COMMISSION MEETING MINUTES
April 28, 2020

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Chair Elofson called the meeting to order and Ms. Cascio read the roll call of HRSD Commissioners.

Name	Title	Present for Item Nos.
Elofson, Frederick N.	Commission Chair	1-17
Lynch, Maurice P.	Commission Vice-Chair	1-17
Glenn, Michael E.	Commissioner	1-17
Lakdawala, Vishnu K.	Commissioner	1-17
Levenston, Jr., Willie	Commissioner	1-17
Rodriguez, Stephen C.	Commissioner	1-17
Taraski, Elizabeth	Commissioner	1-17
Ward, Molly Joseph	Commissioner	absent

1. Consent Agenda

Action: Approve the items listed in the Consent Agenda.

Moved: Vishnu Lakdawala
Seconded: Michael Glenn
Roll call vote: **Ayes: 7** **Nays: 0**

Brief:

a. Approval of minutes from previous meeting.

b. Contract Awards

1. Calgon FILTRASORB® 400 Granular Activated Carbon Sole Source and Contract Award — $319,500

2. Fluid Pressure Modeling of Managed Aquifer Recharge – James River SWIFT Facility — $28,258

3. Thalia Creek Environmental Research Study and Enhancement of Water Quality Condition — $126,371

c. Task Orders

1. Atlantic Treatment Plant Influent Screens (1-3) Replacement — $335,439

2. York River Isolation Valve Installation and Replacement — $348,800

d. Change Orders

1. Secondary Clarifier Drive $57,000

e. Sole Source

1. Agilent UV-VIS Cary 60 Spectrometer Service Contract
2. Amwell Rotary Distributor Mechanism
3. Dewatering Screw Conveyor Parts
4. Elucidating Nitrification Kinetics of Comammox Bacteria in Complex Nitrifying Systems Study

Item(s) Removed for Discussion: None

Attachment #1: Consent Agenda

Public Comment: None

2. **Methanol Blanket Purchase Agreement**
Rejection of all Bids (>$200,000)

Action: Approve rejection of all bids submitted for the Methanol Blanket Purchase Agreement.

Moved: Vishnu Lakdawala
Seconded: Willie Levenston
Roll call vote: **Ayes: 7** **Nays: 0**

Type of Procurement: Competitive Bid

Bidder	Bid Amount
Suffolk Sales and Service Corp.	$835,049
Univar USA Inc.	$923,371

HRSD Estimate: $1,180,310

Contract Description: Services include the supply and delivery of Methanol. Pure methanol, waste methanol products, and waste glycerol products are used as supplemental carbon sources for denitrification at HRSD treatment plants. Although HRSD staff work to minimize the usage of supplemental carbon, methanol feed is a critical aspect of meeting effluent total nitrogen requirements.

The methanol is added to a second stage anoxic zones using sensor-based control systems, for example in the 5-stage Bardenpho processes at the Nansemond and Army Base treatment plants, and post denitrification processes like the denitrification filters at the York River Treatment Plant.

Staff recommends rejection of all bids and advertisement of a new solicitation. The solicitation requested two bidding options: one for monthly index based (similar to our existing contract structure) and one for fixed annual pricing. Bidders were to provide the differential or “adder” unit rate that would be placed on top of the monthly Methanex index cost for the monthly index-based pricing option. This adder unit rate would be the contracted rate that would stay consistent and therefore be evaluated for award. All Bidders misinterpreted this line item and did not bid correctly. The solicitation will be re-issued and made clearer for all interested Bidders.

Attachment: None

Public Comment: None

3. **Financial Policy Revisions**
Commission Adopted Policy

Action: For review only. No action required.

Brief: HRSD's Financial Operations are guided by its Financial Policy (Policy). The Policy was originally adopted in 2009 and most recently revised in 2018. It is the primary document that places parameters and defines management discretion and philosophies relative to the financial aspects of HRSD. The Policy covers areas such as reserves; budgetary principles and control; key financial metrics, internal controls and audits; debt affordability; and risk, debt, derivative and investment management.

The driver for this revision is to include the definition of Adjusted Days Cash on Hand which more closely manages how the Finance Department makes decisions about liquidity levels. The other changes are minor additions and clarifications such as the inclusion of the Water Infrastructure and Financing Act (WIFIA) and the Virginia Resources Authority (VRA) Master Financing Agreement. In addition, there are updates based on regulatory changes. For example, LIBOR is expected to be phased out in 2021 and the policy was edited to include "or substitute" and Secured Overnight Financing Rate (SOFR), which is the leading candidate to replace SOFR.

This document was reviewed by bond counsel and HRSD's Financial Advisor. After review by the Commission, the final Policy will be presented for approval at a future Commission meeting.

Attachment #2: Draft Financial Policy

Public Comment: None

4. **Bloxoms Corner Force Main Replacement**
Initial Appropriation and Contract Award

Actions:

a. Appropriate total project funding in the amount of $3,495,808.

b. Award a contract to Kimley-Horn and Associates, Inc. (Kimley-Horn).

Moved: Vishnu Lakdawala
Seconded: Elizabeth Taraski
Roll call vote: **Ayes:** 7 **Nays:** 0

CIP Project: BH015900

Type of Procurement: Competitive Negotiation

Proposers	Technical Points	Recommended Selection Ranking
Kimley-Horn and Associates, Inc.	80	1
O'Brien & Gere Engineers, Inc	78	2
Michael Baker International, Inc.	73	3

Contract Description: The Public Notice was issued on December 8, 2019, resulted in seven proposals on January 15, 2020. All seven firms who submitted proposals were determined to be responsive and deemed fully qualified, responsible, and suitable to the requirements in the Request for Proposals. Three firms were shortlisted, interviewed, and technically ranked. The Professional Services Selection Committee recommends the firm of Kimley-Horn and Associates, Inc., whose professional qualifications and proposed services best serve the interest of HRSD.

Project Description: This project will replace 6,100 linear feet of 8-inch cast iron pipe from the Bloxom's Corner Pump Station to the gravity discharge located at the first HRSD manhole located near Buckroe Avenue and Seaboard Avenue in Hampton, Virginia. Disproportionate force main failure history on this line presents a material risk of failure. The work is a part of the Consent Decree Rehabilitation Plan - Phase Two plan.

Funding Description and Cost Analysis: The total project cost estimate of $3,495,808 includes approximately $355,973 for engineering costs, $2,511,868 in construction costs and a project contingency of $627,967. Kimley-Horn will provide professional services including preliminary engineering report services, design services, pre-construction services, contract administration services, field engineering and inspection services, startup and testing services, operations and training services, and post-startup and certification

services for the project. A fee of $81,500 was negotiated with Kimley-Horn for the preparation of a PER.
All other Professional Services will be negotiated at a later date.

Schedule:		
	PER	May 2020
	Design	October 2020
	Bid	November 2021
	Construction	March 2022
	Project Completion	May 2023

Attachment: None

Public Comment: None

5. **Central Environmental Laboratory Phase II - Study**
New CIP and Initial Appropriation

Actions:

a. Approve a new CIP project for the Central Environmental Laboratory Phase II - Study.

b. Appropriate total project funding in the amount of $400,000.

Moved: Maurice Lynch
Seconded: Willie Levenston
Roll call vote: **Ayes:** 7 **Nays:** 0

CIP Project: AD012310

Project Description: In October of 2017 the Commission approved two projects to provide needed space for the Water Quality Department. The first project was the Water Quality Services Building Phase II project. This project will provide a new 20,000 SF building adjacent to the Operations Center in Virginia Beach. This project is underway and the construction is planned to be completed in early 2021. A secondary benefit of this project was the ability to re-purpose the space vacated by the Technical Services Division (TSD) and Pretreatment and Pollution Prevention (P3) staff who will be moving to the new building. The second project was the Central Environmental Laboratory (CEL) – Phase II project. The goal of this project was to renovate the TSD/P3 space adjacent to the existing CEL building and provide for the needs of increased CEL staff, specialty equipment and allow for implementation of new technology in the future as needed. As this project was developed, it has become apparent that the existing TSD/P3 space will not meet the long-term needs of the CEL Division.

