	Acres	21		
							BR/ac	5	BR/ac		BR/ac	-	BR/ac	5		
							Total BR	165	Total BR	40	Total BR	445	Total BR	52.5		
							Flow / BR	120	Flow / BR	120	Flow / BR	120	Flow / BR	120		
		PS Capacity (gpd)			Current Flows (2022), gpd		Buildout Duration (yrs)	5	Buildout Duration (yrs)	2	Buildout Duration (yrs)	5	Buildout Duration (yrs)	5	Total	
							Construction to Begin	2028	Construction to Begin	2025	Construction to Begin	2024	Construction to Begin	2029		
Year	Calendar Year	80%	90%	100%	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual
0	2023	83,200	93,600	104,000		6,717	19,800	0	4,800	0	53,400	0	6,300	0	84,300	6,717
1	2024	83,200	93,600	104,000		6,851	19,800	0	4,800	0	42,720	5,340	6,300	0	73,620	12,191
2	2025	83,200	93,600	104,000		6,988	19,800	0	2,400	1,200	32,040	10,680	6,300	0	60,540	18,868
3	2026	83,200	93,600	104,000		7,128	19,800	0	0	2,400	21,360	16,020	6,300	0	47,460	25,548
4	2027	83,200	93,600	104,000		7,271	19,800	0	0	2,400	10,680	21,360	6,300	0	36,780	31,031
5	2028	83,200	93,600	104,000		7,416	15,840	1,980	0	2,400	0	26,700	6,300	0	22,140	38,496
6	2029	83,200	93,600	104,000		7,564	11,880	3,960	0	2,400	0	26,700	5,040	630	16,920	41,254
7	2030	83,200	93,600	104,000		7,716	7,920	5,940	0	2,400	0	26,700	3,780	1,260	11,700	44,016
8	2031	83,200	93,600	104,000		7,870	3,960	7,920	0	2,400	0	26,700	2,520	1,890	6,480	46,780
9	2032	83,200	93,600	104,000		8,027	0	9,900	0	2,400	0	26,700	1,260	2,520	1,260	49,547
10	2033	83,200	93,600	104,000		8,188	0	9,900	0	2,400	0	26,700	0	3,150	0	50,338
Growth Rate						2.0%										

Winfield Pump Station Capacity Evaluation

Firm Capacity	100	gpm	144,000	gpd
Design ADF (Firm Capacity / 2.5 PF)	58,000	gpd		
Current Average Daily Flow	7,713	gpd		
Max Daily Flow	26,796	gpd		
Current Allocated, Not-Yet Tributary	21,000	gpd		
Available Capacity	29,287			

							Planned Development			
							Dameron Property			
							Acres	35		
							BR/ac	5		
							Total BR	175		
							Flow / BR	120		
					Current Flows (2022), gpd		Buildout Duration (yrs)	3		
		PS Capacity (gpd)					Construction to Begin	2026	Total	
Year	Calendar Year	80%	90%	100%	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual
0	2023	46,400	52,200	58,000		7,713	21,000	0	21,000	7,713
1	2024	46,400	52,200	58,000		7,867	21,000	0	21,000	7,867
2	2025	46,400	52,200	58,000		8,024	21,000	0	21,000	8,024
3	2026	46,400	52,200	58,000		8,185	14,000	3,500	14,000	11,685
4	2027	46,400	52,200	58,000		8,349	7,000	7,000	7,000	15,349
5	2028	46,400	52,200	58,000		8,516	0	10,500	0	19,016
6	2029	46,400	52,200	58,000		8,686	0	10,500	0	19,186
7	2030	46,400	52,200	58,000		8,860	0	10,500	0	19,360
8	2031	46,400	52,200	58,000		9,037	0	10,500	0	19,537
9	2032	46,400	52,200	58,000		9,218	0	10,500	0	19,718
10	2033	46,400	52,200	58,000		9,402	0	10,500	0	19,902
Growth Rate						2.0%				

Ninth Street Pump Station Capacity Evaluation

Firm Capacity	705	gpm	1,015,000	gpd
Design ADF (Firm Capacity / 2.5 PF)	406,000	gpd		
Current Average Daily Flow	223,717	gpd		
Max Daily Flow	1,628,280	gpd		
Current Allocated, Not-Yet Tributary	53,700	gpd		
Available Capacity	128,583	gpd		

