

City of Graham

Water and Wastewater System

Development Fee Analysis



April 2022

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EXECUTIVE SUMMARY

The enclosed analysis was performed in accordance with North Carolina House Bill 436 (“HB-436”) and serves to establish a System Development Fee structure for the City of Graham (the “City”). Water and wastewater system analyses and comprehensive master planning are imperative for facilitating orderly growth of water and wastewater systems, and for providing utility infrastructure which will promote economic development within the City and its service area. As an accompaniment to this level of planning, implementation of a System Development Fee assists in equitably proportioning the financial burden of both existing infrastructure and new infrastructure which is needed to serve new development to the new users and away from existing customers. This analysis follows a previous review in 2018 which provided for the adoption of the current System Development Fees.

Elements of the water and wastewater systems, including storage facilities, pumping facilities, treatment facilities, and the distribution, collection, and conveyance network, were inventoried and evaluated against industry standards as outlined in the Current Utility Infrastructure section of this report.

At present the City’s water and wastewater systems have capacity to serve new customers. Significant system-wide improvements will be necessary to facilitate future growth to meet projected capacity needs. As such, a combined cost approach was utilized in this analysis.

In addition to calculating an existing system “Buy-In” fee, water and wastewater system improvements necessary to serve the 10-year planning horizon were evaluated. City initiated projects will focus primarily on water transmission main improvements in order to provide water from the Graham-Mebane Water Plant to the City’s distribution system, making improvements to reclaim wastewater capacity, and providing new elevated water storage capacity, and upgrading of the Cooper Road Pump Station. These projects are anticipated to commence and be completed within the 10-year planning window. An upgrade of the Wastewater Treatment Plant that includes an expansion is also projected during this planning window but is primarily being funded as a treatment upgrade and not as a capacity expansion.

In order to calculate a system development fee, it is required to evaluate the value of the existing water and sewer systems. Pursuant to HB-436 and methodology prescribed by the American Water Works Association, the following analysis identifies Net Asset Valuations of \$22,131,976 and \$20,060,262 for the water and wastewater systems respectively and identifies approximately \$82,010,00 of needed system-wide capital improvements. Of these capital improvements, approximately \$11,750,000 is identified as potentially recoverable through System Development Fees.

HB-436 defines a service unit as “a unit of measure, typically an equivalent residential unit, calculated in accordance with generally accepted engineering or planning standards.” For the purposes of this analysis, the City establishes a service unit as an Equivalent Residential Unit (“ERU”) which consumes an average of 240 gallons per day through a standard $\frac{3}{4}$ ” water meter serving a 2-bedroom home at 120 gallons/day/bedroom. This ERU is based upon the minimum residential meter provided in the City of Graham and the minimum sewer permitting for a single-family home per North Carolina’s 2T Rules. For any non-residential development which requires a different size water meter, a service unit equivalent is established at a multiplier based on its operating capacity with respect to the $\frac{3}{4}$ ” water meter. The equivalency factors and associated System Development Fee by water meter size are shown in **Table 1**. **Table 1** also provides equivalency factors for residential connections based upon houses with more than 2-bedrooms.

Given 10-year growth projections, an estimated **2,537** additional ERU's will require water and wastewater service by the year 2032. Based on projected additional ERU's, current system valuations, and referenced capital planning documents, the City may assess a maximum System Development Fee of \$4,519 per ERU.

Table 1: Maximum Assessable System Development Fee for Commonly Used Water Meters and Bedrooms[†]

Water & Sewer System Development Fees[†]				
Customer Type	Equivalent Residential Unit[‡]	Water Fee	Sewer Fee	Total Fee
Residential Dwelling Unit (3/4" Meter - 2 BR)*	1	\$2,771	\$1,748	\$4,519
Residential Dwelling Unit (3/4" Meter - 3 BR)*	1.5	\$4,157	\$2,622	\$6,779
Residential Dwelling Unit (3/4" Meter - 4 BR)*	2	\$5,542	\$3,496	\$9,038
Residential Dwelling Unit (3/4" Meter - 5 BR)*	2.5	\$6,928	\$4,370	\$11,298
All Other Zoning Categories/Uses - 3/4" Meter	1	\$2,771	\$1,748	\$4,519
All Other Zoning Categories/Uses - 1" Meter	1.67	\$1,918	\$4,466	\$6,384
All Zoning Categories/Uses - 1.5" Meter	3.33	\$3,837	\$8,931	\$12,768
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All Zoning Categories/Uses - 3" Meter	11.67	\$13,428	\$31,260	\$44,688
All Zoning Categories/Uses - 4" Meter	21	\$24,171	\$56,267	\$80,438
All Zoning Categories/Uses - 6" Meter	43.33	\$49,876	\$116,107	\$165,983