To address the long-term needs of the CEL Division, it has been determined that the best approach is to conduct a study to best use the existing space and plan for the future. A new project is proposed to conduct a study to consider the following:

- Long-term staffing needs
- New laboratory technologies and associated space needs
- Ability to meet SWIFT Program goals and future regulatory compliance
- Provide for a modern facility that meets current and future goals of HRSD

This study will allow for the consideration of best practices from across the U.S., a plan for future growth, and a conceptual cost estimate for these new facilities for planning purposes. A consultant will be hired to assist with this effort who is knowledgeable in the latest laboratory design feature and best practices. An additional CIP project will be created in the future pending the results of this study.

Funding Description: The total cost for this project is estimated at $400,000 based on comparable studies and the expected level of effort.

Schedule:		
	Project Award	August 2020
	Study Completion	March 2021

Attachment: None

Public Comment: None

6. **Kingsmill Pump Station Piping Replacement and Wet Well Rehabilitation Additional Appropriation, Contract Award (>$200,000) and Task Order (>$200,000)**

Actions:

a. Appropriate additional funding in the amount of $3,210,185.
b. Award a contract to Basic Construction Company, LLC in the amount of $3,614,450.
c. Approve a task order with Rummel, Klepper and Kahl, LLP (RK&K) in the amount of $447,610.

Moved: Vishnu Lakdawala
Seconded: Stephen Rodriguez
Roll call vote: **Ayes:** 7 **Nays:** 0

CIP Project: WB012600

Budget	$1,345,000
Previous Expenditures and Encumbrances	($312,125)
Available Balance	$1,032,875
Proposed Contract Award to Basic Construction Co.	($3,614,450)
Requested Task Order to RK&K	($447,610)
Proposed Contingency	($181,000)
Project Shortage/Requested Additional Funding	($3,210,185)
Revised Total Project Authorized Funding	$4,555,185

Type of Procurement: Competitive Bid

Bidder	Bid Amount
Basic Construction Company LLC	$3,614,450
Bridgeman Civil Inc.	$3,670,216
MEB General Contractors Inc.	$3,817,938
Garney Companies Inc.	$4,174,940

Engineer Estimate: $3,960,000

Contract Status:	Amount
Original Contract with RK&K	$99,400
Total Value of Previous Task Orders	$312,124
Requested Task Order	$447,610
Total Value of All Task Orders	$759,734
Engineering Services as % of Construction	21%

Project Description: This project involves the rehabilitation of the Kingsmill Pump Station wet well and will require complete bypass of the pump station. Additionally, yard piping, interior and exterior valves, and a portion of the interceptor force main upstream and downstream of the pump station will be replaced as part of this project.

Contract Description: In accordance with HRSD's competitive sealed bidding procedures, the Engineering Department advertised and solicited bids directly from potential bidders. Four bids were received and evaluated based upon the requirements of the Invitation for Bid. RK&K recommends award of the construction contract to Basic Construction LLC with a bid amount of $3,614,450.

Task Order Description: This task order will provide construction phase engineering services for the project. A fee of $447,610 was negotiated with RK&K and is comparable to other projects of similar size and complexity.

Funding Description and Analysis of Cost: The original CIP project estimate did not anticipate the full extent of necessary piping replacement, and other complexities of design and construction discovered during the initial effort. This project requires additional funding due to a refined project scope and an increased construction cost. The amount for this work is $3,210,185 and exceeds the balance available for this CIP project. This request includes a $181,000 contingency to accommodate any additional unforeseen conditions during construction.

Schedule:		
	PER	November 2018
	Design	March 2019
	Bid	March 2020
	Construction	June 2020
	Project Completion	November 2021

Attachment: None

Public Comment: None

7. **Little Neck Interceptor Force Main Repair**
New CIP and Initial Appropriation

Actions:

a. Approve a new CIP project for the Little Neck Interceptor Force Main Repair.

b. Appropriate total project funding in the amount of $500,000.

Moved: Maurice Lynch
Seconded: Elizabeth Taraski
Roll call vote: **Ayes:** 7 **Nays:** 0

CIP Project: AT014700

Project Description: This proposed Commission action creates and fully funds a new CIP project that will allow all project costs to be charged to this CIP project.

An emergency declaration was authorized on April 7, 2020 for the repair of the 18-inch Little Neck Road Interceptor Force Main (SF-127). On April 4, this force main failed near the intersection of North Lynnhaven Road and Little Neck Road.

This emergency declaration is for traffic control, pump and haul services, excavation, roadway repairs, construction administration and construction inspection. Staff isolated the leak by diverting flow with two mainline valves.

The contractor, Tidewater Utility Construction, Inc. (TUCI), provided traffic control, excavation, installation of the new clamp, and roadway restoration. The On-Call General Engineering contract with Hazen and Sawyer will be used to provide construction administration and inspection.

Funding Description: The total cost for this project is estimated at $500,000 based on a Class 5 cost estimate and a 10 percent contingency included in the requested appropriation.

Attachment: None

Public Comment: None

8. **Nansemond Treatment Plant Advanced Nutrient Reduction Improvements and Expansion Phase I**
Initial Appropriation and Task Order

Actions:

a. Appropriate total project funding in the amount of $1,500,000.

b. Approve a task order with AECOM in the amount of $992,787.

Moved: Stephen Rodriguez
Seconded: Michael Glenn
Roll call vote: **Ayes:** 7 **Nays:** 0

CIP Project: NP013810

Contract Status:	**Amount**
Original Contract with AECOM	$0
Total Value of Previous Task Orders	$0
Requested Task Order	$992,787
Revised Contract Value	$992,787
Engineering Services as % of Construction	0.52%

Project Description: The Nansemond Treatment Plant (NTP) Advanced Nutrient Reduction Improvements Phase I project will involve the preliminary engineering necessary to begin design and construction of improvements to NTP to support reliable treatment of raw, screened wastewater from the Boat Harbor Treatment Plant (BHTP) service area and raw influent from the NTP service area. A Capacity Study determined that nutrient removal and hydraulic upgrades would be required to treat both flows and loads to meet the targeted effluent concentrations.

The scope includes preliminary engineering for equalization of primary effluent and upgrades to preliminary and secondary treatment, solids handling including the Struvite Recovery Facility (SRF), disinfection facilities, odor control system, effluent pump station and drain pump station. Preliminary engineering will include planning which will determine the appropriate design conditions for the upgraded and new facilities and ensure optimal and efficient treatment performance will be maintained.

Task Order Description: This task order will provide study services, including treatment unit process evaluation, flow evaluation and equalization tank sizing in coordination with related work at BHTP, identification of future interface points with SWIFT, and development of an initial facility plan. This Phase I scope of work will define the basis of design criteria and concept design to inform the design and construction of the upgrades under a separate

project (Phase II). Deliverables from this task order will be a summary technical memorandum and updated treatment process model information.

Analysis of Cost: The cost for this task order is based on a detailed negotiated scope of work for study services. The raw average labor rate for this project is $44.30 per hour. The total hours budgeted are appropriate for the scope proposed for this task. This task order will be issued as an amendment to the Professional Services Agreement with AECOM for SWIFT Full-Scale Implementation. Hazen and Sawyer is a major subconsultant under the Agreement and will conduct the work. The labor rates for each staff category in the proposed fee are consistent with the rate structure within the Agreement, as approved for FY2020. Compensation will be on a time and materials basis.

