System Development Fee Analysis

Prepared for

Brunswick Regional Water and Sewer H2GO

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1 EXECUTIVE SUMMARY

In July 2017, the North Carolina General Assembly amended Chapter 162A of the General Statues 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*.

In May 2018, The Wooten Company conducted an SDF analysis for the Brunswick Regional Water and Sewer H2GO (BRWSH2GO). The original report utilized the Incremental Cost Method to calculate SDFs necessary to support increased development. This report update also uses the incremental method and reflects project cost refinements and new projects (such as a new Water Treatment Plant) not included in the May 2018 report. The water and sewer system number of existing connections and usage per connection values used in the previous report were not modified in this report. This report updates the total future project costs, the per gallon SDF charges, and the projected 10-year water and sewer revenues from the SDF charges in Sections 6 – 8.

For the existing BRWSH2GO service areas, the updated anticipated capital improvements cost is $100.8 million between years 2018 and 2028, the unit cost per gallon capacity is $53.04 [$22.31 water + $30.73 sewer]. Applying this unit cost to the average 210 gallons per day consumed by the typical BRWSH2GO residential customer, the SDF is $11,200 per residential connection [$4,700 water + $6,500 sewer]. Non-residential connections, requiring larger meters, would be charged higher SDFs. It is expected that the SDFs will generate approximately $40.6 million over 10 years to support necessary water and sewer infrastructure expansion.

This analysis allows policymakers to make an informed decision when allocating system capacity costs between existing and new customers. 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)[1] in July of 2017, amending Chapter 162A: *Water and Sewer Systems*, Article 8: *System Development Fees* of the NC General Statues (NCGS)[2]. 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[3]. 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.

The University of North Carolina at Chapel Hill (UNC) School of Government (SOG) Environmental Finance Center (EFC)[4] and American Water Works Association (AWWA) *Manual*

[1] 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] https://www.ncleg.net/gascripts/billlookup/billlookup.pl?Session=2017&BillID=H436

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

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

[4] 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

of Water Supply Practices (M1)[5] 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.

[5] American Water Works Association (AWWA). *Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices (M1)*. 7th 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[6]. 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;
- Valuate 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 capacity. ERUs are converted to determine the SDF based on meter size (example "base" meter

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

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[7]. Construction or contribution credits (third party) 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.

[7] 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)[8] 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.

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

Table 1. Data Needed in SDF Calculations.

Data Needed	Buy-In / Equity Method	Incremental Cost / Marginal Method	Combined Method
Construction/developer contribution credit	X	X	X
Actual, non-depreciation costs	X		X
Replacement Costs		X	X
Debt Credit	X		X
Grant Credit	X		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		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)*[9], 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[10,11]. 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
168 miles of PVC and DIP	2-24" diameter	Satisfactory

[9] North Carolina Department of Environmental Quality (NC DEQ). Division of Water Resources (DWR). *Local Water Supply Plans*. "Brunswick Regional Water and Sewer District, 2018". https://www.ncwater.org/Water_Supply_Planning/Local_Water_Supply_Plan/search.php

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

[11] NC DEQ. DWR. *Local Water Supply Plans*. "Brunswick County, 2018". https://www.ncwater.org/Water_Supply_Planning/Local_Water_Supply_Plan/search.php

4.2 Wastewater Treatment & Collection

According to the BRWSH2GO 2017 *LWSP*[12], 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[13]. 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.

[12] 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

[13] NC DEQ. DWR. *Local Water Supply Plans*. "Brunswick County, 2017". https://www.ncwater.org/Water_Supply_Planning/Local_Water_Supply_Plan/search.php

Table 4. Water and Sewer System Available Capacity.

System Capacity Million Gallons Per Day (MGD)	Design / Contract Capacity	Average Demand	Available Capacity
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[14], spanning 20 years (with cost projections until 2028). 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. The 10-year CIP project costs used in this SDF analysis are provided the CIP table in **Appendix 1**.

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%[15]. 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.

Table 5. Number of Connections.

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

[14] BRWSH2GO. 2018-2038 Capital Improvements Plan (CIP).
[15] BRWSH2GO. Staff Projection.