Planned Development		Planned Development		Planned Development		Planned Development		Planned Development	
Dameron Property (via Winfield)		14th Street Townhomes		Carpenter Property		Gould Ave. Properties		Bess Town Road	
Acres	35	Acres		Acres	6	Acres		Acres	
BR/ac	5	BR/ac		BR/ac	5	BR/ac		BR/ac	
Total BR	175	Total BR	200	Total BR	30	Total BR	42.5	Total BR	319
Flow / BR	120	Flow / BR	120	Flow / BR	120	Flow / BR	120	Flow / BR	120
Buildout (yrs)	3	Buildout (yrs)	2	Buildout (yrs)	2	Buildout (yrs)	2	Buildout (yrs)	2
Constr. to Begin	2026	Constr. to Begin	2025	Constr. to Begin	2028	Constr. to Begin	2025	Constr. to Begin	2025

		PS Capacity (gpd)			Current Flows (2022), gpd												Total	
Year	Calendar Year	80%	90%	100%	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual
0	2023	324,800	365,400	406,000		223,717	21,000	0	24,000	0	3,600	0	5,100	0	38,280	0	91,980	223,717
1	2024	324,800	365,400	406,000		227,073	21,000	0	24,000	0	3,600	0	5,100	0	38,280	0	91,980	227,073
2	2025	324,800	365,400	406,000		230,479	21,000	0	12,000	6,000	3,600	0	2,550	1,275	19,140	9,570	58,290	247,324
3	2026	324,800	365,400	406,000		233,936	14,000	3,500	0	12,000	3,600	0	0	2,550	0	19,140	17,600	271,126
4	2027	324,800	365,400	406,000		237,445	7,000	7,000	0	12,000	3,600	0	0	2,550	0	19,140	10,600	278,135
5	2028	324,800	365,400	406,000		241,007	0	10,500	0	12,000	1,800	900	0	2,550	0	19,140	1,800	286,097
6	2029	324,800	365,400	406,000		244,622	0	10,500	0	12,000	0	1,800	0	2,550	0	19,140	0	290,612
7	2030	324,800	365,400	406,000		248,291	0	10,500	0	12,000	0	1,800	0	2,550	0	19,140	0	294,281
8	2031	324,800	365,400	406,000		252,016	0	10,500	0	12,000	0	1,800	0	2,550	0	19,140	0	298,006
9	2032	324,800	365,400	406,000		255,796	0	10,500	0	12,000	0	1,800	0	2,550	0	19,140	0	301,786
10	2033	324,800	365,400	406,000		259,633	0	10,500	0	12,000	0	1,800	0	2,550	0	19,140	0	305,623
Growth Rate						1.5%												

Vantine Pump Station Capacity Evaluation

Firm Capacity	200	gpm	288,000	gpd
Design ADF (Firm Capacity / 2.5 PF)	115,000	gpd		
Current Average Daily Flow	46,846	gpd		
Max Daily Flow	151,704	gpd		
Current Allocated, Not-Yet Tributary	27,000	gpd		
Available Capacity	41,154	gpd		

							Planned Development			
							Kiser Properties			
							Acres	45		
							BR/ac	5		
							Total BR	225		
							Flow / BR	120		
							Buildout Duration (yrs)	3		
							Construction to Begin	2030	Total	
Year	Calendar Year	PS Capacity (gpd)			Current Flows (2022), gpd		Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual
0	2023	92,000	103,500	115,000		46,846	27,000	0	27,000	46,846
1	2024	92,000	103,500	115,000		47,549	27,000	0	27,000	47,549
2	2025	92,000	103,500	115,000		48,262	27,000	0	27,000	48,262
3	2026	92,000	103,500	115,000		48,986	27,000	0	27,000	48,986
4	2027	92,000	103,500	115,000		49,721	27,000	0	27,000	49,721
5	2028	92,000	103,500	115,000		50,467	27,000	0	27,000	50,467
6	2029	92,000	103,500	115,000		51,224	27,000	0	27,000	51,224
7	2030	92,000	103,500	115,000		51,992	18,000	4,500	18,000	56,492
8	2031	92,000	103,500	115,000		52,772	9,000	9,000	9,000	61,772
9	2032	92,000	103,500	115,000		53,564	0	13,500	0	67,064
10	2033	92,000	103,500	115,000		54,367	0	13,500	0	67,867
Growth Rate						1.5%				

