

January 28, 2018

Eric T. Weatherly, P.E.  
County Engineer  
County of Currituck  
153 Courthouse Road, Suite 302  
Currituck, NC 27929

**Subject: County of Currituck System Development Fees**

Dear Mr. Weatherly:

Raftelis has completed an evaluation to develop cost-justified water and wastewater system development fees for consideration by the County of Currituck (County). This letter documents the results of the analysis, which is based on an approach for establishing system development fees set forth in North Carolina General Statute 162A Article 8 – “System Development Fees.” As one of the largest and most respected utility financial, rate, management, and operational consulting firms in the U.S., and having prepared system development fee calculations for utilities in North Carolina and across the U.S. since 1993, Raftelis is qualified to perform system development fee calculations for water and wastewater utilities in North Carolina.

**Background**

System development fees are one-time charges assessed to new water and/or wastewater customers, or developers or builders, to recover a proportional share of capital costs incurred to provide service availability and capacity for new customers. North Carolina General Statute 162A Article 8 (Article 8) provides for the uniform authority to implement system development fees for public water and wastewater systems in North Carolina, which was signed into law on July 20, 2017 and amended on June 22, 2018. According to the statute, system development fees must be adopted in accordance with the conditions and limitations of Article 8 and must conform to the requirements set forth in the Article. In addition, the system development fees must also be prepared by a financial professional or licensed professional engineer, qualified by experience and training or education, who, according to the Article, shall:

- Document in reasonable detail the facts and data used in the analysis and their sufficiency and reliability.
- Employ generally accepted accounting, engineering, and planning methodologies, including the buy-in, incremental cost or marginal cost, and combined cost approaches for each service, setting forth appropriate analysis to the consideration and selection of an approach appropriate to the circumstances and adapted as necessary to satisfy all requirements of the Article.

- Document and demonstrate the reliable application of the methodologies to the facts and data, including all reasoning, analysis, and calculations underlying each identifiable component of the system development fee and the aggregate thereof.
- Identify all assumptions and limiting conditions affecting the analysis and demonstrate that they do not materially undermine the reliability of conclusions reached.
- Calculate a final system development fee per service unit of new development and include an equivalency or conversion table for use in determining the fees applicable for various categories of demand.
- Consider a planning horizon of not less than 5 years, nor more than 20 years.

This letter report documents the results of the calculation of water and wastewater system development fees for the County in accordance with these requirements.

Article 8 references three methodologies that can be used to calculate system development fees. These include the buy-in method, the incremental cost method, and the combined cost method. A description of each of these methods follows:

#### Capacity Buy-In Approach

The Capacity Buy-In Methodology is most appropriate in cases where the existing system assets provide adequate capacity to provide service to new customers. This approach calculates a fee based upon the proportional cost of each user's share of existing plant capacity. The cost of the facilities is based on fixed assets records and usually includes escalation of the depreciated value of those assets to current dollars.

#### Incremental Cost Approach

The second method used to calculate water and wastewater system development fees is the Incremental Cost (or Marginal Cost) Methodology. This method focuses on the cost of adding additional facilities to serve new customers. It is most appropriate when existing facilities do not have adequate capacity to provide service to new customers, and the cost for new capacity can be tied to an approved capital improvement plan (CIP) that covers at least a 5-year planning period.

#### Combined Approach

A combined approach, which is a combination of the Buy-In and Incremental Cost approaches, can be used when the existing assets provide some capacity to accommodate new customers, but where the capital improvement plan also identifies significant capital investment to add additional infrastructure to address future growth and capacity needs.

## **Summary of Results**

To perform the system development fee calculation, Raftelis requested and was provided with the following data from County staff:

- Water and wastewater fixed asset data;
- Outstanding utility debt and associated debt service;
- Capital improvement plan;
- Contributed or grant funded capital;
- Capacity in water and wastewater systems;
- Equivalent residential units
- History of system development fees collected.

It should be noted the County has three water systems and two sewer systems which include the following: Ocean Sands Water and Sewer District (OSW&SD), Southern Outer Banks Water System (SOBWS), Mainland Water System, and Mainland Sewer System. The OSW&SD systems and the SOBWS are located on the Outer Banks, whereas the other systems are located on the mainland. A system development fee has been calculated for each system.

The Buy-In approach was chosen as the method to calculate all but one of the system development fees, including the water systems for the OSW&SD, the SOBWS, the Mainland Water System, and the sewer system for the OSW&SD. For these systems, the five-year capital improvement plan prepared by the County did not identify any capital projects that would increase the water or sewer capacity over the next five-year period. Therefore, the Buy-In approach was chosen to calculate the water and wastewater system development fees for these systems, as described in the following section.

The Combined approach was chosen as the method to calculate the Mainland Sewer System's system development fee. The County has existing sewer capacity but has also identified projects over the next five years that will expand the sewer treatment capacity. As a result, the Combined approach was chosen as the method for calculating system development fees for the County's Mainland System's sewer service area. The Combined approach involves both a buy-in and incremental cost calculation, as discussed below.

