

# System Development Fee Analysis

Prepared for

*Brunswick Regional Water and Sewer H2GO*



May 2018

Prepared by:



THE WOOTEN COMPANY

120 N. Boylan Avenue  
Raleigh, NC 27603  
License No. F-0115  
TWC No. 3081-AH

## TABLE OF CONTENTS

1	Executive Summary .....	1
2	Introduction.....	2
2.1	Background .....	2
2.2	Purpose .....	3
3	Methodologies of Determining System Development Fees .....	4
3.1	Buy-In Method .....	4
3.2	Incremental Cost Method .....	5
3.3	Combined Method .....	6
3.4	Overall Technical Approach .....	6
3.4.1	Rational Nexus Test .....	7
3.4.2	Costs in SDF Calculations .....	7
4	Existing Conditions .....	9
4.1	Water Treatment & Distribution.....	9
4.2	Wastewater Treatment & Collection.....	10
4.3	Total System Capacity .....	10
5	Future Conditions.....	12
5.1	Improvements to Existing Systems.....	12
5.2	Future Demand .....	12
5.3	Assumptions & Limitations .....	14
5.4	Proposed System Expansion .....	15
5.4.1	Water Treatment & Distribution .....	15
5.4.2	Wastewater Treatment & Collection.....	15
5.5	Methodology Selection .....	16
6	Analysis of System Development Fees.....	17
6.1	Future Capacity Related Assets.....	17
6.2	Valuation Adjustments.....	19
6.3	Cost Per Unit of Volume.....	20
7	Application of System Development Fees.....	22
8	Conclusions & Recommendations.....	25

## **INDEX OF TABLES**

Table 1. Data Needed in SDF Calculations.....	8
Table 2. Water System Components.....	9
Table 3. Sewer System Components.....	10
Table 4. Water and Sewer System Available Capacity.....	11
Table 5. Number of Connections.....	13
Table 6. Estimated Average Water Demand, 2028.....	14
Table 7. Estimated Average Sewer Demand, 2028.....	14
Table 8. Water System Incremental Valuation.....	18
Table 9. Sewer System Incremental Valuation.....	19
Table 10. Adjusted Incremental Valuation.....	19
Table 11. Proposed Capacity Cost Per Gallon.....	20
Table 12. Proposed Capacity Cost Per Equivalent Connection.....	21
Table 13. Estimated Water Revenues, 2028.....	22
Table 14. Estimated Sewer Revenues, 2028.....	23
Table 15. Total Estimated Revenues From Incremental Cost Method, 2028.....	23
Table 16. Proposed System Development Fees by Capacity.....	25

## **INDEX OF APPENDICES**

1. BRWSH2GO Capital Improvements Plan- Priority Projects & Schedule
2. Public Participation- Notices, Presentations, Discussion, Adoption



## 1 EXECUTIVE SUMMARY

In July 2017, the North Carolina General Assembly amended Chapter 162A of the General Statutes by passing House Bill 436. This amendment created “Article 8: System Development Fees”, and requires local governments to adopt uniform system development fees for public water and sewer systems by July 1, 2018. A factor driving the legislation is application of the ‘rational nexus text’, which requires decision makers to confirm the direct and reasonable connection between the impact of the new development, need of new infrastructure to support that development, and justify the appropriated **System Development Fees (SDFs)** necessary to support that growth. Prescribed methodologies to determine these SDFs are the *Buy-In (Equity) Method*, the *Incremental Cost (Marginal) Method*, and the *Combined Method*.

The Brunswick Regional Water and Sewer H2GO (BRWSH2GO) retained the professional engineering services provided by The Wooten Company to conduct the SDF analysis. Considering the district’s limited water and sewer permitted treatment capacities of 2.0 MGD and 1.084 MGD, respectively, and given the forecasted population of 38,700 persons for the next 10-year planning period, the most practical methodology to calculate SDFs is the Incremental Cost Method. The Incremental Cost Method avoids adverse financial impacts to existing customers for construction of new infrastructure necessary to support increased development.

Based on anticipated capital improvements cost of \$47.8 million between years 2018 and 2028, the unit cost per gallon capacity is \$37.07 [\$8.59 water + \$28.47 sewer]. Applying this unit cost to the average 210 gallons per day consumed by the typical BRWSH2GO residential customer, the SDF is \$7,784 per residential connection [\$1,804 water + \$5,980 sewer]. Non-residential connections, requiring larger meters, would be charged higher SDFs.

This analysis allows policymakers to make an informed decision when allocating system capacity costs between existing and new customers. It is expected that the SDFs will generate approximately \$28.2 million over 10 years to support necessary water and sewer infrastructure expansion. As required by the legislation, Brunswick Regional Water and Sewer H2GO will need to reevaluate this analysis and proposed SDFs every five years.