[†]Applicable System Development Fee(s) for development requiring smaller or larger water meters will be calculated on a project specific basis using rates and methodology identified in the City's System Development Fee Analysis.

[‡]Equivalent Residential Unit is approximate multiplier adapted from AWWA Manual of Water Supply Practices-M1, *Principles of Water Rates, Fees, and Charges*.

*120 gallons per day per bedroom (min. 2-BR)

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INTRODUCTION

The City of Graham (the “City”) retained the services of Alley, Williams, Carmen & King, Inc. (“AWCK”) for the purpose of preparing a written analysis and establishing a System Development Fee in accordance with House Bill 436⁽¹⁾ (“HB-436”) as enacted by the North Carolina General Assembly and ratified on 29 June 2017. HB-436 is entitled “An Act to Provide for Uniform Authority to Implement System Development Fees for Public Water and Sewer Systems in North Carolina and to clarify the Applicable Statute of Limitations”. It amends Chapter 162A of the North Carolina General Statutes and enables local government units (“LGU”) to assess a System Development Fee on new development within their planning area. The initial analysis was completed in 2018 and is currently being reviewed per the recommended 2-5 year period for possible changes in the fee being assessed.

A System Development Fee is a **one-time** levy assessed against new water and wastewater consumers for system capacity. Proceeds from this fee are then used to fund the design and construction of growth related water and wastewater system capital projects, and/or to reimburse the LGU for previous water and wastewater capacity related capital expenditures.

Currently portions of the City’s water and wastewater systems have capacity to serve new customers. However, current growth rates highlight the need for significant system-wide improvements which will facilitate future growth and meet projected capacity needs. As such, a combined cost approach which seeks to blend the value of both the existing and future expanded systems is utilized in this analysis.

This report relies on existing City planning documents, the American Water Works Association Manual M1, *Principles of Water Rates, Fees, and Charges*⁽²⁾ (“AWWA Manual”), HB-436, and where necessary sound engineering judgement to satisfy the requirements of HB-436 and provide the City with a schedule of maximum allowable System Development Fee assessments.

CURRENT UTILITY INFRASTRUCTURE

Components of the City’s current water and wastewater systems include the following:

- The City retains 50% ownership and capacity allocation in the 12.00 million gallon per day (“MGD”) Graham-Mebane Lake Drinking Water Treatment Facility, and allocates 0.181 MGD and 0.300 MGD of this capacity to the Towns of Green Level and Swepsonville respectively. Current average day use by the City is approximately 1.67 MGD (27.8% of remaining 6.0 MGD allocation). Projected water demand for the year 2032 is approximately 2.89 MGD (48.2% of remaining 6.0 MGD allocation). The City has adequate water production capacity to meet forecasted demand for the next 10 years.
- The City owns and operates one (1) elevated water storage tank with a capacity of 500,000 gallons. Existing storage capacity (ground storage and elevated storage) meets minimum design criteria. The City does expect to need another 1.0 Million Gallon water tank at the end of the 10 year planning period to comply with the needs of the City’s system and regulatory requirements.
- The City owns and maintains approximately 112 miles of water distribution lines. Existing distribution lines generally meet minimum design criteria for demand and pressure. However,

improvements are needed in order to improve overall levels of service, increase system redundancy, and extend service to unserved areas. The City’s existing transmission lines from the Graham Mebane Water Plant to the distribution system represent a constriction on the City’s distribution system.