Schedule:	Pre-Planning	May 2020
	Project Completion	October 2020

Attachment: None

Public Comment: None

9. **Norfolk City Pump Station Upgrades**
Initial Appropriation

Action: Appropriate total project funding in the amount of $1,400,000.

Moved: Vishnu Lakdawala
Seconded: Maurice Lynch
Roll call vote: **Ayes:** 7 **Nays:** 0

CIP Project: CE011836

Project Description: This project will complete upgrades on the City of Norfolk Pump Station 124 (Airport Pump Station) that cannot meet the new pressure policy post-2021 Chesapeake-Elizabeth Treatment Plant closure. HRSD completed a preliminary analysis in 2018 on this station under the Capital Improvement Project CE011820 (Chesapeake-Elizabeth Interceptor System Diversion Improvements). The City of Norfolk will administer design and construction with reimbursement from HRSD for the required upgrades. All betterments to the station will be paid for by the City.

Funding Description: The total cost for this project is estimated at $1,400,000 based on recent bid tabulations on similar, small pump station projects, estimated consultant fees, and a 20 percent contingency. A cost sharing agreement will be prepared in the coming months for this design and construction efforts and will be presented to the Commission for approval at that time.

Schedule:		
	Design	May 2020
	Construction	March 2021
	Project Completion	March 2022

Attachment: None

Public Comment: None

10. **Smithfield Pressure Reducing Station**
Additional Appropriation and Task Order

Actions:

a. Appropriate additional funding in the amount of $530,486.

b. Approve the Task Order to the Sewer Repair and Condition Assessment Contract with Bridgeman Civil Inc. in the amount of $395,380 for the construction of the Smithfield Interim Pressure Reducing Station.

Moved: Stephen Rodriguez
Seconded: Michael Glenn
Roll call vote: **Ayes:** 7 **Nays:** 0

CIP Project: NP014300

Budget	$1,460,000
Previous Expenditures and Encumbrances	($1,080,061)
Available Balance	$379,939
Proposed Task Order to Contractor	($395,380)
Proposed Contingency	($515,045)
Project Shortage/Requested Additional Funding	($531,441)
Revised Total Project Authorized Funding	$1,990,486

Project Description: The buildup of gasses in HRSD's interceptor force main in the Town of Smithfield (Smithfield) causes system pressures to routinely exceed design parameters HRSD provided to Smithfield. Consequently, during wet weather Smithfield experiences detrimental effects including routine pump seal failures and has had to purchase additional pumps to avoid overflows in their system.

This project is designed to reduce pressures in the force main by constructing a new Pressure Reducing Station (PRS) in Smithfield on Turner Drive. The PRS will consist of one electric eight-inch variable frequency drive (VFD) pump and an eight-inch critically silenced diesel backup pump along with necessary piping. A mainline check valve, pump controls, flow and pressure metering, and SCADA monitoring will also be included with this project. This project also includes funds for replacement of pumps at Smithfield's Wellington Circle and Rising Star Pump Stations.

Funding Description: The estimated cost to construct the pipeline and pressure reducing station exceeded the original estimates by $460,380. Electrical work and design fees are also estimated to be higher than the original estimates based on costs for recent similar projects. This request includes an additional $530,486 to complete design work, the

purchase and installation of new pumps, electrical equipment, instrumentation and SCADA equipment, as well as providing new Dominion Power service and final landscaping. A 10 percent contingency is included.

Analysis of Cost: The proposed Task Order cost from Bridgeman Civil Inc. is in agreement with other similar efforts from other firms.

Task Order Description: This task order with Bridgeman Civil Inc. will provide labor and materials for the construction of the Pressure Reducing Station to include: station piping, construction of pump slabs, setting of pumps, construction of E1 pump station and drainage pipes, installation of geogrid matting and stone for fenced in station area, perimeter vinyl fencing, and construction of both flow meter and check valve vaults.

Schedule:	Construction	May 2020
	Project Completion	December 2020

Attachment: None

Public Comment: None

11. **West Point Treatment Plant Tertiary Filter**
Contract Award and Additional Appropriation (>$200,000)

Actions:

a. Award a contract to Shaw Construction Corporation in the amount of $691,895.

b. Appropriate additional funding in the amount of $394,387.

Moved: Maurice Lynch
Seconded: Stephen Rodriguez
Roll call vote: **Ayes:** 7 **Nays:** 0

CIP Project: MP012400

Budget	$641,780
Previous Expenditures and Encumbrances	($169,299)
Available Balance	$472,481
Proposed Task Order to MBP	($76,558)
Proposed Funds for Owner Constructed Equipment	($63,730)
Proposed Contract Award to Shaw Construction Corporation	($691,985)
Proposed Contingency	($34,595)
Project Shortage/Requested Additional Funding	($394,387)
Revised Total Project Authorized Funding	$1,036,167

Type of Procurement: Competitive Bid

Bidder	Bid Amount
Shaw Construction Corporation	$691,985

HRSD Engineer Estimate: $ 593,840

Contract Description: This contract is for the West Point Treatment Plant Tertiary Filter project. In accordance with HRSD's competitive sealed bidding procedures, the project was advertised and solicited bids directly from potential bidders on February 6, 2020. One bid was received on February 28, 2020 and evaluated based upon the requirements for the invitation for bid. Shaw Construction Corporation is the apparent responsive and responsible low bidder with a bid amount of $691,985.

Project Description: This project is to add a tertiary filter and pump station at the West Point Treatment Plant (WPTP), between the secondary clarifiers and the chlorine contact tank. The tertiary filter was formerly part of a side stream process at York River Treatment Plant (YRTP) when the YRTP provided reclaimed water to the Yorktown Refinery and has been relocated to the WPTP for repurposing at the plant. The project includes a new

submersible pump station and valve vault installation, associated electrical improvements, instrumentation for capturing filter/pump station operating data, and piping to convey process water to and from the filter.

Funding Description and Analysis of Cost: The total cost estimate for this project is approximately $1,036,077. The CIP total project budget was updated in Fiscal Year (FY) 2021 and is reflected in the FY-2021 budget as $790,295. The HRSD Engineer's estimated cost is low comparatively to the bid price for the pump station, but due to the limited number of bidders and overall bidding environment the bid is felt reasonable for the completion of the work. Negotiations were held with Shaw Construction resulting in a five percent decrease from the original bid amount as well. The apparent low bid of $691,985 as submitted by Shaw Construction Corporation is reflective of current market conditions for construction in Small Communities at this time. The lowest bid amount of $691,985 exceeds the balance available for this CIP project. Therefore, this project requires approximately $394,387 in additional funding to execute the construction phase.

Schedule:	Construction	May 2020
	Project Completion	February 2021

Attachment: None

Public Comment: None

12. Capital Improvement Program (CIP) Quarterly Update

Action: No action required.

Brief: Implementing the CIP continues to be a significant challenge as we address numerous regulatory requirements, SWIFT Program implementation and the need to replace aging infrastructure. Staff provided an update on the CIP expenditures for FY-2020 to date; asset management program; consent decree/sewer rehabilitation plan project; Providence Road Offline Storage Facility; Water Quality Services Building Phase II; Atlantic Treatment Plant Thermal Hydrolysis Process and Fats, Oil & Grease (FOG) Receiving Station; and COVID-19 impacts to staff, consultants and contractors.

Discussion Summary: Staff explained assets that were designed prior to implementation of the Asset Management System are manually entered into the Asset Management System as the asset is brought online. At startup, these assets will then be included in the Atlantic Plant Replacement Planning Model. Going forward, assets, including those related to SWIFT, will be included directly into the Asset Management Program and replacement planning model after the design is complete using Building Information Modeling (BIM) software.