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

Based on the LWSP info, and according to calculation guidelines from state administrative code and statutes[16,17,18], 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.

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
		Total	**3.288**

[16] 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

[17] 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

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

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
		Total	2.266

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[19]. 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[20]. 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.

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 $124.7 million over the next 10-year planning period. The detailed project list from the district's CIP is included in **Appendix 1**.

[19] BRWSH2GO. Staff Projection.
[20] BRWSH2GO. Staff Projection.

5.4.1 Water Treatment & Distribution

Total projected 10-year water system needs are estimated to cost approximately $82.67 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 $13.11 million.
- **Construction of one new elevated water storage tank**: Estimated to be 0.750 million gallons, this new tank is planned for the distribution system near Compass Pointe, for an estimated total cost of $2.7 million during FY's 2021-22.
- **New Water Supply and Treatment System**: Tap a new deep aquifer source and construct new raw water supply wells, new raw water transmission lines, a new reverse osmosis (RO) water treatment plant (WTP), new finished water lines, and new RO concentration discharge line to the Brunswick River. The new supply wells and water treatment plant have a design capacity of 4.0 MGD, and then expansion to 6 MGD, to serve existing and future needs of H2GO.

  Total projected new supply and treatment system construction cost is $56.3 million for a 4 MGD capacity. This includes an estimated $33.5 million in future construction costs, $5.7 in costs already expended, and $16.3 million dollars in bond interest costs. As explained later, a portion of the capacity of the new WTP is for existing customers such that a credit is provided.

  An additional $7.51 million for construction of an additional 2 MGD capacity is also anticipated. This construction may occur simultaneously with the 4 MGD construction or be offset to a future time period. However, it is anticipated that the extra 2 MGD of capacity will be needed within the 10 year time frame of this SDF analysis. All of this additional capacity would be for future growth.
- **Aquifer Storage and Recovery System (ASR)**. Storage of finished water underground after treatment with later retrieval for use is termed aquifer storage and recovery. This system allows storage of a much greater volume underground than can be stored above ground. For the purposes of the SDF analysis, the system would be built in the approximately 2023 to 2028 time frame for an estimated cost of $3.05 million dollars.

5.4.2 Wastewater Treatment & Collection

Total projected 10-year sewer system needs are estimated to cost approximately $42.05 million.

- **Regional Pump Stations and Force Mains**: Two regional pump station projects and associated force mains are already under design, to be complete by FY 2022. The combined estimated cost is $9.70 million. Approximately half of these projects service existing customers and half is for new customers, therefore a credit is applied.
- **Expansion of the Brunswick County Wastewater Treatment Plant**: The Brunswick WWTP Capacity expansion by 1.175 MGD to provide future capacity (for future growth) is estimated to be a capital cost of $51.9 million. H2GO's share of this expansion is 47% or $24.4 million. Leland's share is 32.4% or $16.8 million. The annual debt payment for an H2GO loan at 2.75% interest (for $24.4 M share) within the next 10-year planning period is $7.95 million. Thus the total cost is anticipated to be $32.35 million 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 as stated om the current Local Water Supply Plan. The elevated tank is based on a storage volume of 0.750 million gallons each. The future RO water treatment plant is based on a capacity of 4.0 MGD total. However, half of the WTP cost and half of the WTP capacity will serve existing customers. Thus, a 50% credit on the WTP cost is applied and the capacity for future growth is set at 2.0 MGD. Thus, 2 MGD is the capacity used in the SDF calculations.

No outside debt credits, principal forgiveness loans, or grants are anticipated to offset the total water system costs. **Table 8** lists the cost per gallon of capacity for each anticipated project. The total water cost per gallon of capacity is $24.28. This cost represents the 'per gallon' cost of all identified water improvements.

Sewer System: The combined capacity of the two proposed regional pump stations and force mains is 1.47 MGD. However, for each project there is a developer that will paying up-front for portions of this capacity. Thus, a 50% credit on the WTP cost is applied and the combined capacity for future growth is set at 0.735 MGD. The expansion of the Brunswick County Wastewater Treatment Plant by 1.175 MGD is to serve future growth is included. Therefore, all of the cost applies to this capacity.