- The City owns and operates the 3.50 MGD City of Graham Wastewater Treatment Plant and allocates 0.750 MGD of this capacity to the City of Mebane. Current average daily return flow is approximately 1.81 MGD (65.8% of remaining 2.75 MGD capacity). The City retains additional capacity allocations with the City of Burlington and The Town of Haw River totaling 0.500 MGD and 0.125 MGD respectively. Current average daily return flows are 0.192 MGD and 0.020 MGD respectively. Cumulative projected wastewater demand for the year 2032 is approximately 2.78 MGD (82.4% of total remaining 3.375 MGD capacity/allocation). The City has limited capacity to meet future projected demand at the Graham Wastewater Treatment Plant. A treatment upgrade which includes an expansion of the WWTP is projected to begin in late 2022. This project is included within the planning window but is not included as a growth project due it’s primary goal of compliance with regulatory impacts. As a result, the capacity of the WWTP during the proposed period is 3.375 MGD.
- The City owns and maintains a wastewater collection and conveyance system comprised of six (6) pump stations, approximately four (4) miles of force main, and approximately 106 miles of gravity sewer. Existing pump stations and conveyance lines are generally able to meet minimum design parameters. However, improvements are needed in order to prevent sanitary sewer overflows, improve overall system efficiency, and extend service to unserved areas.

GROWTH AND POPULATION TRENDS

The City of Graham has seen significant growth in the last 5 years and this growth is anticipated to continue well beyond the next 10 years. The City is projecting a 2.5% growth rate over the 10 year period. This projected growth rate is included within the City’s planning for water and sewer infrastructure projects. **Table 2** shows future population projections and resulting increases in demand.

*Table 2: Min. 10-year Planning Window Additional ERU's
Water System*

Demand	2021		2027		2032		Increase	
	ADF	ERU	ADF	ERU	ADF	ERU	ADF	ERU
Residential	634,000	5,891	1,639,621	6,832	1,855,081	7,730	1,221,081	1,839
Commercial	384,000	1,600	445,322	1,856	503,841	2,099	119,841	499
Industrial	242,000	1,008	280,646	1,169	317,525	1,323	75,525	315
Institutional	81,000	338	93,935	391	106,279	443	25,279	105
Total	1,341,000	8,837	2,459,524	10,248	2,782,726	11,595	1,441,726	2,758

Wastewater System

Demand	2021		2027		2032		Increase	
	ADF	ERU	ADF	ERU	ADF	ERU	ADF	ERU
Residential	1,206,621	5,891	1,639,621	6,832	1,855,081	7,730	648,459	1,839
Commercial	327,719	1,600	445,322	1,856	503,841	2,099	176,122	499
Industrial	206,531	1,008	280,646	1,169	317,525	1,323	110,994	315
Institutional	69,128	338	93,935	391	106,279	443	37,151	105
Total	1,810,000	8,837	2,459,524	10,248	2,782,726	11,595	972,726	2,758

PROPOSED INFRASTRUCTURE IMPROVEMENTS

The City of Graham maintains an ongoing capital improvement plan (CIP) that primarily addresses existing infrastructure. In 2021, the City of Graham completed investigation on growth projects for the water and wastewater systems as well as for both plants. These growth plans outlined a series of projects that were needed to support growth within the City. These projects include projects that are within the 10 year planning window and beyond. The projects within the 10 year planning window that are wholly or partially recoverable from a system development fee include the following:

- 10" Water Main Replacement (10% recoverable for upsizing).
- W. Elm Street Waterline Replacement (15% recoverable for upsizing).
- Downtown Water and Sewer Replacements (15% recoverable for upsizing).
- Trollingwood 16" Waterline Connection (75%).
- Harden Street 16" Waterline Connection (75%).
- Woody Drive 16" Waterline Connection (75%).
- Elevated Water Storage Tank (40%).
- Cheeks Lane Waterline Extension (75%).
- Southern Water Interconnection (50%).
- Cooper Road Pump Station and Force Main Upgrade (75%).
- Kimrey Road Outfall Extension (100%).

ESTABLISHED LEVEL OF SERVICE

HB-436 defines a service unit as "a unit of measure, typically an equivalent residential unit, calculated in accordance with generally accepted engineering or planning standards."