### **Buy-In Calculation**

Using the Buy-In approach, Raftelis calculated the estimated cost, or investment in, the current capacity available to provide utility services to existing and new customers. This analysis was based on a review of fixed asset records and other information as of June 30, 2018. The depreciated value of the assets was escalated to reflect an estimated replacement cost, or "replacement cost new less depreciation" (RCNLD).<sup>1</sup>

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<sup>1</sup> The RCNLD value represents the value of the County's assets as they are now, including depreciation. The cost of replacing these assets with new, undepreciated assets would therefore be significantly higher than the RCNLD value shown.

The asset values were escalated using the Handy Whitman Index of Public Utility Construction Costs (for the South Atlantic Region). Results of the asset escalation by asset category are shown in Exhibits 1 and 2.

**Exhibit 1 – Replacement Cost New, Less Depreciation for Water Systems**

Asset Category	OSWSD Water RCNLD Value	SOBWS RCNLD Value	Mainland Water RCNLD Value
Plant	\$0	\$24,739,351	\$14,529,949
Tanks	\$658,890	\$4,967,146	\$5,532,030
Equipment/Computers	\$11,412	\$309,165	\$87,663
Vehicles	\$7,761	\$57,470	\$141,633
Meters	\$0	\$240,326	\$154,740
Well	\$5,778	\$1,704,962	\$856,703
Land	\$901,006	\$42,600	\$0
Lines/Mains/Pipes	\$0	\$1,555,155	\$7,488,119
Pump Station	\$0	\$3,088	\$0
Hydrants	\$0	\$56,740	\$543,719
<b>Total</b>	<b>\$1,584,847</b>	<b>\$33,676,002</b>	<b>\$29,334,557</b>

**Exhibit 2 – Replacement Cost New, Less Depreciation for Wastewater Systems**

Asset Category	OSWSD Sewer RCNLD Value	Mainland Sewer RCNLD Value
Plant	\$13,737,772	\$7,801,075
Tank	\$0	\$0
Equipment/Computers	\$83,152	\$1,942
Vehicles	\$7,761	\$0
Meters	\$0	\$14,624
Well	\$0	\$0
Land	\$62,006	\$897,229
Lines/Mains/Pipes/Outfall	\$60,150	\$1,848,631
Pump Station	\$57,436	\$1,218,632
Hydrants	\$0	\$0
<b>Total</b>	<b>\$14,008,278</b>	<b>\$11,782,132</b>

Several adjustments (Exhibit 3&4) were then made to the estimated water and wastewater RCNLD values in accordance with Article 8, as described below.

- **Contributed Capital** - The listing of fixed assets provided was reviewed to identify assets that were donated (or contributed) or funded through grants. The RCNLD value of all assets donated or funded through grants was subtracted from the RCNLD value, as these assets do not represent an investment in system capacity by the County.

- Non-Core Fixed Assets - The RCNLD value excludes non-core assets such as equipment, vehicles, and meters.
- Outstanding Debt Service Deduction - Utilities often borrow funds to construct assets, and revenues from retail rates and charges can be used to make the payments on these borrowed funds. To ensure that new customers are not being double charged for debt-funded assets, once through retail rates and charges and again through system development fees, the proportion of the outstanding debt principal that is anticipated to be funded through retail rates was deducted from the system development fee calculation. Because the County applies system development fee revenue to offset debt service payments the debt deduction may be reduced. This reduction was calculated by comparing the historical annual amount of revenues collected from water and wastewater system development fees with the respective annual principal payments (refer to the Appendix for additional detail).

**Exhibit 3 – Deductions from RCNLD Value for Water Systems**

Deduction or Credit	OSWSD Water RCNLD Value	SOBWS RCNLD Value	Mainland Water RCNLD Value
Total Eligible Assets	\$1,584,847	\$33,676,002	\$29,334,557
Less: Contributed/Grant Funded Capital	\$0	\$0	\$0
Less: Vehicles, Non-core Equipment, Computers	(\$19,173)	(\$606,961)	(\$384,037)
Less: Outstanding Principal	\$0	(\$2,975,000)	(\$5,951,346)
<b>Net System Assets</b>	<b>\$1,565,674</b>	<b>\$30,094,041</b>	<b>\$22,999,173</b>

**Exhibit 4 – Deductions from RCNLD Value for Wastewater Systems**

Deduction or Credit	OSWSD Sewer RCNLD Value	Mainland Sewer RCNLD Value
Total Eligible Assets	\$14,008,278	\$11,782,132
Less: Contributed/Grant Funded Capital	\$0	(\$5,332,047)
Less: Vehicles, Non-core Equipment, Computers	(\$90,913)	(\$16,566)
Less: Outstanding Principal	(\$7,250,000)	(\$527,603)
<b>Net System Assets</b>	<b>\$6,667,364</b>	<b>\$5,905,916</b>

The adjusted net system values for water and wastewater are then converted to a unit cost of capacity by dividing by their respective capacity in gallons per day (GPD) (Exhibit 5,6, &7). The capacities of each system were based on information provided by County staff. The capacities represent the amount of water or wastewater flow that can be treated and delivered assuming no limiting factors. For example, the Mainland Water System has a treatment capacity of 2.9 MGD but the capacity is limited by the ability to obtain raw water. The raw water system only allows for the treatment and delivery of 2.15 MGD. Additional information on system capacities is provided in the Appendix.