No outside debt credits, principal forgiveness loans, or grants are anticipated to offset the total costs. **Table 9** lists the cost per gallon of capacity for each anticipated project. The total wastewater cost per gallon of capacity is $40.97. This cost translates to the 'per gallon' cost of all identified sewer 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.	$ 1,973,155	$ -	$ 1,973,155	2.000	$ 0.99
18" water line extension from Lanvale Rd to existing 24" on Trade Street	$ 862,523	$ -	$ 862,523	2.000	$ 0.43
12" and 18" water line extensions from Grayson Park to Compass Pointe west entrance (system loop)	$ 3,918,000	$ -	$ 3,918,000	2.000	$ 1.96
2010 Water Distribution System Study - Improvements Group 1, #6 thru #11	$ 2,150,000	$ -	$ 2,150,000	2.000	$ 1.08
2010 Water Distribution System Study - Improvements Group 2, #12 thru #18	$ 550,000	$ -	$ 550,000	2.000	$ 0.28
0.750 MGAL New Elevated Water Storage Tank - Compass Pointe service area	$ 2,700,000	$ -	$ 2,700,000	0.750	$ 3.60
12" water main extension - Mallory Creek to Town Creek along NC133	$ 3,250,000	$ -	$ 3,250,000	2.000	$ 1.63
18" water main Atkinson Trail to existing 12-inch tie-in on Wire Rd – Brunswick Forrest	$ 165,000	$ -	$ 165,000	2.000	$0.08
Connection from Kay Todd Road at US17 to Brunswick Forest 16" entry point	$ 245,00	$ -	$ 245,000	2.000	$0.12
New 4.0 MGD Reverse Osmosis Water Treatment Plant	$ 56,300,000	$ 28,150,000	$ 28,150,000	2.000	$14.08
WTP Expansion to 6.0 MGD	$ 7,510,000	$ -	$ 7,510,000	2.000	$3.76
Aquifer Storage and Recovery (ASR) System	$ 3,050,000	$ -	$ 3,050,000	1.73	$1.76
			TOTAL WATER COST/GALLON CAPACITY		$ 29.75

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
1,500 GPM Colon Mintz Regional Pump Station and FM (from Colon Mintz near Malmo Loop to Commerce PS)	$ 5,384,900	$ 4,000,000	$ 1,384,900	0.210	$ 6.59
1,100 GPM Town Creek Rd / NC133 Regional Pump Station and FM (to Westport PS)	$ 4,315,000	$ 2,157,500	$ $ 2,157,500	0.3150	$ 6.85
New Brunswick Co. 1.175 MGD WWTP expansion	$ 32,347,000	$ -	$ 32,4347,000	1.175	$ 27.53
			TOTAL SEWER COST/GALLON CAPACITY		$ 40.97

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	$ 29.75	25%	$ 22.31
Sewer	$ 49.10	25%	$ 30.73
Total	$ 73.38		$ 53.04

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 on a per gallon capacity value acts 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 AWWA meter size equivalent ratios.

Table 11. Maximum Allowable Capacity Cost Per Gallon.

Meter Size, inches	Equivalent Ratio	Water Capacity Cost, $/gallon	Sewer Capacity Cost, $/gallon	Total, $/gallon (1)
5/8	1.0	$22.31	$30.73	$53.04
1	2.5			$132.61
1-1/2	5.0			$265.21
2	8.0			$424.34
3	16.0			$848.68
4	25.0			$1,326.07
6	50.0			$2,652.13
8	80.0			$4,243.41
10	115.0			$6,099.90
12	215.0			$11,404.16

(1) Total $/gallon = 53.04 x Equivalent Ratio. Example 1 inch meter = $53.04 x 2.5 = $132.61

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. Maximum Allowable Capacity Cost Per Equivalent Connection.