## 2 INTRODUCTION

### 2.1 *Background*

The North Carolina General Assembly (NCGA) ratified House Bill 436 (HB 436)<sup>1</sup> in July of 2017, amending Chapter 162A: *Water and Sewer Systems*, Article 8: *System Development Fees* of the NC General Statutes (NCGS)<sup>2</sup>. This legislation requires local governments to adopt uniform system development fees for public water and sewer systems by July 2018. System Development Fees (SDFs), also commonly known as capacity charges, are charges imposed to customers (users) to fund capital improvements for new development, to recuperate costs of existing facilities that serve new development, or a combination<sup>3</sup>. According to HB 436, units of local government, authorities, and districts that provide water and sewer services are required to do the following:

- Calculate SDFs by using a buy-in, incremental, or combined costs method;
- Identify assumptions and limitations of the data analysis;
- Identify metric components of the SDF, demand, and capacity by customer class/category;
- Illustrate clear factors for units of measurement;
- Provide a 10-20 year planning timeline;
- Provide public notice and conduct a public hearing;
- Adopt fees by resolution or ordinance to incorporate into the jurisdiction's annual budget; and
- Update and reevaluate the SDFs every five (5) years.

---

<sup>1</sup> North Carolina General Assembly (NCGA). "Public Water and Sewer System Development Fee Act." *Local Government/Regulatory Fees, House Bill 436*. Session Law 2017-138. Ratified 20 July 2017. [HB 436]

<sup>2</sup> North Carolina General Statutes (NCGS). Chapter 162A. *Water and Sewer Systems*. <https://www.ncleg.net/gascripts/Statutes/StatutesTOC.pl>

<sup>3</sup> NCGA. HB 436. <https://www.ncleg.net/gascripts/billlookup/billlookup.pl?Session=2017&BillID=H436>



The University of North Carolina at Chapel Hill (UNC) School of Government (SOG) Environmental Finance Center (EFC)<sup>4</sup> and American Water Works Association (AWWA) *Manual of Water Supply Practices (M1)*<sup>5</sup> provide detailed guidance and considerations for SDF determinations. In general, jurisdictions will need an inventory and condition of assets, financial commitment to capital improvements, and evidence of master planning strategies.

## 2.2 Purpose

Brunswick Regional Water and Sewer H2GO (BRWSH2GO) has requested The Wooten Company to provide professional consulting services, conduct an in-depth analysis of anticipated system costs, and project estimated revenues for updating its existing 20-year Capital Improvements Plan (CIP). This analysis will include evaluation of System Development Fee methodologies, investigate the scenario that provides the optimum outcome, present findings, and calculate proposed SDFs for public for comment and BRWSH2GO adoption.

---

<sup>4</sup> Hughes, Jeff & Millonzi, Kara. (2017, August 17). "Update on the Authority to Charge Water System Development Fees." [Webinar]. University of North Carolina at Chapel Hill (UNC). School of Government (SOG). Environmental Finance Center (EFC). <https://efc.sog.unc.edu/resource/update-authority-charge-water-system-development-fees>

<sup>5</sup> American Water Works Association (AWWA). *Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices (M1)*. 7<sup>th</sup> Edition, 2017.



## **3 METHODOLOGIES OF DETERMINING SYSTEM DEVELOPMENT**

### **FEES**

System Development Fees (SDFs) are charges to new water and wastewater (sewer) system users for system capacity. Revenue from these capacity fees funds capital improvements for new development, recuperates costs of existing facilities that serve new development, or some combination<sup>6</sup>. SDFs do not include routine administrative or system inspection fees, connection (tap) fees, or ancillary development costs without written agreement regarding credit to the developer. Available methodologies to calculate SDFs are the *Buy-In Method*, *Incremental Cost Method*, and *Combined Method*, as described in more detail below.

#### ***3.1 Buy-In Method***

The Buy-In Method, otherwise known as the equity method, is generally more appropriate for use when the current system facilities are sufficient to serve existing and future customers or in systems where existing components do not anticipate needing replacement or expansion in the near future. In this approach, the past contributions of existing customers count as built-in equity accrued. New customers contribute equity (buy-in) to the system, relative to the debt-free position of current customers, accounting for their new share of the system cost. In simplest terms, the process of the buy-in method is to:

- Identify existing capacity of assets;
- Value that capacity;
- Calculate a cost per unit of capacity; and
- Provide conversion units to assign capacity based on customer type and demand.

The cost of facilities is based on system assets and liabilities, equity sources, and usage. Costs of system assets include replacement costs and depreciated value of that asset. System liabilities and equity include outstanding long-term debt, contributions such as grants, and revenues from existing users and customers. A common unit of measurement by type of customer and demand, such as *equivalent residential unit* (ERU), calculates the cost per unit of increased

---

<sup>6</sup> NCGA. HB 436. <https://www.ncleg.net/gascripts/billlookup/billlookup.pl?Session=2017&BillID=H436>

capacity. ERUs are converted to determine the SDF based on meter size (example “base” meter size, 5/8-inch meter), fixture units (number of water-using devices), square footage of property, or number of bedrooms. Revenue from SDFs using the Buy-In Method must be expended on rehabilitation of system components, as well as previously completed capital improvements activities where capacity still exists.

### **3.2 Incremental Cost Method**

The Incremental Cost Method, or marginal method, is generally more appropriate for use when the current system facilities are sufficient to serve existing customers, but significant upgrades or expansion are required to serve any new customers. The primary concept of this approach is to charge new customers for the new development without existing user rates being adversely affected, but concurrently tackling the debt service associated with the capital improvements.

A primary step in calculating the SDF is determining the service area, such as jurisdictional boundaries or corporate limits. The planning period aligned with projected growth and demand patterns within an existing master plan or Capital Improvements Plan (CIP), with projected growth and demand patterns for at least 10-year lifespan to ensure adequate increase in needed system capacity.