**Exhibit 5 – Cost per GPD of Capacity for Water Systems**

	OSWSD Water (1) RCNLD Value	SOBWS RCNLD Value	Mainland Water RCNLD Value
A. Net System Assets	\$1,565,674	\$30,094,041	\$22,999,173
B. Existing Capacity (GPD)	695,783	3,100,000	2,150,000
<b>Cost Per GPD (A/B)</b>	<b>\$2.25</b>	<b>\$9.71</b>	<b>\$10.70</b>

(1) Cost per Unit of Capacity (per gallon) - OSWSD - Water Distribution System only

**Exhibit 6 – Cost per GPD of Capacity: Wastewater**

	OSWSD Sewer RCNLD Value	Mainland Sewer RCNLD Value
A. Net System Assets	\$6,667,364	\$5,905,916
B. Existing Capacity (GPD)	600,000	284,000
<b>Cost Per GPD (A/B)</b>	<b>\$11.11</b>	<b>\$20.80</b>

It should be noted the OSWSD water system receives treated water from the SOBWS system. The calculation for the water system development fee for the OSWSD includes the cost per gallon per day for the water distribution system only. To recognize both the SOBWS water treatment plant assets used to produce treated water and the distribution assets of the OSWSD used to distribute treated water, the cost per gallon per day for SOBWS treatment plant assets were calculated and added to the cost per gallon per day for distribution assets of the OSWSD system, as shown in Exhibit 7, to derive the total system development fee for a new water service connections in OSWSD.

**Exhibit 7 – Cost per GPD of Water Treatment and Distribution Capacity - OSWSD**

Plant Assets Only	SOBWS
Plant	\$24,739,351
<i>Less: Outstanding Debt</i>	<i>(\$2,975,000)</i>
Net Assets - Plant only	\$21,764,351
Capacity (gpd)	3,100,000
Cost per Unit of Capacity (per gallon)	<b>\$7.02</b>
Distribution Assets Only	OSWSD Water
Plus:	
Cost per Unit of Capacity (per gallon)	<b>\$2.25</b>
<b>Total Plant and Distribution Assets</b>	<b>\$9.27</b>
Cost per Unit of Capacity (per gallon)	

**Incremental Calculation**

The Incremental Cost Approach was used to calculate the system development fee for the Mainland Sewer System since the five-year capital improvement plan identified capital projects that will expand sewer treatment capacity. Using the Incremental Cost approach, Raftelis calculated the cost of capital improvements relative to the increased water capacity to be provided. The starting point for the Incremental approach is the cost of capital improvements for expansion-related capital projects included in the County’s wastewater capital improvement plan, which is \$6,000,000 for the Mainland Sewer system (Exhibit 8). The aggregate project costs must be reduced by a revenue credit according to the North Carolina General Statute 126A-207 “Minimum requirements” of Article 8. The credit shall reflect a deduction of either the outstanding principal debt or the net present value (NPV) of projected revenues received by the local governmental unit for the capital improvements. The credit must be no less than 25% of the aggregate cost of these capital improvements. The revenue credit is applied to ensure that new customers are not paying twice for the capacity (once through the system development fee and then again through rates which are used to pay debt service issued for the projects that provided capacity). The County anticipates debt funding the Mainland Sewer’s expansion projects. The net present value of the principal debt to be issued is \$4,099,835 (Refer to the Appendix for more details), which exceeds the 25% minimum credit. The net capital improvement costs are shown in Exhibit 8, and are divided by the additional capacity to be provided by these projects to derive a cost per GPD for the Incremental Approach.

**Exhibit 8 – Capital Improvement Costs for Mainland Wastewater System**

Cost per GPD (A/B)	Capital Improvement Costs
Total Expansion Project Cost	\$6,000,000
Less: Revenue Credit (NPV of Principal Debt)	<u>(\$4,099,835)</u>
<b>A. Net Project Costs</b>	<b>\$1,900,165</b>
<b>B. Added Capacity (GPD)</b>	<b>200,000</b>
<b>Cost per GPD (A/B)</b>	<b>\$9.50</b>

**Combined Cost Calculation**

For the Mainland sewer system, the cost per GPD calculated under the Buy-In Approach and the Incremental Approach are then combined using the weighted average of the respective cost per GPD numbers, as illustrated in Exhibit 9 to derive the cost per gallon per day.