Meter Size, inches	Equivalent Ratio	Water Capacity Cost, $/connection	Sewer Capacity Cost, $/connection	Total Capacity Cost, $/connection
5/8	1.0	$4,700	$6,500	$11,200
1	2.5	$11,750	$16,250	$28,000
1-1/2	5.0	$23,500	$32,500	$56,000
2	8.0	$37,600	$52,000	$89,600
3	16.0	$75,200	$104,000	$179,200
4	25.0	$117,500	$162,500	$280,000
6	50.0	$235,000	$325,000	$560,000
8	80.0	$376,000	$520,000	$896,000
10	115.0	$540,500	$747,500	$1,288,000
12	215.0	$1,010,500	$1,397,500	$2,408,000

Note: The above capacity costs per connection represent the maximum fee that may be assessed to a new water and/or sewer customer. BRH2GO may elect to implement a lower fee schedule to remain economically competitive with neighboring utilities or to better attract new residential and commercial development.

7 APPLICATION OF SYSTEM DEVELOPMENT FEES

According to Article 8 (System Development Fees) of the NC General Statues[21], 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; and, institutional customers a 2" water meter. No industrial growth is anticipated, given proximity to the industrial development presence in nearby Wilmington.

Table 13. Estimated Maximum Water Revenues, 2028.

Year	Residential (5/8")	Commercial (1")	Institutional (2")	Industrial (3")	TOTAL
2019	$1,576,533	$176,426	$48,880	$-	$1,801,839
2020	$1,627,770	$182,160	$50,469	$-	$1,860,399
2021	$1,680,673	$188,080	$52,109	$-	$1,920,862
2022	$1,735,294	$194,193	$53,802	$-	$1,983,290
2023	$1,791,692	$200,504	$55,551	$-	$2,047,747
2024	$1,849,921	$207,021	$57,356	$-	$2,114,298
2025	$1,910,044	$213,749	$59,220	$-	$2,183,013
2026	$1,972,120	$220,696	$61,145	$-	$2,253,961
2027	$2,036,214	$227,868	$63,132	$-	$2,327,215
2028	$2,102,391	$235,274	$65,184	$-	$2,402,849
TOTAL	$18,282,653	$2,045,971	$566,849	$-	$20,895,472

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

Table 14. Estimated Maximum Sewer Revenues, 2028.

Year	Residential (5/8")	Commercial (1")	Institutional (2")	Industrial (3")	TOTAL
2019	$1,540,013	$119,884	$42,250	$-	$1,702,147
2020	$1,590,063	$123,781	$43,623	$-	$1,757,467
2021	$1,641,740	$127,803	$45,041	$-	$1,814,584
2022	$1,695,096	$131,957	$46,505	$-	$1,873,558
2023	$1,750,187	$136,246	$48,016	$-	$1,934,449
2024	$1,807,068	$140,674	$49,577	$-	$1,997,319
2025	$1,865,798	$145,246	$51,188	$-	$2,062,231
2026	$1,926,436	$149,966	$52,851	$-	$2,129,254
2027	$1,989,046	$154,840	$54,569	$-	$2,198,455
2028	$2,053,690	$159,872	$56,343	$-	$2,269,904
TOTAL	$17,859,137	$1,390,269	$489,963	$-	$19,739,368

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

Year	Residential (5/8")	Commercial (1")	Institutional (2")	Industrial (3")	TOTAL
2019	$3,116,545	$296,311	$91,130	$-	$3,503,986
2020	$3,217,833	$305,941	$94,092	$-	$3,617,865
2021	$3,322,413	$315,884	$97,150	$-	$3,735,446
2022	$3,430,391	$326,150	$100,307	$-	$3,856,848
2023	$3,541,879	$336,750	$103,567	$-	$3,982,196
2024	$3,656,990	$347,694	$106,933	$-	$4,111,617
2025	$3,775,842	$358,994	$110,408	$-	$4,245,245
2026	$3,898,557	$370,662	$113,997	$-	$4,383,215
2027	$4,025,260	$382,708	$117,701	$-	$4,525,669
2028	$4,156,081	$395,146	$121,527	$-	$4,672,754
TOTAL	$36,141,789	$3,436,240	$1,056,812	$-	$40,634,841

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 $124.7 million, $40.6 million of which are estimated SDFs to be collected in the next 10 years; using an annual growth rate of 3.25%.
- 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 will require expansion 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 maximum allowable SDFs for new water and sewer customers.