Predicting future system expansion and capacity needs requires the type of customer, demand by customer type, and rate of growth over the planning period. Examples of customer types generally include residential, commercial, industrial, and institutional categories. Growth rates can include population and employment estimates. Just as with the Buy-In Method, a common unit of measurement by customer type is assigned a utilization rate equivalent to the typical ERU.

According to HB 436, the Incremental Cost Method must also account for revenue credit, which is a deduction of either the outstanding debt principal or present value of project revenues of the new development over the timeline of the planning period, at a minimum of twenty-five percent (25%) of cost of the capital improvements<sup>7</sup>. Construction or contribution credits may also be calculated to determine the excess cost of developer’s share of connecting the new development to oversized facilities that accommodate anticipated future development.

---

<sup>7</sup> NCGA. HB 436. <https://www.ncleg.net/gascripts/billlookup/billlookup.pl?Session=2017&BillID=H436>



System capacity expansion is more efficient and cost-effective when done in an incremental manner. The cost of each increment is shifted to the new customers instead of the existing customers of the system. Revenue from collected SDFs covers the costs of constructing capital improvements and professional fees.

### ***3.3 Combined Method***

The Combined Method is a combination of the two previous methods. This approach is generally more appropriate for use when the current system facilities have capacity to serve some of the new growth, but that the CIP identifies infrastructure that must be constructed to fully meet the needs of the projected growth. Calculation of SDFs includes both existing and planned capacity.

### ***3.4 Overall Technical Approach***

To determine the most appropriate and logical approach to calculate SDFs, the jurisdiction must evaluate its service area priorities and objectives:

- Is major expansion anticipated?
- Will new developments solely pay for new capacity?
- What financial reserves exist for capital improvements?
- What is the current debt situation?
- Does current capacity adequately support the needs of the anticipated demand?
- Do current revenues adequately support the needs of the system?
- Are there any system assumptions or limitations?
- What does the local government hope to achieve by charging SDFs? (What is the financial function for SDFs?)
- Besides state legislation and local ordinances, are there any case law(s) applicable to the local system service area?
- Are there any unique criteria important to our jurisdiction or local system service area?

### 3.4.1 Rational Nexus Test

A common legal consideration to apply when determining SDFs is the ‘rational nexus test’ to ensure appropriate relationship between the SDF and cost of the new development. The ‘rational nexus test’ requires the following:

- Confirm the direct and reasonable connection between the impact of the new development and need of new or expanded infrastructure (e.g., evaluation of master planning documents);
- Determine the cost of the new infrastructure to support the new development (e.g., evaluating intricacies of how new infrastructure is financed and its economic development contributions); and
- Demonstrate the rationale of appropriating the capital necessary to support that growth (e.g., providing a direct link between the establishment of fair and just fees to the amenities and benefits received by the new users of the new infrastructure).

### 3.4.2 Costs in SDF Calculations

The American Water Works Association (AWWA) *Manual of Water Supply Practices (M1)*<sup>8</sup> provides detailed guidance and considerations for SDF determinations. In general, costs related to existing system assets, estimated capital projects, interest costs, administrative costs, and reclaimed water costs can be included in calculating SDFs. **Table 1** below summarizes the typical information needed to calculate the various methods.

---

<sup>8</sup> American Water Works Association (AWWA). *Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices (M1)*. 7<sup>th</sup> Edition, 2017.

**Table 1. Data Needed in SDF Calculations.**

<b>Data Needed</b>	<b>Buy-In / Equity Method</b>	<b>Incremental Cost / Marginal Method</b>	<b>Combined Method</b>
Construction/developer contribution credit	X	X	X
Actual, non-depreciation costs	X		
Replacement Costs		X	
Debt Credit	X		
Grant Credit	X		
Revenue Credit (25%, debt balance, Present Value of debt service)		X	X
Asset Inventory	X		X
Replacement value of assets		X	X
10-20 Year CIP		X	X
Capacity of Assets	X		
Capacity of Growth CIP projects		X	X
Estimated capacity needs of customers based on demand	X	X	X



## 4 EXISTING CONDITIONS

To determine existing capacity, system components including water sources, treatment and distribution and wastewater collection, treatment and discharge must be identified and their overall condition assessed for adequacy to continue providing service.

### 4.1 *Water Treatment & Distribution*

According to the 2017 *Local Water Supply Plan (LWSP)*<sup>9</sup>, the BRWSH2GO water distribution system consists of a 1.5 MGAL elevated water storage tank and approximately 164 miles of 2-24-inch diameter polyvinyl chloride (PVC) and ductile iron (DI) water lines, as shown in **Table 2**. BRWSH2GO purchases all water from Brunswick County. The County withdraws groundwater from the Cape Fear River Basin<sup>10,11</sup>. The agreement is for up to 2.0 MGD on a regular basis, with an average daily demand of 1.714 MGD. The district’s primary service area includes portions of the Towns of Leland and Belville, south of the Town of Navassa, and west of the Brunswick River. According to 2018 BRWSH2GO records, the system serves 10,321 residential customers and 502 non-residential customers.