During discussion of COVID-19 impacts to contractors (slide 22 of presentation), staff explained HRSD has incorporated similar guidelines as recommended by the CDC. Where possible, we have added vehicles to the fleet and offer mileage reimbursement to employees who use their personal vehicle. In instances where employees must ride together, they are kept on the same crew to minimize contact with others.

Attachment #3: Presentation

Public Comment: None

13. **Unfinished Business** – None

14. **New Business** – None

15. **Commissioner Comments** – None

16. **Public Comments Not Related to Agenda**

Ms. Cascio read the following comment from Mr. Mike Gaffney of RK&K Engineers: "*I want to thank HRSD for the commitment to be safe but move forward. It's a strong and appreciated commitment to our community and industry.*"

20. **Informational Items**

Action: No action required.

Brief: The items listed below were presented for information.

a. Management Reports

b. Strategic Planning Metrics Summary

c. Effluent Summary

d. Air Summary

e. Emergency Declaration – Little Neck Interceptor Force Main Repair

Attachment #4: Informational Items

Public Comment: None

Next Commission Meeting Date: May 26, 2020

Meeting Adjourned: 10:18 am.

SUBMITTED:

Jennifer L. Cascio

Jennifer L. Cascio
Secretary

APPROVED:

Frederick N. Elofson

Frederick N. Elofson, CPA
Chair

HRSD COMMISSION MEETING MINUTES
April 28, 2020

ATTACHMENT #1

AGENDA ITEM 1. CONSENT AGENDA

Resource: Steve de Mik

CONSENT AGENDA ITEM 1.b.1. – April 28, 2020

Subject: Calgon FILTRASORB® 400 Granular Activated Carbon
Sole Source (>$10,000) and Contract Award (>$200,000)

Recommended Action:

a. Approve the use of FILTRASORB® 400 Granular Activated Carbon by the Calgon Carbon Corporation at HRSD.

b. Award a contract to Calgon Carbon Corporation in the estimated amount of $63,900 for year one with four annual renewal options and an estimated cumulative value in the amount of $319,500.

HRSD Estimate: $63,900

Sole Source Justification:

☐ Compatibility with existing equipment or systems is required

☒ Support of a special program in which the product or service has unique characteristics essential to the needs of the program

☐ Product or service is covered by a patent or copyright

☐ Product or service is part of standardization program to minimize training for maintenance and operation, and parts inventory

Contract Description: This contract is an agreement to furnish and deliver FILTRASORB® 400 (F400) granular activated carbon (GAC). The carbon is currently being used in the GAC contactors at the SWIFT Research Center with the potential to be used at all full-scale SWIFT facilities. It was also the GAC that has been used in all previous pilot testing work.

One of the most important questions that needs to be answered at the SWIFT Research Center is the expected GAC usage rate. The SWIFT Research Center has two years of research and performance data using F400 carbon and the need for consistent comparison is critical to the historical data set and projections of GAC usage rate at full-scale SWIFT facilities.

Calgon Carbon Corporation is the only supplier of the FILTRASORB® 400 granular activated carbon. Previous purchases of F400 were made via ProCard or provided by the design-build contractor for the SWIFT Research Center, and continual purchases exceed the small dollar threshold.

Resource: Jim Pletl

CONSENT AGENDA ITEM 1.b.2. – April 28, 2020

Subject: Fluid Pressure Modeling of Managed Aquifer Recharge – James River SWIFT Facility
Contract Award – Multi-Year Research Study

Recommended Action: Award a contract to Virginia Polytechnic Institute and State University (Virginia Tech) in the total estimated amount of $28,258.

Project Description: Recharge of SWIFT Water through managed aquifer recharge will increase fluid pressure within the coastal plain aquifer system. Understanding the extent of the propagation of the fluid pressure wave and its potential to propagate to the underlying bedrock is important to understanding the potential for induced seismicity. The modeling proposed by Virginia Tech is being conducted at a small scale initially, focusing on the James River SWIFT facility with a planned recharge capacity of 16 MGD. Once complete, the model output can be used to identify optimal locations for the placement of sensitive seismic instrumentation designed to detect otherwise undetectable events. This will allow us to gain an understanding of the background seismicity of the region prior to the implementation of James River SWIFT facility.

This is the first use of this model in an unconsolidated sediment aquifer system like the Coastal Plain. If the modeling proves to be reliable and informative, the scope of future modeling efforts will be expanded to capture additional full-scale SWIFT facilities.

SUMMARY OF SCOPE FOR:
QUANTIFYING THE EXTENT OF FLUID PRESSURE PROPAGATION FROM MANAGED AQUIFER RECHARGE OPERATIONS IN SOUTHEAST VIRGINIA (JAMES RIVER SITE)

Ryan M. Pollyea, Ph.D. (Principal Investigator)
Department of Geosciences, Virginia Tech, Blacksburg, Virginia

The Sustainable Water Initiative for Tomorrow (SWIFT) is an innovative aquifer recharge project designed to enhance long-term groundwater resource sustainability in southeast Virginia while offsetting coastal land subsidence and saltwater intrusion to the Coastal Plain Aquifer system. The SWIFT project is based on the principle managed aquifer recharge, which is the process of injecting tertiary treated wastewater into the deep aquifer system. Groundwater replenishment targets for SWIFT are on the order of 100 million gallons of water per day (379,000 m^3/day) through a network of injection wells distributed across five sites in southeast Virginia. Research shows that the cumulative injection volume will result in sufficient pore fluid pressure to offset land subsidence caused by groundwater withdrawals. However, the pore fluid pressure build-up from SWIFT injections may also cause injection-induced earthquakes, if fluid pressure propagates deep into the basement rocks underlying the Potomac Aquifer. **The objective of this project is to optimize the placement of seismic monitoring stations by modeling fluid pressure propagation into the geologic basement prior to full-scale injection operations at the James River injection site** (Figure 1)**.**

Injection-induced earthquakes occur when fluid injections into deep geologic formations cause pore pressure to rise within naturally occurring faults; however, the location and stress-state of pre-existing basement faults is often unknown before earthquakes occur. Despite this uncertainty, numerous groundwater models show that fluid pressure migration from injection wells matches earthquake occurrence in space and time. This "history-matching" approach has been used to demonstrate the linkage between earthquakes and oilfield wastewater disposal throughout the central United States, e.g., in Oklahoma, Kansas, Texas, Colorado, Ohio, Arkansas, and others. Interestingly, each of these case studies has implemented groundwater modeling efforts *after* injection-induced earthquakes occur. Given the success of history-matching groundwater models to earthquake occurrence, this project is a proactive modeling approach designed to assess the spatial extent of pore fluid propagation into the seismically active basement *before* injection operations begin. This forward-looking approach is particularly important for the Coastal Plain Aquifer system because its geology is characterized by unconsolidated sediments, which are likely to respond differently than consolidated rock formations in the central United States. The research developed here will provide first-order knowledge about the spatial and temporal progression of injection-induced fluid pressure propagation, which may lead to more effective earthquake monitoring because seismometer accuracy increases with closer proximity to earthquake occurrence. Moreover, increasing seismometer accuracy also lowers the magnitude threshold that can be detected, i.e., monitoring earthquakes that people cannot feel. This level of accuracy is an important component of seismic hazard mitigation because the occurrence of small earthquakes increases the probability of larger earthquakes that pose a risk to human health and safety.