The minimum sized water meter for a new single family home is $\frac{3}{4}$ " while the minimum sewer permitting allocation for a single family home is 240 gallons per day (gpd). The 240 gallons per day is due to NC DEQ's 2T rules which require all new single family homes to be permitted at 120 gpd. For the purposes of this analysis, the City establishes a service unit as an Equivalent Residential Unit ("ERU") which consumes an average of 240 gallons per day through a standard $\frac{3}{4}$ " water meter and being permitted at 80 gallons per day/bedroom for a 2-bedroom home. Existing system demand is based upon the City's 2021 Local Water Supply Plan and the number of future ERU's the City may serve is based on an assumed demand of 240 gpd/ERU for a 2-bedroom home.

SYSTEM BUY-IN ASSESSMENT

The system buy-in method values capacity in existing system components, with the resulting fee intended to achieve capital equity between existing and future customers. For the purposes of this analysis, portions of the City's Audit report as well as information regarding the City's water and wastewater systems were utilized to establish values of existing system capacity as shown below.

Water System		Wastewater System	
Non-depreciable Capital Assets	\$640,773	Non-depreciable Capital Assets	\$0
Depreciable Capital Assets	\$29,020,415	Depreciable Capital Assets	\$32,441,547
Accumulated Depreciation	(\$7,529,212)	Accumulated Depreciation	(\$12,381,285)
Debt Credits, Grants, Etc.	\$ (2,181,892.60)	Debt Credits, Grants, Etc.	\$ (4,245,771.60)
Grant Depreciation	\$0	Grant Depreciation	\$0
Net Asset Value	\$19,950,084	Net Asset Value	\$15,814,491
Existing Capacity (GPD)	6,000,000	Existing Capacity (GPD)	3,375,000

In keeping with methodology prescribed in the AWWA Manual, a system buy-in fee is calculated as shown below. **Table 3** shows the City may assess a maximum buy-in System Development Fee of \$8.01 per gallon of average daily flow (ADF). Assuming an average daily flow (ADF) of 240 gpd, this equates to \$798.00 for water service and \$1,124.59 for wastewater service, totaling \$1,922.59 per ERU.

$$\frac{\text{Buy In Fee}}{\text{Gallon}} = \frac{\text{Original Cost} - \text{Accumulated Depreciation} - \text{Debt Principal Outstanding} - \text{Grants, etc.}}{\text{Total System Capacity (gal.)}}$$

Table 3: Maximum Permissible Buy-In System Development Fee

Buy-In Fee Calc.	\$/Gal ADF	\$/ESFC
Water (1 ESFC = 240 gpd)	\$3.33	\$798.00
Sewer (1 ESFC = 240 gpd)	\$4.69	\$1,124.59
Total	\$8.01	\$1,922.59

INCREMENTAL COST ASSESSMENT

The incremental cost method considers future system expansions which are required, either all or in part, to serve new development. The projected capital cost associated with these expansions are then assessed equitably to new customers in relation to their projected usage of the new facilities and the investment required to construct them. For the purposes of this analysis, eleven (11) capital projects which were previously identified through growth planning and deemed to offer a system-wide benefit are considered eligible for recoverable cost through System Development Fee assessments over the 10-year planning window. **Tables 4 and 5** show future capital projects and costs deemed as recoverable for the water and wastewater systems respectively.

Table 4: Water System Capital Projects Eligible for Cost Recovery

Water System Capital Projects	Total Capital Cost	Recoverable Percentage	Recoverable Cost
10" Water Main Replacement	\$13,050,000	10%	\$1,305,000
W. Elm Street Waterline Replacement	\$1,200,000	15%	\$180,000
Downtown Water and Sewer Improvements	\$600,000	15%	\$90,000
Trollingwood 16" Waterline Connection	\$2,000,000	75%	\$1,500,000
Harden Street 16" Waterline Replacement	\$400,000	75%	\$300,000
Woody Drive 16" Waterline Replacement	\$1,600,000	75%	\$1,200,000
Elevated Water Storage Tank	\$3,500,000	40%	\$1,400,000
Cheeks Lane Waterline Extension	\$1,000,000	75%	\$750,000
Southern Water Interconnection	\$1,000,000	50%	\$500,000
SYSTEM DEVELOPMENT FEE STUDY (1/2)	\$30,000	100%	\$30,000
Total	\$24,380,000	-	\$7,255,000

*Professional fees incurred by the LGU for preparation of a System Development Fee analysis are recoverable costs under HB-436.