**Table 2. Water System Components.**

Component	Capacity	Overall Condition
Brunswick County Purchase	2.0 MGD contract; 1.714 MGD average daily demand	Satisfactory
1 Elevated Water Storage Tank	1.5 MGAL	Satisfactory
164 miles of PVC and DIP	2-24" diameter	Satisfactory

<sup>9</sup> North Carolina Department of Environmental Quality (NC DEQ). Division of Water Resources (DWR). *Local Water Supply Plans*. “Brunswick Regional Water and Sewer District, 2017”.

[https://www.ncwater.org/Water\\_Supply\\_Planning/Local\\_Water\\_Supply\\_Plan/search.php](https://www.ncwater.org/Water_Supply_Planning/Local_Water_Supply_Plan/search.php)

<sup>10</sup> NC DEQ. DWR. *Basin Planning Branch*. <https://deq.nc.gov/about/divisions/water-resources/planning/basin-planning>

<sup>11</sup> NC DEQ. DWR. *Local Water Supply Plans*. “Brunswick County, 2017”.

[https://www.ncwater.org/Water\\_Supply\\_Planning/Local\\_Water\\_Supply\\_Plan/search.php](https://www.ncwater.org/Water_Supply_Planning/Local_Water_Supply_Plan/search.php)



## 4.2 Wastewater Treatment & Collection

According to the BRWSH2GO 2017 *LWSP*<sup>12</sup>, the wastewater (sewer) system includes a 0.4 MGD Wastewater Treatment Plant (WWTP), 50 pump stations, and approximately 117 miles 2-24-inch DIP, PVC, and vitrified clay pipe (VCP) sewer lines, as shown in **Table 3**. The primary service area is the same as the water system. Water that is collected is treated and then discharged into the Brunswick River. Any water collected that exceeds the WWTP’s treatment capacity is transmitted to Brunswick County for processing and treatment<sup>13</sup>. The district’s contract with the County is for 0.684 MGD, and average utilization is at approximately 0.646 MGD. According to 2018 BRWSH2GO data, there are 7,290 residential customers and 252 non-residential customers, with an average demand at approx. 0.998 MGD.

**Table 3. Sewer System Components.**

Component	Capacity	Overall Condition
BRWSH2GO WWTP	0.4 MGD design; 0.352 MGD average demand	Satisfactory
Brunswick Co. WWTP	0.684 MGD contract; 0.646 MGD average demand	Satisfactory
50 Pump Stations	Various	Satisfactory
78 miles of PVC, DIP, and VCP gravity	6-15” diameter	Satisfactory
39 miles of PVC and DIP force main	2-24” diameter	Satisfactory

## 4.3 Total System Capacity

Capacities for the water and wastewater system are evaluated on average daily demands and flows. Based on the aforementioned data and resources, as summarized in **Table 4**, the capacities for the water and wastewater do meet the need for existing customer demand and use. Additionally, operation and maintenance of existing assets is covered entirely by user fees. Therefore, SDFs should not include charges to existing customers.

<sup>12</sup> NC DEQ. DWR. *Local Water Supply Plans*. “Brunswick Regional Water and Sewer District, 2017”.

[https://www.ncwater.org/Water\\_Supply\\_Planning/Local\\_Water\\_Supply\\_Plan/search.php](https://www.ncwater.org/Water_Supply_Planning/Local_Water_Supply_Plan/search.php)

<sup>13</sup> NC DEQ. DWR. *Local Water Supply Plans*. “Brunswick County, 2017”.

[https://www.ncwater.org/Water\\_Supply\\_Planning/Local\\_Water\\_Supply\\_Plan/search.php](https://www.ncwater.org/Water_Supply_Planning/Local_Water_Supply_Plan/search.php)

**Table 4. Water and Sewer System Available Capacity.**

<b>System Capacity Million Gallons Per Day (MGD)</b>	<b>Design / Contract Capacity</b>	<b>Average Demand</b>	<b>Available Capacity</b>
Water System	2.0 MGD	1.714 MGD	0.286 MGD
Sewer System	1.084 MGD	0.998 MGD	0.086 MGD



## 5 FUTURE CONDITIONS

To determine necessary future capacity, planned water and sewer system components must be identified, roughly sized, and prioritized. Such improvements are normally identified in a 10-20 year capital improvements planning document adopted by the governing body, or other master planning documents serving the locality.

### *5.1 Improvements to Existing Systems*

As previously mentioned, the district does have a CIP<sup>14</sup>, spanning 20 years (with cost projections until 2028), which is included in **Appendix 1**. However, because all of BRWSH2GO's assets are relatively new and paid by previous development fees, no major rehabilitation or replacement projects for the existing water and sewer assets are planned in the next 10-year planning period.

### *5.2 Future Demand*

Based on current BRWSH2GO data, the population in the service area is projected to be 38,700 persons by 2028, with an average annual growth rate of 3.25%<sup>15</sup>. For the next five years, growth is expected to be 3.5%, and then trail off to approximately 3.0% for the following 5 years. **Table 5** outlines the number and type of connections for the district's existing and future service areas.

---

<sup>14</sup> BRWSH2GO. 2018-2038 Capital Improvements Plan (CIP).

<sup>15</sup> BRWSH2GO. Staff Projection.