**Exhibit 9 – Wastewater Weighted Cost/gallon/day under Combined Approach**

	Mainland Sewer System		
	Net System Assets	Net Project Costs	Total
Cost of Assets	\$5,905,916	\$1,900,165	\$7,806,081
Capacity of Assets (GPD)	284,000	200,000	484,000
<b>Combined Cost per GPD</b>	<b>\$16.13</b>		

**Equivalent Residential Unit (ERU) Calculation**

The cost per GPD becomes the basic building block or starting point for determining the *maximum cost-justified level* of the water and wastewater capacity development fees. The next step is to define the level of demand associated with a typical, or average, residential customer, often referred to as an Equivalent Residential Unit, or ERU.

When planning for future growth and the capacity required to meet growth, the County uses different methods for estimating residential demand which is specific to each system. The water and sewer use associated with the County’s water and sewer systems that are located on the mainland is very different than the water and sewer use associated with the systems located in the Outer Banks. First, residents living on the mainland are typically present year-round. In contrast, the Outer Banks has a high tourist population and therefore the population, and water and sewer use, peaks during the warmer months. Second, many homes on the Outer Banks are vacation rentals with a large number of bedrooms, as compared to the homes on the mainland that typically have two to three bedrooms. As such, water demand per unit on the Outer Banks can be more than twice as high as water demand on the mainland. The capacity in the Outer Banks must be sized to meet both the larger water demand per unit and the seasonal water demand. Because of the contrast in water use between the mainland and the Outer Banks service areas, the County uses actual water and sewer flow data and number of customers to determine the required gallons per day per residential household for the systems located on the Outer Banks. For determining the level of residential demand for the systems on the mainland, the County uses the water and wastewater design flow rates as specified by state guidelines<sup>2</sup>, which reflect typical water and sewer demand. Exhibit 10, shows the ERUs for each system and the basis of the ERU. It should be noted the ERUs for OSWSD and SOBWD reflect peak use for the water system and inflow and infiltration (I&I) for the sewer systems.

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<sup>2</sup> Sewer guidelines -Administrative Code Title 15A (Department of Environment and Natural Resources) Subchapter 2T, which states that the sewage from dwelling units is 120 gallons per day per bedroom; Water Guidelines – North Carolina Administrative Code Title 15A Department of Environmental Quality Subchapter 18C Water Supplies, which states the daily flow for design is 400 gallons per day per residential connection.



**Exhibit 10 – Equivalent Residential Unit by System**

System Name	ERU	Source
OSWSD Water	640	Historical Flows/Connections
OSWSD Sewer	533	Historical Flows/Connections
SOBWS	750	Historical Flows/Connections
Mainland Water	400	Design Flow Rates per NC Public Water Supply Rules
Mainland Sewer	360	NC DEQ 2T rules (1)

**(1) Calculation of ERU**

- Wastewater permitted capacity design flow rates
  - 120 gallons per day per bedroom
  - 240 gallons per day for 2 bedrooms
  - 360 gallons per day for 3 bedrooms
- Estimated gallons per day per household - 3 bedrooms

**Assessment Methodology**

The previous analysis results in a maximum cost-justified level of system development fees that can be assessed by the County. For residential customers, the calculation of the system development fee is based on the cost per gallon per day multiplied by the number of gallons per day required to serve each ERU. The calculated system development fees are shown below in Exhibits 11 and 12, and Exhibit 13 provides a comparison of the calculated and existing system development fees.

**Exhibit 11 – Calculated Maximum Cost Justified Water System Development Fees for Residential Customers (rounded to the nearest dollar)**

	Assessment of System Development Fee		
	OSWSD Water (1)	SOBWS	Mainland Water
A. Cost Per GPD	\$9.27	\$9.71	\$10.70
B. Calculated ERU (GPD)	640	750	400
<b>Calculated SDF per ERU (A*B)</b>	<b>\$5,933</b>	<b>\$7,281</b>	<b>\$4,279</b>

(1) Calculated System Development Fee per ERU - OSWSD Water Distribution System and SOBWS treatment assets only.

**Exhibit 12 – Calculated Maximum Cost Justified Wastewater System Development Fee for Residential Customers (rounded to the nearest dollar)**

	Assessment of System Development Fee	
	OSWSD Sewer	Mainland Sewer (2)
A. Cost Per GPD	\$11.11	\$16.13
B. Calculated ERU (GPD)	533	360
<b>Calculated SDF per ERU (A*B)</b>	<b>\$5,924</b>	<b>\$5,806</b>

(2) Calculated System Development Fee per ERU under the Combined Approach.