Pinchback Pump Station Capacity Evaluation

Firm Capacity	172	gpm	248,000	gpd
Design ADF (Firm Capacity / 2.5 PF)	99,000	gpd		
Current Average Daily Flow	47,418	gpd		
Max Daily Flow	168,072	gpd		
Current Allocated, Not-Yet Tributary	42,700	gpd		
Available Capacity	8,882			

							Planned Development - Residential		Planned Development - Industrial			
							Georgia & Pinchback		FMC Lithium USA			
							Acres		Acres			
							BR/ac		s.f./ac			
							Total BR	22.5	Total s.f.			
							Flow / BR	120	Flow / 1,000 s.f.			
							Buildout Duration (yrs)	3	Buildout Duration (yrs)			
							Construction to Begin	2030	Construction to Begin	2026	Total	
Year	Calendar Year	PS Capacity (gpd)			Current Flows (2022), gpd*		Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual
0	2023	79,200	89,100	99,000		47,418	2,700	0	40,000	0	42,700	47,418
1	2024	79,200	89,100	99,000		48,129	2,700	0	40,000	0	42,700	48,129
2	2025	79,200	89,100	99,000		48,851	2,700	0	40,000	0	42,700	48,851
3	2026	79,200	89,100	99,000		49,584	2,700	0	40,000	0	42,700	49,584
4	2027	79,200	89,100	99,000		50,327	2,700	0	0	40,000	2,700	90,327
5	2028	79,200	89,100	99,000		51,082	2,700	0	0	40,000	2,700	91,082
6	2029	79,200	89,100	99,000		51,849	2,700	0	0	40,000	2,700	91,849
7	2030	79,200	89,100	99,000		52,626	1,800	450	0	40,000	1,800	93,076
8	2031	79,200	89,100	99,000		53,416	900	900	0	40,000	900	94,316
9	2032	79,200	89,100	99,000		54,217	0	1,350	0	40,000	0	95,567
10	2033	79,200	89,100	99,000		55,030	0	1,350	0	40,000	0	96,380
Growth Rate						1.5%						

FMC - LC Road Pump Station Capacity Evaluation

Firm Capacity	50	gpm	72,000	gpd
Design ADF (Firm Capacity / 2.5 PF)	29,000	gpd		
Current Average Daily Flow	136	gpd		
Max Daily Flow	936	gpd		
Current Allocated, Not-Yet Tributary	0	gpd		
Available Capacity	28,864	gpd		

							Planned Development			
							Acres			
							BR/ac			
							Total BR			
							Flow / BR			
							Buildout Duration (yrs)			
							Construction to Begin		Total	
Year	Calendar Year	80%	90%	100%	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual
0	2023	23,200	26,100	29,000		136			0	136
1	2024	23,200	26,100	29,000		138			0	138
2	2025	23,200	26,100	29,000		140			0	140
3	2026	23,200	26,100	29,000		142			0	142
4	2027	23,200	26,100	29,000		144			0	144
5	2028	23,200	26,100	29,000		147			0	147
6	2029	23,200	26,100	29,000		149			0	149
7	2030	23,200	26,100	29,000		151			0	151
8	2031	23,200	26,100	29,000		153			0	153
9	2032	23,200	26,100	29,000		156			0	156
10	2033	23,200	26,100	29,000		158			0	158
Growth Rate						1.5%				

Crowders Pump Station Capacity Evaluation

Firm Capacity	137	gpm	197,000	gpd
Design ADF (Firm Capacity / 2.5 PF)	79,000	gpd		
Current Average Daily Flow	19,805	gpd		
Max Daily Flow	99,954	gpd		
Current Allocated, Not-Yet Tributary	0	gpd		
Available Capacity	59,195			

							Planned Development			
					Current Flows (2022), gpd*					
		PS Capacity (gpd)					Acres			
							BR/ac			
							Total BR			
							Flow / BR			
							Buildout Duration (yrs)			
							Construction to Begin		Total	
Year	Calendar Year	80%	90%	100%	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual
0	2023	63,200	71,100	79,000		19,805		0	0	19,805
1	2024	63,200	71,100	79,000		20,201		0	0	20,201
2	2025	63,200	71,100	79,000		20,605		0	0	20,605
3	2026	63,200	71,100	79,000		21,017		0	0	21,017
4	2027	63,200	71,100	79,000		21,438		0	0	21,438
5	2028	63,200	71,100	79,000		21,867		0	0	21,867
6	2029	63,200	71,100	79,000		22,304		0	0	22,304
7	2030	63,200	71,100	79,000		22,750		0	0	22,750
8	2031	63,200	71,100	79,000		23,205		0	0	23,205
9	2032	63,200	71,100	79,000		23,669		0	0	23,669
10	2033	63,200	71,100	79,000		24,142		0	0	24,142
Growth Rate						2.0%				