**Table 5. Number of Connections.**

<b>WATER CONNECTIONS</b>	<i>Existing</i>	<i>Future (2028)</i>
Residential	10,321	14,221
Non-Residential		
Commercial	462	636
Institutional	40	55
Industrial	0	0
Total Non-Residential	502	691
<b>TOTAL WATER</b>	<b>10,823</b>	<b>14,912</b>

<b>SEWER CONNECTIONS</b>	<i>Existing</i>	<i>Future (2028)</i>
Residential	7,290	10,038
Non-Residential		
Commercial	227	313
Institutional	25	34
Industrial	0	0
Total Non-Residential	252	347
<b>TOTAL SEWER</b>	<b>7,542</b>	<b>10,385</b>

Based on the LWSP info, and according to calculation guidelines from state administrative code and statutes<sup>16,17,18</sup>, increases in customer population and demands are anticipated. **Table 6** illustrates estimated future water demand while **Table 7** shows estimated sewer flows based on average daily demands (ADD) approved by the North Carolina Department of Environmental Quality (NC DEQ) for the residential category, and actual demands for the commercial, institutional and industrial categories.

Based on the available capacity of existing facilities and the projected average daily demands, the water system needs an additional 1.288 MGD ADD (3.288 – 2.0 MGD), and the sewer system needs an additional 1.182 MGD (2.266 – 1.084 MGD) of average daily flow (ADF) to meet demands for year 2028.

<sup>16</sup> North Carolina Administrative Code (NCAC). 15A NCAC 02T. *Waste Not Discharged to Surface Waters*.

<http://reports.oah.state.nc.us/ncac.asp?folderName=\Title%2015A%20-%20Environmental%20Quality\Chapter%2018%20-%20Environmental%20Health>

<sup>17</sup> NCAC. 15A NCAC 18C .0409. *Service Connections*.

<http://reports.oah.state.nc.us/ncac.asp?folderName=\Title%2015A%20-%20Environmental%20Quality\Chapter%2018%20-%20Environmental%20Health>

<sup>18</sup> NCGS. Chapter 162A. *Water and Sewer Systems*. <https://www.ncleg.net/gascripts/Statutes/StatutesTOC.pl>



**Table 6. Estimated Average Water Demand, 2028.**

Expanded Service Area Customer Type	Quantity	Design flow (gallons per unit per day)	Design flow MGD
Residential	14,211	210	2.984
Commercial	636	377	0.239
Institutional	55	1,175	0.065
Industrial	0	0	0.000
<b>Total</b>			<b>3.288</b>

**Table 7. Estimated Average Sewer Demand, 2028.**

Expanded Service Area Customer Type	Quantity	Design flow (gallons per unit per day)	Design flow MGD
Residential	10,038	210	2.108
Commercial	313	377	0.118
Institutional	34	1,175	0.040
Industrial	0	0	0.000
<b>Total</b>			<b>2.266</b>

### 5.3 Assumptions & Limitations

Brunswick County has the highest percent of population growth in the State of North Carolina, experiencing nearly 19% growth between April 2010 and July 2016<sup>19</sup>. BRWSH2GO staff estimates that population growth will be 3.5% for the next several years, and then slow to 3.0% percent thereafter. Hence, for the 10-year SDF planning period, a 3.25% growth rate is incorporated to project annual revenues from water and sewer SDFs.

BRWSH2GO has no existing debt service for significant assets<sup>20</sup>. Previous assets have been installed using revenues from water and sewer ‘impact fees’ for water treatment and pressure delivery, and water and sewer ‘recovery fees’ for construction of distribution and collection lines. For the most recent five-year period covering FY 2013 to 2017, BRWSH2GO collected \$8.67 million total and averaged \$1.73 million annually.

<sup>19</sup> BRWSH2GO. Staff Projection.

<sup>20</sup> BRWSH2GO. Staff Projection.

## 5.4 Proposed System Expansion

To meet the anticipated demand of the rapidly growing population, BRWSH2GO has a multitude of proposed expansion projects. Considering the assumptions and limitations, anticipated costs for capital improvements total \$47.8 million over the next 10-year planning period. The detailed project list from the district's CIP is included in **Appendix 1**.

### 5.4.1 Water Treatment & Distribution

Total projected 10-year water system needs are estimated to cost approximately \$30.8 million. Proposed improvements include line extensions, new elevated storage tanks, and additional WTP treatment capacity.

- **Installation of 12"-18" diameter water line extensions:** All proposed water line extensions are essential to provide redundancy through looping and higher water quality. Total projected waterline extension costs are \$16.25 million.
- **Construction of two new elevated water storage tanks:** Estimated to be 0.750 million gallons each, these new tanks are planned for the distribution system near Compass Pointe and Grayson Park, for total cost of \$5.0 million. Only the Compass Pointe elevated tank is estimated to be needed within the next 10 years, with a construction cost of \$2.5 million during FY's 2021-22.

### 5.4.2 Wastewater Treatment & Collection

Total projected 10-year sewer system needs are estimated to cost approximately \$16.9 million.

- **Regional Pump Station and Force Main:** One regional pump station project and one force main replacement project are already under design, to be complete by FY 2022.
- **Additional Collection Areas:** Three regional pump stations, with associated force main and gravity sewer lines, have anticipated project implementation occurring between FY 2023 and FY 2028.
- **Expansion of the Brunswick County Wastewater Treatment Plant:** Capacity expansion by 1.175 MGD is estimated to cost \$27.6 million. Within the 10-year planning period, \$12.015 million, or 43% of the total cost, is anticipated to be expended between FY 2020 and FY 2028.