This project focuses on the planned injection activities at the James River injection site, which is currently projected to operate at a cumulative injection volume of 16 million gallons per day. The extent of fluid pressure change that are caused by this injection rate will be modeled using numerical simulation methods that reproduce known geology of the Coastal Plain Aquifer system and underlying basement rock. The geologic model is based on structure contour data of the Coastal Plain Aquifer system that is available by Internet download from the United States Geological Survey. The geologic model comprises three layers: the shallow and upper Potomac aquifers, the middle and deep Potomac aquifers, and the underlying crystalline basement rock, the latter of which shall be modeled to a depth of 6.2 miles (10 km). In order to refine the geologic model near the James River injection site, this project is designed to be a close collaboration with HRSD to acquire as much hydraulic and operational data as is presently available. Specifically, data needs for this study include site characterization data from James River study area and surrounding region:

- Aquifer geometry, particularly depth and thickness of known aquitards;
- Results of *in situ* hydraulic testing within the deep aquifer system, i.e., permeability, transmissivity, or conductivity, as well as confined storage coefficient(s) (or compressibility/bulk modulus data);

- Porosity data for the primary aquifer materials and low permeability confining units;
- Water quality data, particularly total dissolved solids concentration;
- Downhole temperature logs or thermal gradient estimates;
- Well locations, depth and operational data for high-rate aquifer production wells in the region; and,
- Current estimates for SWIFT well locations and proposed injection rates.
- Location and withdrawal rates of large-scale production wells within 50 km of the site.

We anticipate that hydraulic properties (particularly permeability) for the basement are *a priori* unknown, and, as a result we proposed implementing the depth-dependent permeability model that is commonly utilized for hydrogeologic studies of deep basal rock formations. All project data will be incorporated into the GIS database, which will then be utilized to produce the geologic model in the format that is required for the groundwater modeling simulator.

When the geologic model is complete, recharge injections will be modeled with the TOUGH3 numerical flow and transport simulator developed at Lawrence Berkeley National Laboratory. Perhaps the most challenging aspect for a groundwater model of this type is to establish initial conditions, which is the fluid pressure distribution within the aquifer and basement prior to the start of injection. This is typically achieved with a procedure called "model calibration" that requires historical groundwater data for much of the study area. Because this project is designed to estimate pore pressure in the deep basal rocks there are insufficient data for robust calibration. As a result, this project will implement a "spin-up" procedure, which reproduces known fluid withdrawals across the study area for an extended period prior to the time window of interest. For this project, we propose a spin-up run of no less than 30 years that starts with general (hydrostatic) conditions and then reproduces groundwater withdrawals from known high-rate production wells. This will result in a set of initial conditions that reflect depressurization caused by long-term groundwater withdrawals from the Coastal Plain Aquifer system within the study area, as well as the underlying crystalline basement.

After completing the initial condition simulation, recharge injections at the James River site will be modeled using operational injection rates provided by HRSD. The model will also reproduce permitted groundwater using current estimates for the primary production wells in the study area. Incorporating both production and injection wells permits analysis of the relationship between depressurization from production and pressure accumulation from injection, while avoiding unrealistically high pore pressure estimates. The model will simulate injections for a 20-year period, but this can be shortened or extended as requested by HRSD. To account for uncertainty of hydraulic properties in the crystalline basement, we will rerun several permutations of the model by varying the basement permeability structure within a range of three orders-of-magnitude. Model output will be evaluated by mapping fluid pressure change within the Potomac Aquifer and underlying basement rocks for all permeability scenarios tested. These simulation data will be incorporated into the project GIS database for evaluating that spatial extent of fluid pressure changes that may lead to seismicity. The integration of simulated fluid pressure data into a GIS framework facilitates optimal seismic station placement by allowing for consideration of both hydraulic changes in the deep basement and pragmatic constraints at the land surface, e.g., property ownership, electrical access, etc.

The period of performance for this project is May 1, 2020 to December 31, 2020. The principal investigator for this project **Dr. Ryan M. Pollyea**, who is an assistant professor and director of the *Computational Geofluids Lab* in the Department of Geosciences at Virginia Tech. Dr. Pollyea's research group specializes in the physical and chemical processes that govern fluid injections in deep geologic formations. His research program has been continuously funded since 2014 by the U.S. Department of Energy and United States Geological Survey to study the effects of fluid pressure propagation during geologic carbon storage and oilfield wastewater disposal. Pollyea's research in the area of injection-induced earthquakes has received international media coverage and he has been invited to speak internationally on the relationship between fluid injections, pore pressure propagation, and earthquake occurrence. Pollyea will be responsible for all technical aspects of the project, as well as project management and reporting. To assist with GIS database development, this project will support one undergraduate research assistant who will work under the direct supervision of PI Pollyea.

BUDGET

PERFORMANCE PERIOD: 05/01/2020 – 12/31/2020

NAME/POSITION	TOTAL
Pollyea/PI (50% effort, SMR)	$14,660
TBA/Undergraduate Research Asst. (100% - summer)	@ 4,000
TOTAL PERSONNEL SALARIES	$18,660

FRINGE BENEFITS	
Pollyea (50% effort, SMR)	$ 1,136
TBA/Undergraduate Research Asst. (100% - summer)	$ 310
TOTAL FRINGE BENEFITS	$ 1,446

Fringe Rates
SMR faculty: 7.5% thru 6/30/20, 8.0% after 6/30/20
Summer Undergraduate: 7.5% thru 6/30/20, 8.0% after 6/30/20

TOTAL SALARIES & FRINGES	$20,106
EQUIPMENT	$ 0
SUPPLIES	$ 0
SERVICES/CONSULTANTS	$ 0
RADIOCARBON OR OTHER DATING	$ 0
TRAVEL (domestic)	$ 2,500
PUBLICATION FEES	$ 0
OTHER DIRECT COSTS	$ 0
TOTAL DIRECT COSTS	$22,606
INDIRECT COSTS @ 25% (per HRSD)	$ 5,652
Base for indirect costs:	$22,606
TOTAL COSTS	**$28,258**

DETAILED BUDGET JUSTIFICATION

1. Salaries and Wages

Ryan Pollyea. (PI) Will be responsible for overall project supervision, training the undergraduate student researcher, performing numerical modeling and analysis (Task 2), and as project reporting. Salary request is $14,660 for 1.5 months summer, based upon a current base 9-month academic year salary of $84,577.

TBN. (Undergraduate Research Assistant - Summer). Responsible for data management and simulation visualization associated with Task 2. Salary is request is $4,000, which reflects for $10 per hour for 40 hours per week for 10 weeks.

2. Fringe Benefits

The standard VT fringe benefits rate effective through June 30, 2020 is 7.5% for summer faculty and summer wage employees. This escalates to 8.0% effective July 1, 2020. Fringe Benefits include FICA, workers compensation, unemployment compensation, medical insurance, group life insurance, employee retirement compensation, faculty and staff fee waivers, and educational leave. Total amount requested is $1,446.

7. Travel

Funds are requested for two overnight visits to the USGS Virginia Water Science Center and/or HRSD ($500/person-trip). Funds are also requested for PI or student research assistant to present project results at one national geoscience conference, e.g., Geological Society of America, Seismological Society of America or similar ($1,500/conference). The total travel budget requested is $2,500.

11. Indirect Costs

Calculated using modified total direct costs, which are total costs less participant support costs, tuition, and equipment and less the portion of each subcontract over $25,000. Pursuant to sponsor requirements, the indirect rate is 25%. Total amount requested is $5,652.

CONSENT AGENDA ITEM 1.b.3. – April 28, 2020

Subject: Thalia Creek Environmental Research Study and Enhancement of Water Quality Condition
Contract Award – Multi-Year Research Study

Recommended Action: Award a contract to Virginia Institute of Marine Science (VIMS) in the total estimated amount of $126,371 for 19 months with potential for additional time.

Project Description: Thurston Branch-Thalia Creek (TB-TC) is a small tributary at the head of the Western Branch of the Lynnhaven River. The TB-TC system has undergone many changes due to land use practices and continued urban development. The total maximum daily load (TMDL) for bacteria has been developed by the Virginia Department of Environmental Quality and a reduction of bacterial sources is required. Currently, the drainage basin of the TB-TC system is considered a portion of the watershed subject to the Chesapeake Bay TMDL for nutrients.