Table 16. Maximum Allowable 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 (1)
5/8	1.0	$22.31	$30.73	$53.04	$11,200 (2)
1	2.5				$28,000
1-1/2	5.0				$56,000
2	8.0				$89,600
3	16.0				$179,200
4	25.0				$280,000
6	50.0				$560,000
8	80.0				$896,000
10	115.0				$1,288,000
12	215.0				$2,408,000

(1) Total $/connection = $11,200 x Equivalent Ratio. Example 1 inch meter = $11,200 x 2.5 = $28,000.

(2) $/connection for 5/8 inch meter = $53.04 x 210 gallon/typical residential connection ~ $11,200.

Per AWWA Manual M1 guidance, larger meter sizes dictate higher capacity fees for assumed higher water consumption. Since the typical BRWSH2GO residential customer consumes up to 210 gpd, the water SDF of $4,700 and sewer SDF of $6,500 (total of $11,200) is proposed per equivalent residential unit (ERU) connection. It is expected that the SDFs will generate approximately $40.6 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

System Development Fee Analysis

H2GO Analysis

	BRWSH2GO							
	SDF Analysis 2020 to 2030							
Asset/Project ID	CIP Asset/Project Description	Asset Group	Construction Cost	Engineering	Land Acquisition	Reimbursement to CRF for Previous Costs	Bond Interest	Project Costs
S03	1500 GPM Colon Mintz Regional Pump Station and FM (from Colon Mintz near Malmo Loop to Commerce PS)	Sewer	5,000,000	384,900				5,384,900
S04	Project eliminated. May revisit if/when Leland infrastructure is conveyed to H2GO	Sewer	-					-
S05	1100 GPM Town Creek Rd / NC133 Regional Pump Station and FM (to Westport twin 10" FM)	Sewer	4,000,000	315,000				4,315,000
S06	New Brunswick Co. 1.175 MGD WWTP Capacity Allocation	Sewer Trmt	24,400,000				7,947,000	32,347,000
								-
								-
								-
Water								-
W01	12" water line extension from Carol Lynn, along US17, to existing 12" line on Maco Rd (Area 1 of 2018 CIP)	Water	1,853,000	120,155				1,973,155
W02	18" water line extension from Lanvale Rd to existing 24" on Trade Street (Area 3 of 2018 CIP)	Water	810,000	52,523				862,523
W03	12" and 18" water line extensions from Grayson Park to Compass Pointe west entrance (system loop, Area 2 of 2018 CIP)	Water	3,680,000	238,622				3,918,622
W04								-
W05	2010 water distribution system study - improvements Group 1, #6 thru #11	Water	2,000,000	150,000				2,150,000
W06	2010 water distribution system study - improvements Group 2, #12 thru #18	Water	500,000	50,000				550,000
W07	750,000 Gal Elevated Water Storage Tank - Compass Pointe service area	Water	2,500,000	200,000				2,700,000
W08	12" water main extension - Mallory Creek to Town Creek service area along NC133	Water	3,000,000	250,000				3,250,000
W09	Project eliminated.	Water	-					-
W10	Project eliminated.	Water	-					-
W11	Project eliminated.	Water	-					-
W12	18" water main extension from Atkinson Trail to existing 12" tie-in on Wire Rd	Water	150,000	15,000				165,000
W13	12" connection from Kay Todd Rd at US17 to Brunswick Forest 16" Point of Entry	Water	225,000	20,000				245,000
W14	New 4.0 MGD Reverse Osmosis Water Treatment Plant	Water	33,500,000	700,000	100,000	5,700,000	16,300,000	56,300,000
W15	Expansion of RO Water Treatment Plant to 6.0 MGD	Water	7,000,000	400,000	110,000			7,510,000
W16	ASR Well System	Water	2,800,000	250,000				3,050,000
Total			**91,418,000**	**3,146,200**	**210,000**	**5,700,000**	**24,247,000**	**124,721,200**

Brunswick Regional Water and Sewer H2GO System Development Fees
Summary Worksheet
Client: **BRWS H2GO (only)**

Accounting Methodology:

Buy-In Cost	*Pay proportional share of past and current investments (for existing utilities/facilities)*
Incremental Cost	*Pay increase in total costs resulting from increase in production (for new utilities/facilities)*
Combined Cost	*Combination of Buy-In and Incremental Costs*