## ***5.5 Methodology Selection***

Assuming that the population, customers, and service area projections outlined in the planning documents come to fruition, it is clear future demand cannot be met with existing capacity.

**Based on this information, the most appropriate approach to determine SDFs for BRWSH2GO's expanding district is by using the Incremental Cost Method.**

BRWSH2GO has no significant capital assets for which the buy-in methodology is appropriate. All water is currently bulk purchased from Brunswick County, and wastewater is treated and/or pumped to Brunswick County for treatment and disposal. The population needing utility service should fund the required utility system extensions and capacity increases necessary to service new development in this rapidly growing area.



## **6 ANALYSIS OF SYSTEM DEVELOPMENT FEES**

Restated from Section 3.2, the **Incremental Cost Method** is appropriate when the current system facilities are sufficient to serve existing customers, but significant upgrades or expansion are required to serve any new customers. The primary concept of this approach is to charge new customers for the new development without adversely affecting user rates for the existing customers.

### ***6.1 Future Capacity Related Assets***

**Water System:** The permitted purchase capacity of 2.0 MGD from Brunswick County is used as the basis for calculation of the cost per gallon capacity for the water main improvements. The two elevated tanks were based on a storage volume of 0.750 million gallons each. Future water treatment plant or outside purchased capacities are excluded from the calculations at this time.

No outside debt credits, principal forgiveness loans, or grants are anticipated to offset the total water system costs. The water cost per gallon of capacity is \$11.46. This cost represents the 'per gallon' cost of all identified water improvements.



**Table 8. Water System Incremental Valuation.**

CIP Asset/Project Description	Total Costs	Total Credits	Net Total Cost	Capacity, MGD	Net Total Inc. Cost per Gal Capacity, \$/GPD
12" water line extension from Carol Lynn, along US17, to existing 12" line on Maco Rd.	\$ 1,611,300	\$ -	\$ 1,611,300	2.000	\$ 0.81
18" water line extension from Lanvale Rd to existing 24" on Trade Street	\$ 700,000	\$ -	\$ 700,000	2.000	\$ 0.35
12" and 18" water line extensions from Grayson Park to Compass Pointe west entrance (system loop)	\$ 3,200,000	\$ -	\$ 3,200,000	2.000	\$ 1.60
12" water main extension - US17 service to Stoney Creek/Sneed Farms, including meter change outs	\$ 300,000	\$ -	\$ 300,000	2.000	\$ 0.15
2010 Water Distribution System Study - Improvements Group 1, #6 thru #11	\$ 2,000,000	\$ -	\$ 2,000,000	2.000	\$ 1.00
2010 Water Distribution System Study - Improvements Group 2, #12 thru #18	\$ 435,000	\$ -	\$ 435,000	2.000	\$ 0.22
0.750 MGAL New Elevated Water Storage Tank - Compass Pointe service area	\$ 2,500,000	\$ -	\$ 2,500,000	0.750	\$ 3.33
12" water main extension - Mallory Creek to Town Creek along NC133	\$ 3,000,000	\$ -	\$ 3,000,000	2.000	\$ 1.50
12" water main extension - Atkinson Trail to south of Mallory Creek, loop to NC133	\$ 2,500,000	\$ -	\$ 2,500,000	2.000	\$ 1.25
12" water main extension - along SR87 between Colon Mintz and Malmo Loop	\$ 2,500,000	\$ -	\$ 2,500,000	2.000	\$ 1.25
0.750 MGAL New Elevated Water Storage Tank - Grayson Park service area	\$ -	\$ -	\$ -	0.750	\$ -
<b>TOTAL WATER COST/GALLON CAPACITY</b>					<b>\$ 11.46</b>

**Sewer System:** The design pumping capacities of the four proposed pump stations and the design volumetric capacity of the proposed 10-inch force main is used as the basis of calculation of the cost per gallon capacity for the sewer system improvements. Additionally, expansion of the Brunswick County Wastewater Treatment Plant by 1.175 MGD to serve future growth is included.

No outside debt credits, principal forgiveness loans, or grants are anticipated to offset the total costs. The resulting sewer cost per gallon of capacity is \$37.97. This cost translates to the ‘per gallon’ cost of all identified sewer improvements.



**Table 9. Sewer System Incremental Valuation.**

CIP Asset/Project Description	Total Costs	Total Credits	Net Total Cost	Capacity, MGD	Net Total Inc. Cost per Gal Capacity, \$/GPD
1,200 GPM Hewett Burton Rd Regional Pump Station, FM and Gravity Sewers	\$ 4,246,050	\$ -	\$ 4,246,050	0.690	\$ 6.15
10-inch North/South of School LS Force Main Replacement (from NC133 to WWTP)	\$ 750,000	\$ -	\$ 750,000	0.350	\$ 2.14
1,500 GPM Colon Mintz Regional Pump Station and FM (from Colon Mintz near Malmo Loop to Commerce PS)	\$ 5,000,000	\$ -	\$ 5,000,000	0.840	\$ 5.95
750 GPM Town Creek Rd / US17 Regional Pump Station, FM and Gravity Sewers	\$ 3,000,000	\$ -	\$ 3,000,000	0.420	\$ 7.14
1,100 GPM Town Creek Rd / NC133 Regional Pump Station and FM (to Westport PS)	\$ 4,000,000	\$ -	\$ 4,000,000	0.630	\$ 6.35
New Brunswick Co. 1.175 MGD WTP expansion	\$ 12,015,000	\$ -	\$ 12,015,000	1.175	\$ 10.23
<b>TOTAL SEWER COST/GALLON CAPACITY</b>					<b>\$ 37.97</b>

## 6.2 Valuation Adjustments

HB 436 specifies that a minimum 25% credit to developers must be applied to the calculated incremental cost per gallon capacity. This credit assumes that existing retail rates and charges will generate at least 25% of the present worth capital costs through the 10-year planning period necessary to construct infrastructure. To avoid collecting revenues twice (first through the SDF, and secondly through retail water and sewer rates), a credit is applied to the calculated capacity charge.