A collaborative partnership formed with the City of Virginia Beach, Lynnhaven River Now, VIMS, the Virginia Department of Health (VDH) and HRSD is working to identify important bacterial and nutrient sources in the watershed and to provide the best information for control of pollutants through stormwater management, best management practices, and implementation of living shorelines, etc.

The study proposes to use a linked watershed and hydrodynamic model to simulate transport and fate of nutrients and bacteria in the watershed and in the TB-TC system. VIMS will develop a watershed loading model for nutrients and bacteria to provide reliable daily loadings to both the 3D hydrodynamic and water quality models. VIMS will use hydrodynamic and water quality models to simulate eutrophication processes and transport and fate of bacteria. A series of numerical model simulations will be conducted to assist Virginia Beach and HRSD in identifying the contribution of loading and pollutant sources from different sub-watersheds to overall water quality conditions in the Thalia Creek, and evaluating the efficiency of pollutant source management and cost-effectiveness of implementation actions in the watershed.

The entire project is divided into three phases:

- Phase 1: Data collection, data analysis, and the development of a watershed model (March 2020-October 2020)
- Phase 2: Development of hydrodynamic and water quality models (October 2020-May 2021)
- Phase 3: Conduct of management scenarios (June 2021-October 2021)

Thalia Creek Environmental Study and Enhancement of Water Quality Condition

A Proposal Submitted to

Hampton Roads Sanitation District (HRSD)

1432 Air Rail Avenue, Virginia Beach, VA 23455

by

Virginia Institute of Marine Science
School of Marine Science
College of William and Mary
Gloucester Point, Virginia 23062

Project Duration: March 15, 2020 – October 30, 2021

February 2020

1. Introduction

Thurston Branch-Thalia Creek (TB-TC) is a small tributary at the head of the Western Branch of the Lynnhaven River (Figure 1). The TB-TC system has undergone many changes due to changes in land use practices and continued urban development. Water quality degradations have been observed for many years including low dissolved oxygen (DO), algal blooms, and elevated levels of bacterial concentration. The total maximum daily load (TMDL) for bacteria has been developed by the Virginia Department of Environmental Quality (DEQ) and a reduction of bacterial sources is required. Currently, the drainage basin of the TB-TC system is a portion of the watershed subject to the Chesapeake Bay TMDL for nutrient reduction. The City of Virginia Beach (VB) has developed the First Phase Chesapeake Bay TMDL Action Plan (VB, 2019) for implementation of nutrient reduction. A detailed stormwater management plan has been proposed. The implementation plan (IP) for the TMDL for shellfish areas of the Lynnhaven Bay, the Broad Bay, and the Linkhorn Bay watersheds was completed in 2006 by DEQ.

Because of the complex geometry and high variability of land use practices associated with the TB-TC systems, the nutrient and bacterial loadings associated with different land uses at each sub-watershed are very different. When pollutants are discharged into the system, some of them will settle to the bottom, the rest of them are transported to the downstream and then eventually to the Chesapeake Bay. Controls of nutrients and bacteria will be crucial for improving the water quality conditions in the TB-TC system. The Hampton Roads Sanitation District (HRSD) is planning to assist VB in identifying important bacterial and nutrient sources in the watershed and to provide the best information for control of pollutants through stormwater management, best management practices (BMPs), and implementations of living shorelines, etc.

What is unknown is the distribution of pollutants during the transport processes in the TB-TC system and how much pollutant loadings will be discharged to the downstream Lynnhaven River? What management actions, at the sub-watershed level, will have the highest benefit for improvement of the water quality condition in the TB-TC system and Lynnhaven? To address these questions, the Virginia Institute of Marine Science (VIMS) will collaborate with HRSD and VB to study the transport and fate of the pollutants, to provide information on selecting best management areas, and to design cost-effective management of land use practices for improving the water quality conditions of the system. HRSD has held three workshops for the planning of this study. Current water quality issues and important management needs, as well as modeling and observations needs, were discussed during these workshops.

VIMS has assisted VB in developing a water quality model for the TB-TC system to study the cause of the degradation of water quality in 2010 (Sisson et al., 2010). VIMS conducted a survey in 2009 incorporating measurements at 5 stations to collect 15-min observations of DO, salinity, temperature, turbidity, and Chl-a data. Grab samples of nutrients and bacteria were also conducted during 2009. A three-dimensional model was developed to study DO, Chl-a distribution, and the transport of bacteria in the system. However, the model developed during that period was not fine enough spatially, which is not sufficient to address many management questions. One of the deficiencies is that there is no capability to identify

bacterial sources in the watershed and cannot provide detailed information for source reduction in designing a management plan or answering many what-if questions. Recently, VIMS has assisted DEQ in conducting the monitoring of the TB-TC system, including the Buchanan Creek to measure DO, salinity, temperature, turbidity, and Chl-a. These data will be available for model development. VIMS will work with HRSD and VB to develop a high-resolution model for the TB-TC system and to simulate transport and fate of pollutants. Our goal is to assist HRSD and VB, using numerical models, to evaluate the efficiency of management actions and to address questions and issues associated with management plans for improving water quality conditions in the system.

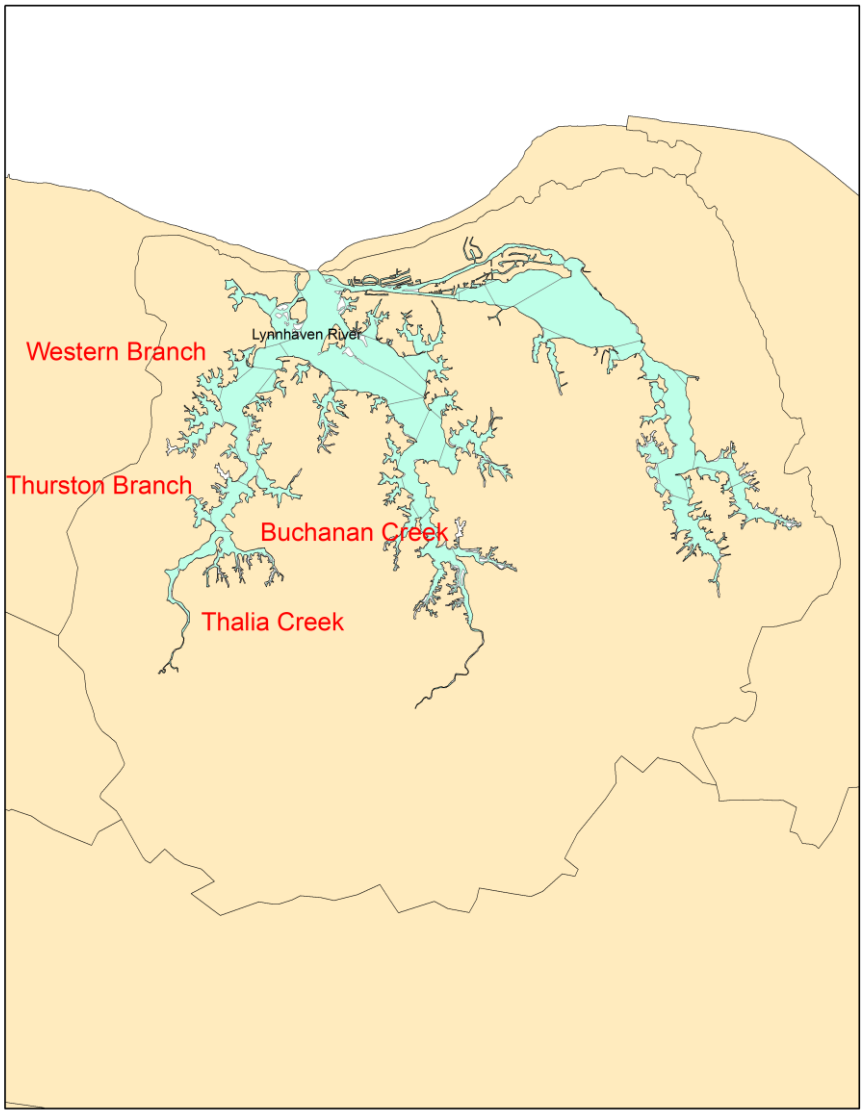

Figure 1. Location map of Thurston Branch-Thalia Creek in the Lynnhaven River system.