**Exhibit 13 – Summary of Existing and Calculated System Development Fees by System**

	OSWSD Water		SOBWS Water		Mainland Water		OSWSD Sewer		Mainland Sewer	
<b>Calculated System Development Fee</b>	\$	5,933	\$	7,281	\$	4,279	\$	5,924	\$	5,806
<b>Existing Fee</b>	\$	2,000	\$	5,000	\$	5,000	\$	450	\$	5,500

For non-residential customers, the fees for the smallest residential meter can be used and then scaled up by the flow ratios for each meter size, as specified in the AWWA M-1 Manual<sup>3</sup>, the results of which are shown in Exhibit 14. This method provides a straightforward approach that is simple to administer and reasonably equitable for most new customers. Exhibit 14 shows the maximum cost justified system development fees. The County may elect to charge a cost per gallon that is less than the maximum cost justified cost documented in this report. If the County elects to charge a fee that is less, all customers must be treated equally, meaning the same reduced cost per gallon per day must be used for all customers.

**Exhibit 14 – Maximum Cost Justified System Development Fees**

Meter Size	AWWA FLOW	AWWA Ratio	OSWSD- Water	OSWSD - Sewer	SOBWS - Water	Mainland Water	Mainland Sewer
5/8"	20	1.0	\$ 5,933	\$ 5,924	\$ 7,281	\$ 4,279	\$ 5,806
1"	50	2.5	\$ 14,834	\$ 14,810	\$ 18,202	\$ 10,697	\$ 14,515
1 1/2"	100	5.0	\$ 29,667	\$ 29,620	\$ 36,404	\$ 21,395	\$ 29,031
2"	160	8.0	\$ 47,467	\$ 47,391	\$ 58,247	\$ 34,231	\$ 46,449
3"	320	16.0	\$ 94,935	\$ 94,783	\$ 116,493	\$ 68,463	\$ 92,899
4"	500	25.0	\$ 148,336	\$ 148,098	\$ 182,020	\$ 106,973	\$ 145,154
6"	1000	50.0	\$ 296,672	\$ 296,196	\$ 364,041	\$ 213,946	\$ 290,309
8"	1600	80.0	\$ 474,675	\$ 473,914	\$ 582,465	\$ 342,313	\$ 464,494
10"	2400	120.0	\$ 712,012	\$ 710,871	\$ 873,698	\$ 513,470	\$ 696,741

We appreciate the opportunity to assist the County of Currituck with this important engagement. Should you have questions, please do not hesitate to contact me at (704) 936-4436.

Sincerely,

**RAFTELIS FINANCIAL CONSULTANTS, INC.**



<sup>3</sup> See the AWWA M-1 Manual – Appendix B- Equivalent Meter Ratios; pp.326

Mr. Eric Weatherly  
County of Currituck

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**Elaine Conti**  
*Vice President*

**Appendix:**  
**Select Schedules for Capacity Development Fee Calculations**

**Figure 1: Buy-In Cost per Gallon per Day: OSWSD Water System**

Currituck County, NC  
 Ocean Sands Water & Sewer District  
 Draft of Calculated System Development Fee -WATER

	System-Buy In Approach
<b>OCSWD - Water System -Distribution System Only</b>	<b>Calculated RCNLD</b>
Generator	\$ -
Tanks	\$ 658,890
Equipment/Computers	\$ 11,412
Vehicles	\$ 7,761
Well	\$ 5,778
Land	\$ 901,006
<b>Total Eligible Assets (1)</b>	<b>\$ 1,584,847</b>
Less: Contributed/Grant Funded Capital	\$ -
Less: Vehicles, Non-core Equipment, Computers (2)	\$ (19,173)
Subtotal: System Costs	\$ 1,565,674
Adjustments:	
Less: Outstanding Principal (3)	\$ -
<b>Net System Assets</b>	<b>\$ 1,565,674</b>
Existing System Capacity (in gpd) (4)	695,783
Cost per Unit of Capacity (per gallon) - OSWSD - Water Distribution System only	\$2.25
Cost per Unit of Capacity (per gallon) - SOBWS - Water Treatment Plant only	\$7.02
Calculated ERU (GPD) (5)	640
<b>Calculated System Development Fee per ERU - OSWSD Water Distribution System Only (6)</b>	<b>\$1,440</b>
<b>Calculated System Development Fee per ERU - OSWSD Water Distribution System &amp; SOBWS Treatment Plant (6)</b>	<b>\$5,933</b>
<i>Current System Development Fee per ERU</i>	<i>\$ 2,000</i>

- (1) Represents the replacement cost new less depreciation of all water assets.
- (2) Equipment, vehicles, and small computers are removed from fixed assets.
- (3) The water system has no outstanding debt.
- (4) The system purchases treated water from SOBWS. The capacity shown represents the capacity in the transmission system.
- (5) Calculated by Currituck staff using historical information and number of connections.
- (6) This represents the system development fee for only the OSWSD Water Distribution System. However, new customers in the OSWSD service area are also receiving water treatment from the SOBWS. Therefore, the capacity of the SOBWS treatment plant (exclusive of any other assets) could be added to the calculated system development fee.