Table 5: Wastewater System Capital Projects Eligible for Cost Recovery

Wastewater System Capital Projects	Total Capital Cost	Recoverable Percentage	Recoverable Cost
Cooper Road Pump Station and Force Main Upgrade	\$3,500,000	75%	\$2,625,000
Kimrey Road Outfall Extension	\$1,000,000	100%	\$1,000,000
Downtown Water and Sewer Improvements	\$600,000	15%	\$90,000
Waste Water Plant Upgrade	\$50,000,000	0%	\$0
SYSTEM DEVELOPMENT FEE STUDY (1/2)	\$30,000	100%	\$30,000
Total	\$57,630,000	-	\$3,745,000

*Professional fees incurred by the LGU for preparation of a System Development Fee analysis are recoverable costs under HB-436.

In the case of future capital projects HB-436 requires a credit back to new users for the future water and wastewater revenue they will generate, a portion of which will theoretically be allocated for funding future capital improvements. This Revenue Credit prevents the City from effectively double charging new users for future capital improvements, once via System Development Fees and again via water and wastewater rates. In accordance with HB-436 this Revenue Credit is based upon the present value of projected rate revenue to be generated by new users within the 10-year planning window and may not total less than 25% of the aggregate project costs. **Table 6** shows Revenue Credits based upon assumed 2,537 new ERU's and current water and wastewater rates.

Table 6: Revenue Credits and Maximum Recoverable Costs

Water System Development Fee Recoverable Capital Cost =	\$ 7,255,000
Water System Development Fee Revenue Credit =	\$ (1,813,750)
Wastewater System Development Fee Recoverable Capital Cost =	\$ 3,745,000
Wastewater System Development Fee Revenue Credit =	\$ (1,061,605)
Total System Development Fee Recoverable Capital Cost =	\$ 8,124,645

In keeping with methodology prescribed in the AWWA Manual **Table 7** shows the City may assess a maximum buy-in System Development Fee of \$12.27 per gallon of average daily flow (ADF). Assuming average daily flow of 240 gpd, this equates to \$1,973.00 for water service and \$973.00 for wastewater

service, totaling \$2,946.00 per ERU.

Table 7: Maximum Permissible Incremental Cost Based System Development Fee

Incremental Fee Calc.	\$/Gal ADD	\$/ERU	After Revenue Credit	
			\$/Gal ADD	\$/ERU
Water (1 ESFC = 240 gpd)	\$10.96	\$2,630.67	\$8.22	\$1,973.00
Sewer (1 ESFC = 240 gpd)	\$5.66	\$1,357.94	\$4.05	\$973.00
Total	\$16.62	\$3,988.60	\$12.27	\$2,946.00

FEE ADOPTION, ADMINISTRATION, AND MAINTENANCE

HB-436 provides a prescriptive guide for the adoption, administration, and on-going maintenance of a System Development Fee analysis and the revenue it generates. As such, any LGU considering adoption of a System Development Fee should consult legal counsel regarding HB-436, the authorization of a System Development Fee, and subsequent use of revenue.

In order to establish a System Development Fee per service unit of new development an LGU must adopt this written analysis via resolution or ordinance. Prior to an LGU’s governing body considering adoption of this and any future System Development Fee analyses, the written analysis shall be posted publicly for a minimum of 45 days in order to solicit public comment regarding its contents. Once the public comment period has expired, the analysis preparer shall consider all received comments and revise or modify the analysis as necessary. The LGU’s governing body must subsequently convene one (1) public hearing prior to considering adoption of the analysis and incorporating the resulting System Development Fee into its adopted budget and/or larger fee schedule. An adopted System Development Fee analysis must be reviewed and updated a minimum of every five (5) years. In the case of rapidly developing areas such as the City, more frequent revisions may be warranted.

HB-436 mandates System Development Fee revenue be accounted for by means of a dedicated Capital Reserve Fund and places certain restrictions on how an LGU may appropriate that revenue. As such, any LGU considering adoption of a System Development Fee should consult with legal counsel and a qualified financial professional regarding HB-436, the authorization of a System Development Fee, and subsequent use of revenue.

The City of Graham adopted a System Development Fee in 2018 using the above prescriptive guide and has followed the same with this 2022 analysis.