2. Study Approach

We propose to use a linked watershed and hydrodynamic model to simulate transport and fate of nutrients and bacteria in the watershed and in the TB-TC system. The watershed model will be used to simulate flow, nutrients and bacterial loadings from the watershed. The 3D water quality model will be used to simulate eutrophication processes and transport of bacteria in the TB-TC system.

Watershed model

VB has developed the storm water management model (SWMM) for the entire Lynnhaven River system. However, the model currently does not simulate nutrient and bacterial loadings in the watershed. During the 2009 period, URS developed a watershed model for the Lynnhaven River using the Hydrologic Simulation Program FORTRAN (HSPF) model. During the same period, VIMS developed a watershed model using the Loading Simulation Program C++ (LSPC) watershed modeling package.

The LSPC model will be used for simulating surface runoff of nutrients and bacteria. The LSPC model is a stand-alone, personal computer-based watershed modeling program developed in Microsoft C++ (Shen et al., 2005). It includes selected HSPF algorithms for simulating hydrology, sediment, and general water quality on land, as well as a simplified stream transport model (USEPA, 2004; VA-DEQ, 2012).

Both LSPC and HSPF are similar models driven by hourly precipitation. The URS model has a high resolution for watershed delineation. We propose to develop the loading model using LSPC. A high resolution of watershed delineation similar to that developed by URS will be used for the current model development. The watershed delineation is shown in Figure 2 in the TB-TC watershed. There is a total of 228 sub-watersheds in the TB-TC system. With a high resolution of watershed delineation, pollutant loadings can be better simulated. In the previous loading simulation, bacterial and nutrient loadings are estimated for base land use application using densities of wildlife, pets, migration birds, nutrient applications (lawns), etc. The estimate of bacterial loading using this approach only provides a mean annual variation and do not reflect the contribution for any individual land use. Specifically, it is unable to identify human contributions that are more critical for water quality, most notably for shellfish growing areas. VIMS will work with the HRSD to use watershed data collected by HRSD for estimating sources and loadings in the watershed and for improving identifiable sources of nutrients and bacteria in the watershed.

Because there are no United States Geological Service (USGS) flow stations in the Lynnhaven watershed, we will use USGS flow data collected in urban areas in the Virginia Beach region and historical data to calibrate the model. We will investigate the SWMM model and use model output to calibrate our watershed model. Currently, there is a USGS station collecting surface

elevation and precipitation data in the Thalia Creek (Figure A3). The hourly data will be processed and used for watershed model simulation.

Hydrodynamic and water quality model

In the previous modeling study, the EFDC model is applied to this area. Although the EFDC model works well for relatively large systems, it is difficult to simulate small creeks, such as the Buchanan Creek. In order to make the model applicable to the local scale and be flexible for the model to follow complex geometry, we plan to use the unstructured grid SCHISM model to do the simulation. The SCHISM (Semi-implicit Cross-scale Hydroscience Integrated System Model) (Zhang et al., 2016) is capable of simulating cross-scale spatial resolution for the complex shoreline of an estuary. This model is an open-source community-supported modeling system, characterized by using mixed triangular-quadrangular unstructured grids in the horizontal and a very flexible coordinate system to fit the complex geometry well.

An example of a high-resolution model grid is shown in Figure 3. The model grid follows the shoreline and includes a portion of the Western Branch, the Thalia Creek, and the Buchanan Creek. The grid has a high spatial resolution for tributaries, such as the Buchanan Creek where the grid includes all major branches. The horizontal dimension of the small grids in these small tributaries ranges from 5-20 m. The model will simulate surface elevation, current, salinity, and temperature. The model will be driven by hourly tide and salinity at the model open boundary and daily freshwater discharge from adjacent watersheds. The freshwater runoff will be simulated by the watershed model. We have 2 good data sets for model calibration. One was measured during the summer of 2009 (about 2 months) and one was measured during the autumn of 2018 to spring 2019, which includes temperature, DO and Chl. For model calibration, our open boundary condition for the model will be derived from the NOAA tidal station at the Chesapeake Bay Bridge Tunnel (CBBT) and observed depth data at the model open boundary. The previous study found that the tide inside of the Lynnhaven River has a good correlation with the tide at the CBBT. With the use of observed depth data, we can estimate correlation and use an established relationship between measured depth and tide at the CBBT to create a long-term boundary condition for the model simulation. The salinity will be estimated based on monthly measurements and previous model simulations of salinity in the Lynnhaven River.

Both eutrophication processes and bacterial transport will be simulated. The water quality model will be calibrated using 2009 and 2018 high-frequency observational data for DO and Chl-a at 5 stations. The DEQ monthly data at Station 7-THA000.76 will be used for model calibration of nutrients and bacteria. There are no good data sets available for either nutrients or bacteria along the Thalia Creek. We will use these data for model calibration when they become available.

Management Scenarios

There are some management and scientific questions that have been raised during the workshops. From a management perspective, any restorations that are beneficial to an IP and can reduce both nutrient and bacterial sources are preferred. However, current TMDLs developed for nutrients and bacteria are based on the watershed scale and do not have a sufficient spatial resolution to sub-watershed scales. It will be cost-effective if the IP project can target hot-spots to reach maximum efficiency. Some of the concerns need to be addressed by this project are:

1. Where are the hot-spots of pollutant sources in the watershed that contribute significantly to the water quality conditions in the TB-TC system?
2. What are the dominant pollutant sources associated with different land uses?
3. What is the human contribution to bacterial sources?
4. Which area will the reduction of nutrients and bacteria have the most benefit and cost-effective effects to the TB-TC system and downstream?
5. Which management options (e.g. enhancement of storm water management, increase BMP scale) are more efficient?
6. How does one evaluate the efficiency for selection of IP projects and compare the efficiency and accumulation effects for multiple IP projects?
7. What magnitude of nutrient and bacterial loading reduction are needed to improve water quality conditions in the TB-TC system?
8. What are the impacts of natural conditions (marshes, wetlands) on nutrients and DO?

The management scenarios are proposed to answer these questions. The approach is to use the watershed and water quality models to answer these what-if questions. Currently, there are no measurement data available in the watershed to be used to identify hot-spots in the watershed, especially human contributions to the bacterial loading. HRSD is planning to use a source tracking method to collect bacterial data for land use-based sampling. With the use of these new data, the source loading input to watershed can be better determined. Considering the large variations in the watershed, a longitudinal survey and data collection can be useful to identify hot-spots of high nutrient discharge in the watersheds adjacent to the shoreline. Figure 4 shows an example of the locations of grab samples of nutrients and bacteria concentration collected by VIMS during the 2009 survey. The distribution of nutrient concentrations provides good information to identify hot-spots. The longitudinal sampling of bacteria can be useful to estimate the bacterial die-off rate for this system. The accumulation and growth of bacteria in the sediment have been observed to be possible. Therefore, a sampling of bottom sediment can be useful for improving the model simulation of bacterial transport and fate processes. A detailed scenario proposed is described in the scope of work.