**Figure 2: Cost per Unit of Capacity (per gallon) – SOBWS**

**Currituck County, NC  
 Southern Outer Banks Water System  
 Draft of Calculated System Development Fee -WATER**

SOBWS Water System	Calculated RCNLD	Plant Costs Only
Plant	\$ 24,739,351	\$ 24,739,351
Tanks	\$ 4,967,146	
Well	\$ 1,704,962	
Equipment/Computers	\$ 309,165	
Meters	\$ 240,326	
Vehicles	\$ 57,470	
Pump Station	\$ 3,088	
Land	\$ 42,600	
Lines/Mains/Pipes	\$ 1,555,155	
Hydrants	\$ 56,740	
<b>Total Eligible Assets (1)</b>	<b>\$ 33,676,002</b>	
Less: Contributed/Grant Funded Capital	\$ -	
Less: Vehicles, Non-core Equipment, Computers, Meters (2)	\$ (606,961)	
Subtotal: System Costs	\$ 33,069,041	
Adjustments:		
Less: Outstanding Principal (3)	\$ (2,975,000)	\$ (2,975,000)
<b>Net System Assets</b>	<b>\$ 30,094,041</b>	<b>\$ 21,764,351</b>
Existing System Capacity (in MGD) (4)	3,100,000	3,100,000
Cost per Unit of Capacity (per gallon)	\$9.71	\$7.02
Calculated ERU (GPD) (5)	750	
<b>Calculated System Development Fee per ERU</b>	<b>\$7,281</b>	
Current System Development Fee per ERU	\$ 5,000	

- (1) Represents the replacement cost new less depreciation of all water assets.
- (2) Equipment, vehicles, and small computers are removed from fixed assets.
- (3) Purchase of the Carolina Water System that serves Corolla Light, Pina island System, and Currituck Club Water System and Refund 2004 debt.
- (4) The capacity includes 1.75 mgd for the reverse osmosis plant and 1.25 mgd for the conventional plant.
- (5) Calculated by Currituck staff using historical flow and number of connections.

**Figure 3: Buy-In Cost per Gallon per Day: OSWSD Wastewater System**  
 Currituck County, NC  
 Ocean Sands Water & Sewer District  
 Draft of Calculated System Development Fee -WASTEWATER

Wastewater System	Calculated RCNLD
Plant (1)	\$ 13,737,772
Tanks	\$ -
Equipment/Computers	\$ 83,152
Vehicles	\$ 7,761
Pump Station	\$ 57,436
Well	\$ -
Land	\$ 62,006
Lines/Mains/Pipes/Outfall	\$ 60,150
<b>Total Eligible Assets (2)</b>	<b>\$ 14,008,278</b>
Less: Contributed/Grant Funded Capital	\$ -
Less: Vehicles, Non-core Equipment, Computers (3)	\$ (90,913)
Subtotal: System Costs	\$ 13,917,364
Adjustments:	
Less: Outstanding Principal (4)	\$ (7,250,000)
<b>Net System Assets</b>	<b>\$ 6,667,364</b>
Existing System Capacity (in MGD) (5)	600,000
Cost per Unit of Capacity (per gallon)	\$11.11
Calculated ERU (GPD) (6)	533
<b>Calculated System Development Fee per ERU</b>	<b>\$5,924</b>
Current System Development Fee per ERU	\$ 450

- (1) Includes the wastewater plant upgrade in 2017.
- (2) Represents the replacement cost new less depreciation of all water assets.
- (3) Equipment, vehicles, and small computers are removed from fixed assets.
- (4) The wastewater plant upgrade in 2017 was debt financed.
- (5) The existing capacity is 500,000 capacity but the plant expansion increases the capacity to 600,000 gpd.
- (6) Calculated by Currituck County using historic flows from 2008-2016 and actual connections. Represents peak flow.

**Figure 4: Buy-In Cost per Gallon per Day: Mainland Water System**

**Currituck County, NC  
 Mainland Water System  
 Draft of Calculated System Development Fee -WATER**

Mainland Water System	Calculated RCNLD
Tanks	\$ 5,532,030
Plant	\$ 14,529,949
Equipment/Computers	\$ 87,663
Vehicles	\$ 141,633
Meters	\$ 154,740
Well	\$ 856,703
Lines/Mains/Pipes	\$ 7,488,119
Hydrants	\$ 543,719
<b>Total Eligible Assets (1)</b>	<b>\$ 29,334,557</b>
Less: Contributed/Grant Funded Capital (2)	\$ -
Less: Vehicles, Non-core Equipment, Computers, Meters	\$ (384,037)
Subtotal: System Costs	\$ 28,950,520
Adjustments:	
Less: Outstanding Principal (3)	\$ (5,951,346)
<b>Net System Assets</b>	<b>\$ 22,999,173</b>
Existing System Capacity (in MGD) (4)	2,150,000
Cost per Unit of Capacity (per gallon)	\$10.70
Calculated ERU (GPD) (5)	400
<b>Calculated System Development Fee per ERU</b>	<b>\$4,279</b>
Current System Development Fee per ERU	\$ 5,000