Southeast Pump Station Capacity Evaluation

Firm Capacity	175	gpm	252,000	gpd
Design ADF (Firm Capacity / 2.5 PF)	101,000	gpd		
Current Average Daily Flow	22,822	gpd		
Max Daily Flow	74,892	gpd		
Current Allocated, Not-Yet Tributary	0	gpd		
Available Capacity	78,178	gpd		

							Planned Development			
							Acres			
							s.f./ac			
							Total s.f.			
							Flow / 1,000 s.f.			
		PS Capacity (gpd)			Current Flows (2022), gpd*		Buildout Duration (yrs)		Total	
							Construction to Begin			
Year	Calendar Year	80%	90%	100%	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual	Allocated, Not-Yet Tributary	Actual
0	2023	80,800	90,900	101,000		22,822			0	22,822
1	2024	80,800	90,900	101,000		23,278			0	23,278
2	2025	80,800	90,900	101,000		23,744			0	23,744
3	2026	80,800	90,900	101,000		24,218			0	24,218
4	2027	80,800	90,900	101,000		24,703			0	24,703
5	2028	80,800	90,900	101,000		25,197			0	25,197
6	2029	80,800	90,900	101,000		25,701			0	25,701
7	2030	80,800	90,900	101,000		26,215			0	26,215
8	2031	80,800	90,900	101,000		26,739			0	26,739
9	2032	80,800	90,900	101,000		27,274			0	27,274
10	2033	80,800	90,900	101,000		27,819			0	27,819
Growth Rate						2.0%				

APPENDIX C:
PRELIMINARY OPINIONS OF PROBABLE COST

**PRELIMINARY OPINION OF PROBABLE COST
6" HOLLAND MEMORIAL CHURCH ROAD WATER LINE EXTENSION
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$14,000
2	6" DIP Water Line	LF	2700	\$125	\$338,000
3	Compact Ductile Iron Fittings	LB	2,700	\$10	\$27,000
4	Fire Hydrant, incl. 6" tapping sleeve, valve, and stem	EA	4	\$10,000	\$40,000
5	6" Gate Valve	EA	2	\$4,000	\$8,000
6	Erosion and Sedimentation Control	LF	2,700	\$6	\$16,000
7	Restoration	LF	2,700	\$8	\$22,000
8	Connection to Existing Distribution System	EA	2	\$10,000	\$20,000
9					\$0
CONSTRUCTION SUBTOTAL					\$471,000
CONTINGENCY					\$71,000
SURVEYING					\$19,000
PRELIMINARY ENGINEERING					\$14,000
ENVIRONMENTAL					\$5,000
ENGINEERING DESIGN AND PERMITTING					\$33,000
BID AND AWARD					\$5,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$28,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$10,000
FUNDING ADMINISTRATION					\$2,000
TOTAL OPINION OF PROBABLE COST					\$658,000

Notes:

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2. The Engineer maintains no control of labor costs, materials, equipment or services furnished by others, the Contractor(s)' methods for determining prices, or competitive or market conditions. The opinions herein for project and construction costs represent the Engineer's best judgment, and are based on experience and qualifications as a Professional Engineer who possesses familiarity with the construction industry. The Engineer does not guarantee the accuracy of the cost opinions which may vary from bids or actual project and construction costs.
3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
N. SIDE WATER LINE LOOP CLOSURES
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$11,000
2	8" DIP Water Line	LF	400	\$150	\$60,000
3	6" DIP Water Line	LF	1,300	\$125	\$163,000
4	Compact Ductile Iron Fittings	LB	1,700	\$10	\$17,000
5	Fire Hydrant, incl. 6" tapping sleeve, valve, and stem	EA	5	\$10,000	\$50,000
6	8" Gate Valve	EA	2	\$5,000	\$10,000
7	6" Gate Valve	EA	2	\$4,000	\$8,000
8	Erosion and Sedimentation Control	LF	1,700	\$6	\$10,000
9	Restoration	LF	1,700	\$8	\$14,000
10	Connection to Existing Distribution System	EA	5	\$10,000	\$50,000
11					\$0
CONSTRUCTION SUBTOTAL					\$382,000
CONTINGENCY					\$57,000
SURVEYING					\$15,000
PRELIMINARY ENGINEERING					\$11,000
ENVIRONMENTAL					\$4,000
ENGINEERING DESIGN AND PERMITTING					\$27,000
BID AND AWARD					\$6,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$23,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$0
FUNDING ADMINISTRATION					\$2,000
TOTAL OPINION OF PROBABLE COST					\$527,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
SKYLAND DRIVE TANK CONNECTIVITY IMPROVEMENTS
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$42,000
2	12" DIP Water Line	LF	3800	\$170	\$646,000
3	Compact Ductile Iron Fittings	LB	6,000	\$10	\$60,000
4	12" Gate Valve	EA	3	\$6,000	\$18,000
5	Air Release Valve in Pre-Cast Concrete Manhole	EA	1	\$15,000	\$15,000
6	Connection to Existing Distribution System	EA	3	\$10,000	\$30,000
7	Fire Hydrant, incl. 6" tapping sleeve, valve, and stem	EA	5	\$10,000	\$50,000
8	Erosion and Sedimentation Control	LF	3,800	\$6	\$23,000
9	Restoration	LF	3,800	\$8	\$30,000
10	Bore and Jack 24" Encasement w/ 12" Carrier Pipe	LF	300	\$1,800	\$540,000
11					\$0
CONSTRUCTION SUBTOTAL					\$1,412,000
CONTINGENCY					\$212,000
SURVEYING					\$56,000
PRELIMINARY ENGINEERING					\$14,000
ENVIRONMENTAL					\$14,000
ENGINEERING DESIGN AND PERMITTING					\$99,000
BID AND AWARD					\$14,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$85,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$0
FUNDING ADMINISTRATION					\$7,000
TOTAL OPINION OF PROBABLE COST					\$1,913,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
SOUTHEAST WATER TANK
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$110,000
2	750,000 Gallon Elevated Steel Water Tank	LS	1	\$3,000,000	\$3,000,000
3	Water Tank Site Piping	LS	1	\$200,000	\$200,000
4	12"x12" Tapping Sleeve and Valve	EA	2	\$15,000	\$30,000
5	12" Gate Valve	EA	4	\$6,000	\$24,000
6	Erosion and Sedimentation Control	LF	500	\$6	\$3,000
7	Restoration	LF	500	\$8	\$4,000
8	12" DIP Water Line	LF	2,300	\$170	\$391,000
8					\$0
CONSTRUCTION SUBTOTAL					\$3,652,000
CONTINGENCY					\$548,000
SURVEYING					\$146,000
PRELIMINARY ENGINEERING					\$37,000
ENVIRONMENTAL					\$37,000
ENGINEERING DESIGN AND PERMITTING					\$256,000
BID AND AWARD					\$37,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$219,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$0
FUNDING ADMINISTRATION					\$18,000
TOTAL OPINION OF PROBABLE COST					\$4,950,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
SOUTHRIDGE PHASE 1 WATER LINE EXTENSIONS
BESSEMER CITY, NORTH CAROLINA
AUGUST 2023**

ITEM NO.	DESCRIPTION	Unit	Quantity	Unit Price	TOTAL
1	Mobilization	LS	1	\$10,000	\$10,000
2	12" DIP Water Line	LF	50	\$300	\$15,000
3	Compact Ductile Iron Fittings	LB	500	\$10	\$5,000
4	Connection to Existing Distribution System	EA	2	\$10,000	\$20,000
5	12" Gate Valve	EA	1	\$6,000	\$6,000
6	Erosion and Sedimentation Control	LF	50	\$6	\$1,000
7	Restoration	LF	50	\$8	\$1,000
8					\$0
CONSTRUCTION SUBTOTAL					\$48,000
CONTINGENCY					\$7,000
SURVEYING					\$2,000
PRELIMINARY ENGINEERING					\$3,000
ENGINEERING DESIGN AND PERMITTING					\$5,000
BID AND AWARD					\$3,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$7,500
TOTAL OPINION OF PROBABLE COST					\$75,500

Notes:

1. All estimated costs are in **2023 dollars**. Due to the volatility of pricing in the current construction market and labor/material shortages, project costs could vary significantly from this preliminary opinion of probable costs.
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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
RAMSEUR ROAD AND SUNSET DRIVE WATER LINE EXTENSION
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$28,000
2	8" DIP Water Line	LF	4,100	\$150	\$615,000
3	Compact Ductile Iron Fittings	LB	5,000	\$10	\$50,000
4	Fire Hydrant, incl. 6" tapping sleeve, valve, and stem	EA	6	\$10,000	\$60,000
5	8" Gate Valve	EA	3	\$5,000	\$15,000
6	Erosion and Sedimentation Control	LF	4,100	\$6	\$25,000
7	Restoration	LF	4,100	\$8	\$33,000
8	Connection to Existing Distribution System	EA	4	\$10,000	\$40,000
9	Air Release Valve in Pre-Cast Concrete Manhole	EA	2	\$15,000	\$30,000
10	Bore and Jack 20" Encasement w/ 8" Carrier Pipe	LF	60	\$1,300	\$78,000
11					\$0
CONSTRUCTION SUBTOTAL					\$946,000
CONTINGENCY					\$142,000
SURVEYING					\$38,000
PRELIMINARY ENGINEERING					\$19,000
ENVIRONMENTAL					\$9,000
ENGINEERING DESIGN AND PERMITTING					\$66,000
BID AND AWARD					\$9,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$57,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$0
FUNDING ADMINISTRATION					\$5,000
TOTAL OPINION OF PROBABLE COST					\$1,291,000

Notes:

1. All estimated costs are in **2023 dollars**. Due to the volatility of pricing in the current construction market and labor/material shortages, project costs could vary significantly from this preliminary opinion of probable costs.
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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
12" SOUTHRIDGE PARKWAY WATER LINE
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	0	N/A	\$78,000
2	12" DIP Water Line	LF	10,500	\$170	\$1,785,000
3	12" Gate Valve	EA	6	\$6,000	\$36,000
4	Fire Hydrant, incl. 6" tapping sleeve, valve, and stem	EA	14	\$10,000	\$140,000
5	Connection to Existing Distribution System	EA	2	\$10,000	\$20,000
6	Erosion and Sedimentation Control	LF	10,500	\$6	\$63,000
7	Restoration	LF	10,500	\$8	\$84,000
8	Bore and Jack 24" Encasement w/ 12" Carrier Pipe	LF	120	\$1,800	\$216,000
9	Compact Ductile Iron Fittings	LB	17,000	\$10	\$170,000
10	Air Release Valve in Pre-Cast Concrete Manhole	EA	5	\$15,000	\$75,000
11					\$0
CONSTRUCTION SUBTOTAL					\$2,589,000
CONTINGENCY					\$388,000
SURVEYING					\$104,000
PRELIMINARY ENGINEERING					\$26,000
ENVIRONMENTAL					\$26,000
ENGINEERING DESIGN AND PERMITTING					\$181,000
BID AND AWARD					\$26,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$155,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$0
FUNDING ADMINISTRATION					\$13,000
TOTAL OPINION OF PROBABLE COST					\$3,508,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
LONG CREEK GRAVITY SEWER EXTENSION PH. 1
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$113,000
2	24" Ductile Iron Gravity Sewer	LF	6900	\$400	\$2,760,000
3	Bore and Jack 36" Encasement w/ 24" Carrier Pipe	LF	100	\$4,000	\$400,000
4	Aerial Gravity Sewer Stream Crossing	EA	3	\$100,000	\$300,000
5	5' Dia. Pre-cast concrete manhole	EA	28	\$7,500	\$207,000
6	Erosion and Sedimentation Control	LF	6,900	\$6	\$41,000
7	Restoration	LF	6,900	\$8	\$55,000
8					\$0
CONSTRUCTION SUBTOTAL					\$3,763,000
CONTINGENCY					\$564,000
SURVEYING					\$113,000
PRELIMINARY ENGINEERING					\$56,000
ENVIRONMENTAL					\$38,000
ENGINEERING DESIGN AND PERMITTING					\$301,000
BID AND AWARD					\$19,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$263,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$188,000
FUNDING ADMINISTRATION					\$75,000
TOTAL OPINION OF PROBABLE COST					\$5,380,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
ARC STREET PS GRAVITY SEWER EXTENSION
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$51,000
2	15" Ductile Iron Gravity Sewer	LF	6,250	\$225	\$1,406,000
3	4' Dia. Pre-cast concrete manhole	EA	25	\$6,000	\$150,000
4	Decommission Existing Arc Street Pump Station	LS	1	\$50,000	\$50,000
5	Erosion and Sedimentation Control	LF	6,250	\$6	\$38,000
6	Restoration	LF	6,250	\$8	\$50,000
7					\$0
CONSTRUCTION SUBTOTAL					\$1,694,000
CONTINGENCY					\$254,000
SURVEYING					\$51,000
PRELIMINARY ENGINEERING					\$25,000
ENVIRONMENTAL					\$17,000
ENGINEERING DESIGN AND PERMITTING					\$136,000
BID AND AWARD					\$8,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$119,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$85,000
FUNDING ADMINISTRATION					\$34,000
TOTAL OPINION OF PROBABLE COST					\$2,423,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
SOUTHEAST GRAVITY SEWER EXTENSION
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$84,000
2	12" Ductile Iron Gravity Sewer	LF	7,000	\$200	\$1,400,000
3	Aerial Gravity Sewer Stream Crossing	EA	2	\$100,000	\$200,000
4	5' Dia. Pre-cast concrete manhole	EA	28	\$7,500	\$210,000
5	Decommission Existing Southeast Pump Station	LS	1	\$50,000	\$50,000
6	Bore and Jack 30" Encasement w/ 18" Carrier Pipe	LF	350	\$2,400	\$840,000
7	Erosion and Sedimentation Control	LF	7,000	\$6	\$42,000
8	Restoration	LF	7,000	\$8	\$56,000
9					\$0
CONSTRUCTION SUBTOTAL					\$2,798,000
CONTINGENCY					\$420,000
SURVEYING					\$84,000
PRELIMINARY ENGINEERING					\$42,000
ENVIRONMENTAL					\$28,000
ENGINEERING DESIGN AND PERMITTING					\$224,000
BID AND AWARD					\$14,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$196,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$140,000
FUNDING ADMINISTRATION					\$56,000
TOTAL OPINION OF PROBABLE COST					\$4,002,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
9TH STREET PUMP STATION IMPROVEMENTS
BESSEMER CITY, NORTH CAROLINA
AUGUST 2023**