**Table 10. Adjusted Incremental Valuation.**

Utility	Calculated Incremental Cost, \$/gallon	Credit, %	Adjusted Incremental Cost, \$/gallon
Water	\$ 11.46	25%	\$ 8.59
Sewer	\$ 37.97	25%	\$ 28.47
<b>Total</b>	<b>\$ 49.43</b>		<b>\$ 37.07</b>

Note this credit adjustment above is different from specific credits given to an individual developer for constructing infrastructure *above and beyond* its proportionate share to service anticipated future connections. These credits should be applied to individual development on a case-by-case basis.



### 6.3 Cost Per Unit of Volume

The adjusted incremental cost of \$37.07 per one-gallon capacity serves as the basis for adjusting the fees for different customer classes. Using an equivalent ratio recommended by AWWA Manual M1, increased operational demands on the water and sewer systems for larger customers are calculated. In this analysis, meter sizes will be utilized to estimate how much water or sewer the customer is expected to use. The equivalent ratio for larger meters represents the higher demand of larger customers, computed using the 5/8- inch meter as a base unit. **Table 11** below calculates the water and sewer capacity costs for larger meter sizes using the equivalent ratios.

**Table 11. Proposed Capacity Cost Per Gallon.**

Meter Size, inches	Equivalent Ratio	Water Capacity Cost, \$/gallon	Sewer Capacity Cost, \$/gallon	Total, \$/gallon
5/8	1.0	\$ 8.59	\$ 28.47	\$ 37.07
1	2.5	\$ 21.48	\$ 71.19	\$ 92.67
1-1/2	5.0	\$ 42.96	\$ 142.37	\$ 185.34
2	8.0	\$ 68.74	\$ 227.80	\$ 296.54
3	15.0	\$ 128.89	\$ 427.12	\$ 556.01

Given that a BRWSH2GO residential customer is approved to consume up to 210 gallons per day (GPD) by NCDEQ, the water and sewer capacity costs from **Table 11** are converted into typical 'per connection' fees for the various water meter sizes, using the same equivalent ratios. These typical 'per connection' costs, illustrated in **Table 12**, are the basis for the annual revenue forecasts in Section 7.1.





**Table 12. Proposed Capacity Cost Per Equivalent Connection.**

<b>Meter Size, inches</b>	<b>Equivalent Ratio</b>	<b>Water Capacity Cost, \$/connection</b>	<b>Sewer Capacity Cost, \$/connection</b>	<b>Total Capacity Cost, \$/connection</b>
5/8	1.0	\$ 1,804	\$ 5,980	\$ 7,784
1	2.5	\$ 4,511	\$ 14,949	\$ 19,460
1-1/2	5.0	\$ 9,022	\$ 29,899	\$ 38,921
2	8.0	\$ 14,435	\$ 47,838	\$ 62,273
3	15.0	\$ 27,066	\$ 89,696	\$ 116,762





## 7 APPLICATION OF SYSTEM DEVELOPMENT FEES

According to Article 8 (System Development Fees) of the NC General Statutes<sup>21</sup>, SDFs are collected for subdivisions of land at the time of plat recording, or when the unit of local government commits water or sewer service for the new development. For un-subdivided land, the SDF applies when the individual customer applies to connect to the system. Revenue projections for water and sewer, given in **Tables 13** and **14** respectively, assume an annual growth rate of 3.25% across all customer classes for the next 10-year planning period. Revenues assume that the typical residential customer will have a 5/8" water meter; commercial customers a 1" water meter; institutional customers a 2" water meter, and industrial customers a 3" water meter. No industrial growth is anticipated, given proximity to the industrial development presence in nearby Wilmington.

**Table 13. Estimated Water Revenues, 2028.**

Year	Residential (5/8")	Commercial (1")	Institutional (2")	Industrial (3")	TOTAL
2019	\$605,253	\$67,733	\$18,766	\$-	\$691,751
2020	\$624,924	\$69,934	\$19,376	\$-	\$714,233
2021	\$645,234	\$72,207	\$20,005	\$-	\$737,446
2022	\$666,204	\$74,553	\$20,655	\$-	\$761,413
2023	\$687,856	\$76,976	\$21,327	\$-	\$786,159
2024	\$710,211	\$79,478	\$22,020	\$-	\$811,709
2025	\$733,293	\$82,061	\$22,736	\$-	\$838,089
2026	\$757,125	\$84,728	\$23,474	\$-	\$865,327
2027	\$781,731	\$87,482	\$24,237	\$-	\$893,450
2028	\$807,138	\$90,325	\$25,025	\$-	\$922,488
<b>TOTAL</b>	<b>\$7,018,968</b>	<b>\$785,477</b>	<b>\$217,621</b>	<b>\$-</b>	<b>\$8,022,066</b>