- (1) Represents the replacement cost new less depreciation of all water assets.
- (2) Equipment, vehicles, and small computers are removed from fixed assets.
- (3) Debt includes the 2004 GO bonds for the Mainland Water plant and distribution system and the 2008 Revenue Bonds for the construction of RO plant. Outstanding principal has been adjusted by the average historic amount of principal covered by system development fee revenues.
- (4) Capacity includes 1.5 mgd for the reverse osmosis plant and 0.65 mgd for the conventional plant.
- (5) Represents design flow rates per NC Public Water Supply Rules which is currently used by staff to determine sufficiency of capacity.



**Figure 5: Buy-In Cost per Gallon per Day: Mainland Sewer System**

<b>Mainland Sewer System</b>	<b>Calculated RCNLD</b>
Lines/Mains/Pipes/Outfall	\$ 1,848,631
Land	\$ 897,229
Plant	\$ 7,801,075
Pump Station	\$ 1,218,632
Meters	\$ 14,624
Equipment/Computers	\$ 1,942
<b>Total Eligible Assets (1)</b>	<b>\$ 11,782,132</b>
Less: Contributed/Grant Funded Capital (2)	\$ (5,332,047)
Less: Vehicles, Non-core Equipment, Computers (3)	\$ (16,566)
Subtotal: System Costs	\$ 6,433,519
Adjustments:	
Less: Outstanding Principal (4)	\$ (527,603)
<b>Net System Assets</b>	<b>\$ 5,905,916</b>
Existing System Capacity (in MGD) (5)	284,000
Cost per Unit of Capacity (per gallon)	\$20.80
Calculated ERU (GPD) (6)	360
<b>Calculated System Development Fee per ERU</b>	<b>\$7,486</b>
Current System Development Fee per ERU	\$ 5,500

- (1) Represents the replacement cost new less depreciation of all water assets.
- (2) Mainland (maple) Sewer received a \$356,593 grant for sewer mains in an industrial park and a \$640,000 grant for construction of sewer plant and force mains. These amounts were escalated by the average escalation of the system's RCNLD, because they were not assigned assets.
- (3) Equipment, vehicles, and small computers are removed from fixed assets.
- (4) Staff indicate this debt was for the construction of Moyock Central Sewer System.  
Outstanding principal has been adjusted by the average historic amount of principal covered by system development fee revenues.
- (5) Capicite detail includes: Moyock: 99,000; Maple: 40,000; Detention Center: 25,000 (to be abandoned and interconnected with Maple estimated July 2019);  
Waterside/Walnut Island: 120,000.
- (6) Represents the design flow rate for a 3 bedroom residential unit (120 gallons per day per bedroom), per the NC DEQ 2T rules.

**Note: Calculation of ERU**

Wastewater permitted capacity design flow rates

120 gallons per day per bedroom

240 gallons per day for 2 bedrooms

360 gallons per day for 3 bedrooms

Estimated gallons per day per household - 3 bedrooms

**Figure 6: Marginal Incremental Cost per Gallon per Day: Mainland Sewer System**

FY 2019 -2028	
Expansion Projects	\$ 6,000,000
NPV of Principal Debt	\$ (4,099,835)
Net Project Costs	\$ 1,900,165
Added Capacity	200,000
<b>Cost per gallon per day</b>	<b>\$ 9.50</b>
Adjusted ERU	360
<b>Calculated System Development Fee</b>	<b>\$ 3,420</b>

**Calculation of Debt Credit**

Term (years)	20									
Interest Rate	3.50%									
Period	1	2	3	4	5	6	7	8	9	10
Fiscal Year	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
Principal Payment	\$212,166	\$219,592	\$227,278	\$235,233	\$243,466	\$251,987	\$260,807	\$269,935	\$279,383	\$289,161
<b>Net Present Value of All Payments</b>	<b>\$ (4,099,835)</b>									

**Figure 7: Combined Cost per Gallon per Day: Mainland Sewer System**

Net System Assets	\$	5,905,916
Net Project Costs	\$	1,900,165
	\$	7,806,081
Total Existing & Proposed Capacity		484,000
<b>Cost per gallon per day</b>	\$	16.13
Adjusted ERU		360
<b>Calculated System Development Fee</b>	\$	<b>5,806</b>