ITEM NO.	DESCRIPTION	Unit	Quantity	Unit Price	TOTAL
1	Mobilization	LS	3%	N/A	\$1,000
2	Pump Upgrades - Replacement impellers (incl. hardware, service)	LS	1	\$25,000	\$25,000
CONSTRUCTION SUBTOTAL					\$26,000
CONTINGENCY (25%)					\$7,000
PRELIMINARY ENGINEERING					\$5,000
TOTAL OPINION OF PROBABLE COST					\$38,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
SHOPPING CENTER PS GRAVITY SEWER EXTENSION
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$42,000
2	12" Ductile Iron Gravity Sewer	LF	4350	\$200	\$870,000
3	Aerial Gravity Sewer Stream Crossing	EA	3	\$100,000	\$300,000
4	4' Dia. Pre-cast concrete manhole	EA	17	\$6,000	\$104,000
5	Decommission Existing Shopping Center Pump Station	LS	1	\$50,000	\$50,000
6	Erosion and Sedimentation Control	LF	4,350	\$6	\$26,000
7	Restoration	LF	4,350	\$8	\$35,000
8					\$0
CONSTRUCTION SUBTOTAL					\$1,385,000
CONTINGENCY					\$208,000
SURVEYING					\$42,000
PRELIMINARY ENGINEERING					\$21,000
ENVIRONMENTAL					\$14,000
ENGINEERING DESIGN AND PERMITTING					\$111,000
BID AND AWARD					\$7,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$97,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$69,000
FUNDING ADMINISTRATION					\$28,000
TOTAL OPINION OF PROBABLE COST					\$1,982,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.