INCREMENTAL COST METHOD

			Project Costs						Project Credits								
Asset/Project ID	CIP Asset/Project Description	Asset Group	Construction Cost	Survey & Engineering Fees	Land Acquisition Cost	Debt Principal and Interest Pmts	Reimbursement to CRF for Previous Costs	Total Costs	Project Capacity Credit (see notes below)	Principal Forgiveness / Grants	Total Credits	Net Total Cost	Additonal Design Capacity, MGD	Net Total Cost per Gal Capacity, $/GPD	% Dev Credit	Adjusted Total Net Cost	Adjusted Incremental Cost
SEWER														$ 40.97			$ 30.73 sewer
S03	1,500 GPM Colon Mintz Regional Pump Station and FM (from Colon Mintz near Malmo Loop to Commerce PS)	Sewer	$ 5,000,000	$ 384,900				$ 5,384,900	$ 4,000,000		$ 4,000,000	$ 1,384,900	0.210	$ 6.59	25%	$ 1,038,675	4.95
S05	1,100 GPM Town Creek Rd / NC133 Regional Pump Station and FM (to Westport twin 10" FM)	Sewer	$ 4,000,000	$ 315,000				$ 4,315,000	$ 2,157,500		$ 2,157,500	$ 2,157,500	0.315	$ 6.85	25%	$ 1,618,125	5.14
S06	New Brunswick Co. 1.175 MGD WWTP expansion	Sewer Trmt	$ 24,400,000			$ 7,947,000		$ 32,347,000			$ -	$ 32,347,000	1.175	$ 27.53	25%	$ 24,260,250	20.65
WATER											$ -			$ 29.75			$ 22.31 water
W01	12" water line extension from Carol Lynn, along US17, to existing 12" line on Maco Rd.	Water	$ 1,853,000	$ 120,155				$ 1,973,155			$ -	$ 1,973,155	2.000	$ 0.99	25%	$ 1,479,866	0.74
W02	18" water line extension from Lanvale Rd to existing 24" on Trade Street	Water	$ 810,000	$ 52,523				$ 862,523			$ -	$ 862,523	2.000	$ 0.43	25%	$ 646,892	0.32
W03	12" and 18" water line extensions from Grayson Park to Compass Pointe west entrance (system loop)	Water	$ 3,680,000	$ 238,622				$ 3,918,622			$ -	$ 3,918,622	2.000	$ 1.96	25%	$ 2,938,967	1.47
W05	2010 Water Distribution System Study - Improvements Group 1, #6 thru #11	Water	$ 2,000,000	$ 150,000				$ 2,150,000			$ -	$ 2,150,000	2.000	$ 1.08	25%	$ 1,612,500	0.81
W06	2010 Water Distribution System Study - Improvements Group 2, #12 thru #18	Water	$ 500,000	$ 50,000				$ 550,000			$ -	$ 550,000	2.000	$ 0.28	25%	$ 412,500	0.21
W07	0.750 MGAL New Elevated Water Storage Tank - Compass Pointe service area	Water	$ 2,500,000	$ 200,000				$ 2,700,000			$ -	$ 2,700,000	0.750	$ 3.60	25%	$ 2,025,000	2.70
W08	12" water main extension - Mallory Creek to Town Creek along NC133	Water	$ 3,000,000	$ 250,000				$ 3,250,000			$ -	$ 3,250,000	2.000	$ 1.63	25%	$ 2,437,500	1.22
W12	18" water main from Atkinson Trail to exst 12-inch tie-in on Wire Rd - Brunswick Forest	Water	$ 150,000	$ 15,000				$ 165,000			$ -	$ 165,000	2.000	$ 0.08	25%	$ 123,750	0.06
W13	12" Connection from Kay Todd Road at US17 tp Brunswick Forest 16" entry point	Water	$ 225,000	$ 20,000				$ 245,000			$ -	$ 245,000	2.000	$ 0.12	25%	$ 183,750	0.09
W14	New 4.0 MGD Reverse Osmosis Water Treatment Plant	Water Trmt	$ 33,500,000	$ 700,000	$ 100,000	$ 16,300,000	$ 5,700,000	$ 56,300,000	$ 28,150,000		$ 28,150,000	$ 28,150,000	2.000	$ 14.08	25%	$ 21,112,500	10.56
W15	Expansion of RO Water Treatment Plant to 6.0 MGD	Water Trmt	$ 7,000,000	$ 400,000	$ 110,000			$ 7,510,000			$ -	$ 7,510,000	2.000	$ 3.76	25%	$ 5,632,500	2.82
W16	ASR Well System	Water	$ 2,800,000	$ 250,000				$ 3,050,000			$ -	$ 3,050,000	1.730	$ 1.76	25%	$ 2,287,500	1.32
											$ -						
											$ -						
TOTAL			$ 91,418,000	$ 3,146,200	$ 210,000	$ 24,247,000	$ 5,700,000	$ 124,721,200	$ 34,307,500	$ -	$ 34,307,500	$ 90,413,700		$ 70.72		$ 67,810,275	$ 53.04 total