<sup>21</sup> NCGS. Chapter 162A. *Water and Sewer Systems*. <https://www.ncleg.net/gascripts/Statutes/StatutesTOC.pl>



**Table 14. Estimated Sewer Revenues, 2028.**

Year	Residential (5/8")	Commercial (1")	Institutional (2")	Industrial (3")	TOTAL
2019	\$1,416,747	\$110,289	\$38,868	\$-	\$1,565,904
2020	\$1,462,791	\$113,873	\$40,131	\$-	\$1,616,796
2021	\$1,510,332	\$117,574	\$41,436	\$-	\$1,669,342
2022	\$1,559,418	\$121,395	\$42,782	\$-	\$1,723,595
2023	\$1,610,099	\$125,340	\$44,173	\$-	\$1,779,612
2024	\$1,662,427	\$129,414	\$45,608	\$-	\$1,837,450
2025	\$1,716,456	\$133,620	\$47,091	\$-	\$1,897,167
2026	\$1,772,241	\$137,963	\$48,621	\$-	\$1,958,825
2027	\$1,829,839	\$142,446	\$50,201	\$-	\$2,022,486
2028	\$1,889,309	\$147,076	\$51,833	\$-	\$2,088,217
<b>TOTAL</b>	<b>\$16,429,659</b>	<b>\$1,278,989</b>	<b>\$450,745</b>	<b>\$-</b>	<b>\$18,159,394</b>

**Table 15. Total Estimated Revenues From Incremental Cost Method, 2028.**

Year	Residential (5/8")	Commercial (1")	Institutional (2")	Industrial (3")	TOTAL
2019	\$2,022,000	\$178,021	\$57,634	\$-	\$2,257,655
2020	\$2,087,715	\$183,807	\$59,507	\$-	\$2,331,029
2021	\$2,155,566	\$189,781	\$61,441	\$-	\$2,406,788
2022	\$2,225,622	\$195,948	\$63,438	\$-	\$2,485,008
2023	\$2,297,955	\$202,317	\$65,500	\$-	\$2,565,771
2024	\$2,372,638	\$208,892	\$67,628	\$-	\$2,649,158
2025	\$2,449,749	\$215,681	\$69,826	\$-	\$2,735,256
2026	\$2,529,366	\$222,691	\$72,096	\$-	\$2,824,152
2027	\$2,611,570	\$229,928	\$74,439	\$-	\$2,915,937
2028	\$2,696,446	\$237,401	\$76,858	\$-	\$3,010,705
<b>TOTAL</b>	<b>\$23,448,627</b>	<b>\$2,064,466</b>	<b>\$668,366</b>	<b>\$-</b>	<b>\$26,181,459</b>



Application of the 'rational nexus Test' to the calculated SDFS demonstrates that:

- There is a direct and reasonable connection between the impact of the new development and need of new or expanded infrastructure as existing water and sewer system capacities are not adequate to handle the projected population increase;
- The total cost of the new infrastructure to support the new development is estimated to be \$47.8 million, \$28.2 million of which are estimated SDFS to be collected in the next 10 years; and
- Appropriation of capital funds necessary to support that growth can be achieved through collection of SDFS using an incremental cost approach so that new development customers are afforded the same level of service as existing utilities customers.



## 8 CONCLUSIONS & RECOMMENDATIONS

The Wooten Company has calculated water and sewer System Development Fees (SDFs) on a ‘per gallon’ basis and ‘per connection’ basis for new development within the Brunswick Regional Water and Sewer H2GO service area. The SDFs are based on the Incremental Cost methodology because BRWSH2GO has no existing debt service, and the remaining purchase and treatment capacities for its water and sewer systems are insufficient to meet the year 2028 population projection of 38,700 people. Existing customers should not bear the financial burden of supporting new growth through increased water and sewer rates and charges. Based on the calculated capacity costs per gallon and connection, **Table 16** summarizes the proposed SDFs for new water and sewer customers.

**Table 16. Proposed System Development Fees by Capacity.**

Meter Size, inches	Equivalent Ratio	Water Capacity Cost, \$/gallon	Sewer Capacity Cost, \$/gallon	Total Capacity Cost, \$/gallon	Total Capacity Cost, \$/connection
5/8	1.0	\$8.59	\$28.47	\$37.07	\$7,784
1	2.5	\$21.48	\$71.19	\$92.67	\$19,460
1-1/2	5.0	\$42.96	\$142.37	\$185.34	\$38,921
2	8.0	\$68.74	\$227.80	\$296.54	\$62,273
3	15.0	\$128.89	\$427.12	\$556.01	\$116,762

Per AWWA Manual M1 guidance, larger meter sizes dictate higher capacity fees. Since the typical BRWSH2GO residential customer consumes up to 210 gpd, the water SDF of \$1,804 and sewer SDF of \$5,980 (total of \$7,784) is proposed per equivalent residential unit (ERU) connection. It is expected that the SDFs will generate approximately \$28.2 million in revenue over 10 years to support necessary water and sewer infrastructure system expansion. In accordance with HB 436, this analysis provides information to the public and Brunswick Regional Water and Sewer H2GO policymakers to assign system development fees to customers, with reevaluation occurring every five years.



## **APPENDIX 1**