CONCLUSIONS

Based upon the City’s 10-year growth projections, an estimated additional 2,577 ERU’s will require water and wastewater service by the year 2032 with an estimated population of 22,511. For the purposes of this analysis an ERU represents a hypothetical service unit which is considered equal to a single family residential connection and is assumed to consume approximately 240 gallons per day through a standard ¾” water meter and being permitted (wastewater) as a 2-bedroom unit using 120 gallons/day/bedroom.

The City’s water and wastewater systems have available capacity to serve new customers. However,

significant system-wide improvements will be necessary to facilitate future growth. As such a combined cost approach based upon reasonable engineering assumptions and American Water Works Association methodology was utilized in this analysis to establish both a buy-in fee and an incremental cost fee. The system buy-in fee is based upon current system valuations, and the incremental fee is based upon planned future system-wide capital improvements. Given projected increases in ERU's, current system valuations, and recoverable capital improvements project costs, the City may assess a total maximum System Development Fee of **\$4,519** per ERU. For any development which requires a different size water meter, a service unit equivalent is established as a multiplier based on its operating capacity with respect to the ¾" water meter. The equivalency factors and associated System Development Fee by water meter size are shown in **Table 1**. These values represent the maximum System Development Fee assessment per ERU permissible under HB-436. The City may elect how to incorporate these values into their current fee structure, but in no case is it permissible under HB-436 to assess a fee greater than that which is supported by this analysis.

NCDEQ permits wastewater at 120 gallons per day per bedroom or 240 gallons per day for a typical 2-bedroom unit flowing the Graham WWTP. This affects permitting capacity and using a multiplier of the ERU for residential development should be considered as follows:

Table 8 Residential Wastewater Permitted to the Graham WWTP

Residential Wastewater Permitted to the Graham WWTP	
2-bedroom – 1.00 for 240 gpd	\$4,519.00
3-bedroom – 1.50 for 360 gpd	\$6,778.50
4-bedroom – 2.00 for 480 gpd	\$9,038.00
5-bedroom – 2.50 for 600 gpd	\$11,297.50

Note: Future study may provide for a NCDEQ reduction in the 120 gallons per day (min. 2-bedroom) to 80 gallons per day (min. 2-bedroom) for wastewater flowing to the Graham WWTP. At that time the assessed fee may be reduced.

This would result in a minor restructuring of the fee that would yield a fee schedule that should match the following format:

Table 9 Maximum SDF Fee Schedule Format

Water & Sewer System Development Fees†				
Customer Type	Equivalent Residential Unit‡	Water Fee	Sewer Fee	Total Fee
Residential Dwelling Unit (3/4" Meter - 2 BR)*	1	\$2,771	\$1,748	\$4,519
Residential Dwelling Unit (3/4" Meter - 3 BR)*	1.5	\$4,157	\$2,622	\$6,779
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All Other Zoning Categories/Uses - 1" Meter	1.67	\$1,918	\$4,466	\$6,384
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All Zoning Categories/Uses - 2" Meter	5.33	\$6,139	\$14,290	\$20,429
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All Zoning Categories/Uses - 4" Meter	21	\$24,171	\$56,267	\$80,438
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†Applicable System Development Fee(s) for development requiring smaller or larger water meters will be calculated on a project specific basis using rates and methodology identified in the City's System Development Fee Analysis.

‡Equivalent Residential Unit is approximate multiplier adapted from AWWA Manual of Water Supply Practices-M1, *Principles of Water Rates, Fees, and Charges*.

*120 gallons per day per bedroom (min. 2-BR)

REFERENCES

¹ *An Act to Provide for Uniform Authority to Implement System Development Fees for Public Water and Sewer Systems in North Carolina and to Clarify the Applicable Statute of Limitations*. General Assembly of North Carolina. Session 2017. Session Law 2017-138; House Bill 436.

² "VII.2." *M1: Principles of Water Rates, Fees, and Charges*, by Chris Woodcock et al., Seventh ed., American Water Works Association, 2017, pp. 321–347.

³ 15A NCAC 02T .0114(b). *Wastewater Design Flow Rates*. (Effective 1 September 2006). North Carolina Administrative Code.

⁴ *Graham Audit Information*. (Year ended June 2021) City of Graham.

⁴ *Hazen and Sawyer Transmission Line Modeling*. City of Graham.

⁵ *Capital Growth Projects*. City of Graham.