**Figure 8: Comparison of Annual Principal to Annual Revenues from System Development Fees**

<b>History of Percentage of Annual Principal Available to be Covered by System Development Fee Revenues</b>					
	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>Average</b>
<b>OSWSD - Wastewater</b>					
Principal					
Interest					
Capacity fee revenue	\$ 4,800	\$ 8,000	\$ 3,600	\$ -	
<b>Mainland Water</b>					
Principal	\$ 890,000	\$ 930,000	\$ 970,000	\$ 1,005,000	
Interest	\$ 733,613	\$ 646,194	\$ 469,485	\$ 439,906	
Capacity fee revenue	\$ 384,049	\$ 570,882	\$ 590,549	\$ 571,478	
<b>% of principal covered by capacity fees</b>	<b>43%</b>	<b>61%</b>	<b>61%</b>	<b>57%</b>	<b>55.6%</b>
<b>OSWSD - Water</b>					
Principal					
Interest					
Capacity fee revenue	\$ -	\$ -	\$ -	\$ -	
<b>Mainland Sewer</b>					
Principal	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	
Interest	\$ 76,478	\$ 70,916	\$ 65,354	\$ 59,792	
Capacity fee revenue	\$ 13,478	\$ 150,600	\$ 4,204	\$ 317,228	
<b>% of principal covered by capacity fees</b>	<b>7%</b>	<b>84%</b>	<b>2%</b>	<b>176%</b>	<b>67.4%</b>
<b>SOBWS - Water</b>					
Principal	\$ 1,947,999	\$ 1,975,449	\$ 2,136,783	\$ 1,777,072	
Interest	\$ 280,885	\$ 233,205	\$ 181,590	\$ 132,439	
Capacity fee revenue	\$ -	\$ -	\$ -	\$ -	
<b>% of principal covered by capacity fees</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0.0%</b>

**Figure 9: Calculation of Water and Sewer Demand per ERU**

Water ERU Calculation						
<u>Ocean Sands Sewer System</u>						
Current District: D, E, F, H, I, J, K, L, M, N, O, P, Q, W, R						
Total number of lots: 1165, Section R is commercial 39,000 sf						
Current lots developed: 993						
Sewer flows (2008-2016):						
			annual average day = 162,222 gpd			
			peak month average day = 370,778 gpd			
			use peak month, peak 3 day average = 533 gpd/user			
Buildout projections current district:						
404,194gpd + 184Lots @ 472gpd/lot and 39,000sf @ 130gpd/sf = 496,044gpd						
buildout		62%				
current		78%				
<u>SOBWS Water</u>						
Current capacity: 2.937mgd						
Usage		peak 3 month average day = 1.712 mgd			58%	
		highest peak month(2014) avg day=2.073mgd			71%	
		peak day (2012-2014 avg peak day) = 2.746 mgd			93%	
		peak 2 day avg in 2012 = 2.797 + 2.716 = 2.757			94%	
		<b>SOBWS = 750gpd/user, OSWSD = 640gpd/user</b>			<b><u>GPD</u>      <u>System</u></b>	
					<b>750      SOBWS</b>	
Expansion to 4.937 mgd					<b>640      OSWSD</b>	
Buildout demand 4.474 mgd for all of SOBWS and OSWSD						
OSWSD remaining well capacity =				25600		
SOBWS remaining skid and well capacity =				150000		

**Figure 9: Calculation of Water and Sewer Demand per ERU continued**

HISTORICAL WASTEWATER FLOWS - 2008 TO 2016							
Year	Annual Avg Day Flow	April to Sept. Avg Day Flow	Peak Month	Peak Month Avg Day Flow	Peak Month Peak 3 Day Avg Flow	Number of Connections (average)	Peak 3 Day Gal/Day per Connection
2008	172,000	242,000	Aug	355,000	409,000	960	426
2009	144,000	210,000	Aug	341,000	389,000	960	405
2010	177,000	257,000	July	366,000	425,000	967	440
2011	156,000	273,000	Aug	423,000	400,000	974	411
2012	156,000	228,000	July	393,000	452,000	981	461
2013	133,000	218,000	July	395,000	475,000	981	484
2014	134,000	218,000	July	343,000	401,000	981	409
2015	203,000	271,000	Aug	345,000	701,800	981	715
2016	185,000	259,000	July	376,000	1,040,000	993	1,047
<b>AVG.</b>	<b>162,222</b>	<b>241,778</b>		<b>370,778</b>	<b>521,422</b>		<b>533</b>
High flow	203,000	273,000		423,000	1,040,000		
Low flow	133,000	210,000		341,000	389,000		
<b>Needed Capacity in Current Service Area (based on 1165 total lots)</b>							
Residential flow: 1165 - 993 = 172 lots @ 533 gpd/lot					91,693		
Commercial flow: 39,000 sf @ 130 gpd/1000 sf					5,070		
Needed capacity					96,763		
<b>Total Capacity</b>							
			Total Demand	Percent Cap. 600k	Percent Cap. 500k		
Current based on peak month avg day			370,778	62%	74%		
Buildout			467,541	78%	94%		
include Section X			482,169	80%	96%		
Current based on April to Sept. avg day			241,778	40%	48%		
Buildout			292,197	49%	58%		