4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
EXIT 13 GRAVITY SEWER EXTENSION
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$32,000
2	8" Ductile Iron Gravity Sewer	LF	2800	\$180	\$504,000
3	4' Dia. Pre-cast concrete manhole	EA	11	\$6,000	\$67,000
4	Bore and Jack 20" Encasement w/ 8" Carrier Pipe	LF	350	\$1,300	\$455,000
5	Erosion and Sedimentation Control	LF	2,800	\$6	\$17,000
6	Restoration	LF	2,800	\$8	\$22,000
7					\$0
CONSTRUCTION SUBTOTAL					\$1,065,000
CONTINGENCY					\$160,000
SURVEYING					\$32,000
PRELIMINARY ENGINEERING					\$16,000
ENVIRONMENTAL					\$11,000
ENGINEERING DESIGN AND PERMITTING					\$85,000
BID AND AWARD					\$5,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$75,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$53,000
FUNDING ADMINISTRATION					\$21,000
TOTAL OPINION OF PROBABLE COST					\$1,523,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
LONG CREEK GRAVITY SEWER EXTENSION PH. 2
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$121,000
2	24" Ductile Iron Gravity Sewer	LF	7750	\$400	\$3,100,000
3	Bore and Jack 36" Encasement w/ 24" Carrier Pipe	LF	100	\$4,000	\$400,000
4	Aerial Gravity Sewer Stream Crossing	EA	2	\$100,000	\$200,000
5	5' Dia. Pre-cast concrete manhole	EA	31	\$7,500	\$233,000
6	Erosion and Sedimentation Control	LF	7,750	\$6	\$47,000
7	Restoration	LF	7,750	\$8	\$62,000
8					\$0
CONSTRUCTION SUBTOTAL					\$4,042,000
CONTINGENCY					\$606,000
SURVEYING					\$121,000
PRELIMINARY ENGINEERING					\$61,000
ENVIRONMENTAL					\$40,000
ENGINEERING DESIGN AND PERMITTING					\$323,000
BID AND AWARD					\$20,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$283,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$202,000
FUNDING ADMINISTRATION					\$81,000
TOTAL OPINION OF PROBABLE COST					\$5,779,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
9TH STREET PUMP STATION GRAVITY SEWER EXTENSION
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$89,000
2	20" Ductile Iron Gravity Sewer	LF	7000	\$300	\$2,100,000
3	Bore and Jack 36" Encasement w/ 20" Carrier Pipe	LF	100	\$3,000	\$300,000
4	Aerial Gravity Sewer Stream Crossing	EA	3	\$100,000	\$300,000
5	5' Dia. Pre-cast concrete manhole	EA	28	\$7,500	\$210,000
6	Decommission Existing Ninth Street Pump Station	LS	1	\$50,000	\$50,000
7	Erosion and Sedimentation Control	LF	100	\$6	\$1,000
8	Restoration	LF	100	\$8	\$1,000
9					\$0
CONSTRUCTION SUBTOTAL					\$2,962,000
CONTINGENCY					\$444,000
SURVEYING					\$89,000
PRELIMINARY ENGINEERING					\$44,000
ENVIRONMENTAL					\$30,000
ENGINEERING DESIGN AND PERMITTING					\$237,000
BID AND AWARD					\$15,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$207,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$148,000
FUNDING ADMINISTRATION					\$59,000
TOTAL OPINION OF PROBABLE COST					\$4,235,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.

**PRELIMINARY OPINION OF PROBABLE COST
OATES ROAD PUMP STATION AND FORCE MAIN
BESSEMER CITY, NORTH CAROLINA
JANUARY 2023**

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL
1	Mobilization	LS	3%	N/A	\$37,000
2	6" C900 PVC Force Main	LF	3500	\$125	\$438,000
3	Duplex Submersible Sanitary Sewer Pump Station w/ Pre-Cast Concrete Wetwell and Valve Vault (200 gpm)	LS	1	\$650,000	\$650,000
4	Combination Air Release Vacuum Valve in Pre-Cast Concrete Manhole	EA	1	\$18,000	\$18,000
5	Bore and Jack 16" Encasement w/ 6" Carrier Pipe	LF	60	\$1,000	\$60,000
6	4' Dia. Pre-cast concrete manhole	EA	1	\$6,000	\$6,000
7	Erosion and Sedimentation Control	LF	3,500	\$6	\$21,000
8	Restoration	LF	3,500	\$8	\$28,000
9					\$0
CONSTRUCTION SUBTOTAL					\$1,221,000
CONTINGENCY					\$183,000
SURVEYING					\$37,000
PRELIMINARY ENGINEERING					\$18,000
ENVIRONMENTAL					\$12,000
ENGINEERING DESIGN AND PERMITTING					\$98,000
BID AND AWARD					\$6,000
CONSTRUCTION OBSERVATION & ADMINISTRATION					\$85,000
LEGAL/ADMINISTRATIVE/EASEMENTS					\$61,000
FUNDING ADMINISTRATION					\$24,000
TOTAL OPINION OF PROBABLE COST					\$1,745,000

Notes:

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3. Rock excavation or undercut of unsuitable material is not included in the above cost opinion.
4. Cost opinion based on publicly available topographical data and conceptual site plan. Revisions to cost opinions should be expected after final design is complete.