Project Credit Notes:

Item S03: 50% of project cost will be attributed directly to SAFFO development (2,000 new connections) which will be collected via $1,000 capital recovery fees included as a special provision in the SAFFO developers agreement
Item S05: 50% of project cost attributed directly to a new development (1,500 new connections) which will be up-front cost sharing.
Item W14: 50% of new WTP capacity is for existing water system customers

CURRENT YEAR - 2018	Residential	Commercial	Institutional	Industrial	Total	Ex. Population	Population: Customer Ratio
No. of Existing Connections	10,321	462	40	-	10,823	28,084	2.59
Percent of Total Connections	*95.4%*	*4.3%*	*0.4%*	*0.0%*			
Volumetric Use per Connection, gpd	115	377	1,175	-			
Total Existing Volumetric Use, gpd	1,186,915	174,174	47,000	-	1,408,089		
Percent of Total Use	*84%*	*12%*	*3%*	*0%*			

PLANNED 10 YEAR - 2028	Residential	Commercial	Institutional	Industrial	Total	Proj. Population
No. of Planned Connections	14,211	636	55	-	14,902	38,669
Percent of Total Connections	*95.4%*	*4.3%*	*0.4%*	*0.0%*		
Volumetric Use per Connection, gpd	115	377	1,175	-		
Total Existing Volumetric Use, gpd	1,634,257	239,819	64,714	-	1,938,790	

Meter Size - per GALLON Basis	Equivalent Ratio	Water	Sewer	Total
5/8	1.0	$ 22.31	$ 30.73	$ 53.04
1	2.5	$ 55.78	$ 76.82	$ 132.61
1-1/2	5.0	$ 111.56	$ 153.65	$ 265.21
2	8.0	$ 178.50	$ 245.84	$ 424.34
3 compound	16.0	$ 357.00	$ 491.68	$ 848.68
4 compound	25.0	$ 557.82	$ 768.25	$ 1,326.07
6 compound	50.0	$ 1,115.63	$ 1,536.50	$ 2,652.13
8 compound	80.0	$ 1,785.01	$ 2,458.40	$ 4,243.41
10 compound	115.0	$ 2,565.95	$ 3,533.95	$ 6,099.90
12 compound	215.0	$ 4,797.21	$ 6,606.95	$ 11,404.16

Meter Size - per CONNECTION basis (rounded values)	Equivalent Ratio	Water	Sewer	Total
5/8 (assumes 210 GPD residential connection)	1.0	$ 4,700	$ 6,500	$ 11,200
1	2.5	$ 11,750	$ 16,250	$ 28,000
1-1/2	5.0	$ 23,500	$ 32,500	$ 56,000
2	8.0	$ 37,600	$ 52,000	$ 89,600
3 compound	16.0	$ 75,200	$ 104,000	$ 179,200
4 compound	25.0	$ 117,500	$ 162,500	$ 280,000
6 compound	50.0	$ 235,000	$ 325,000	$ 560,000
8 compound	80.0	$ 376,000	$ 520,000	$ 896,000
10 compound	115.0	$ 540,500	$ 747,500	$ 1,288,000
12 compound	215.0	$ 1,010,500	$ 1,397,500	$ 2,408,000

Appendix 2

Public Participation

Notices, Presentations, Discussions, Adoption