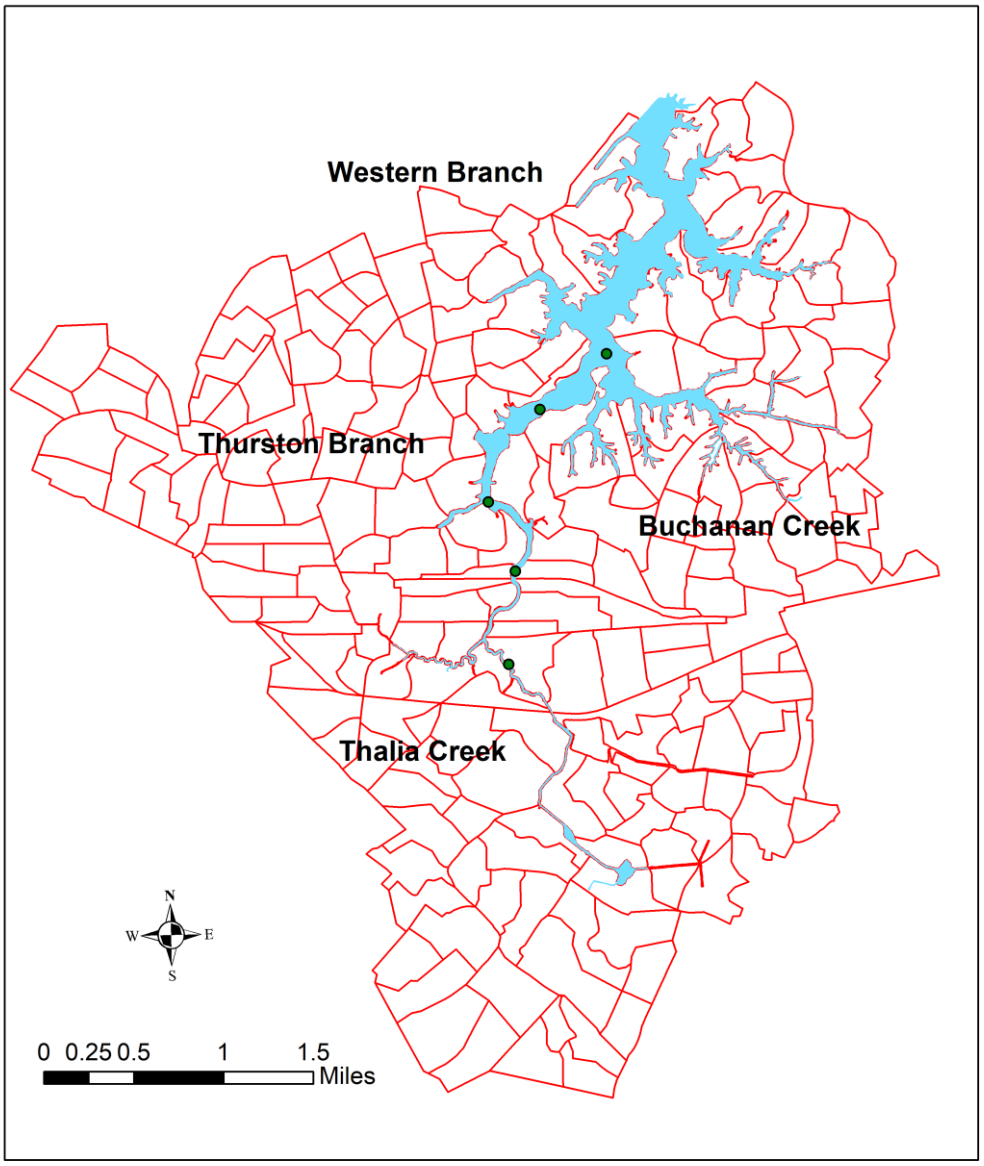

Figure 2. Watershed delineation (red lines delineate sub-watershed boundaries)

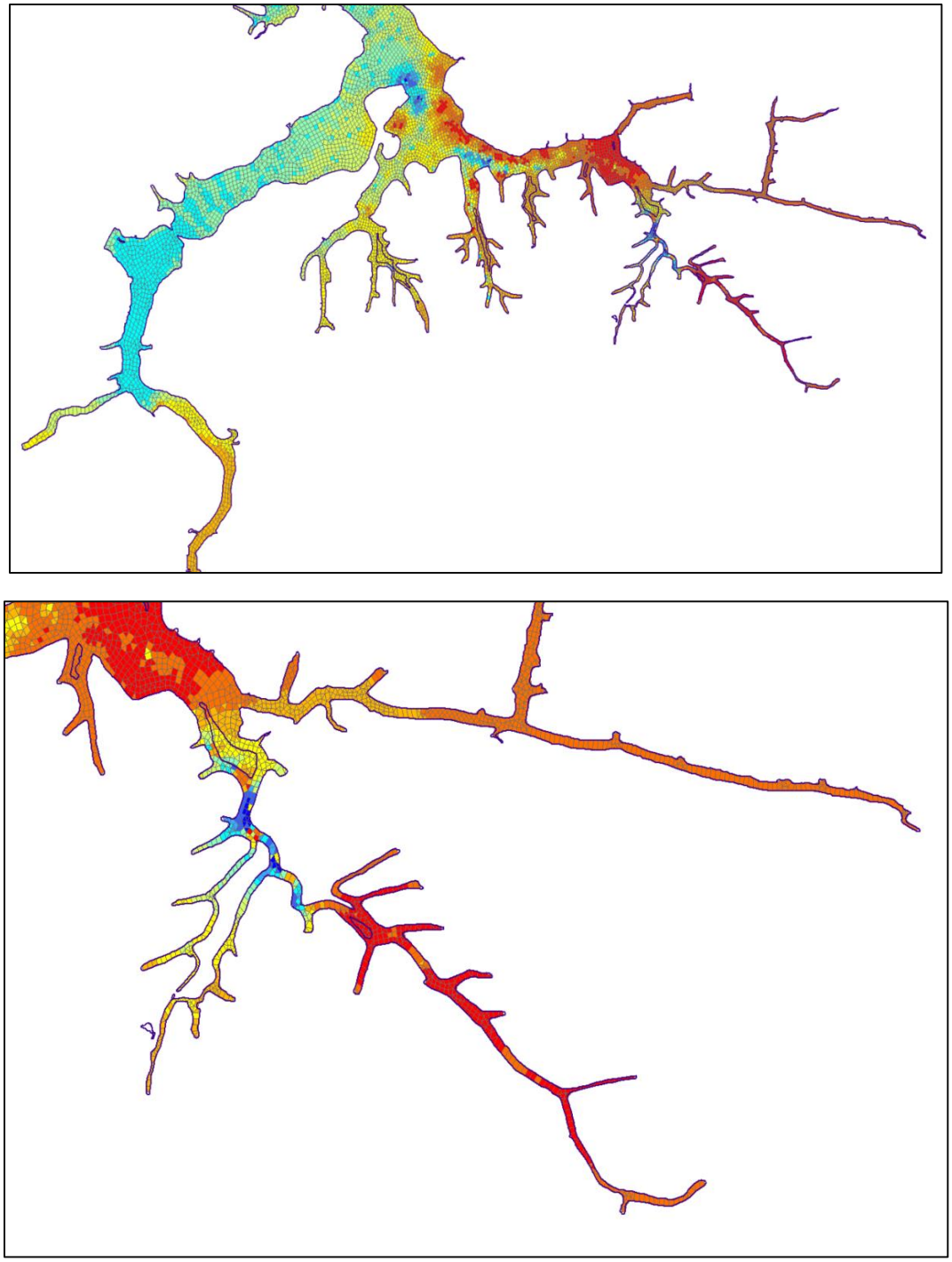

Figure 3. Unstructured model grid near the Buchanan Creek (color indicates water depth and red represents shallow regions. Legends will be updated when new data become available).

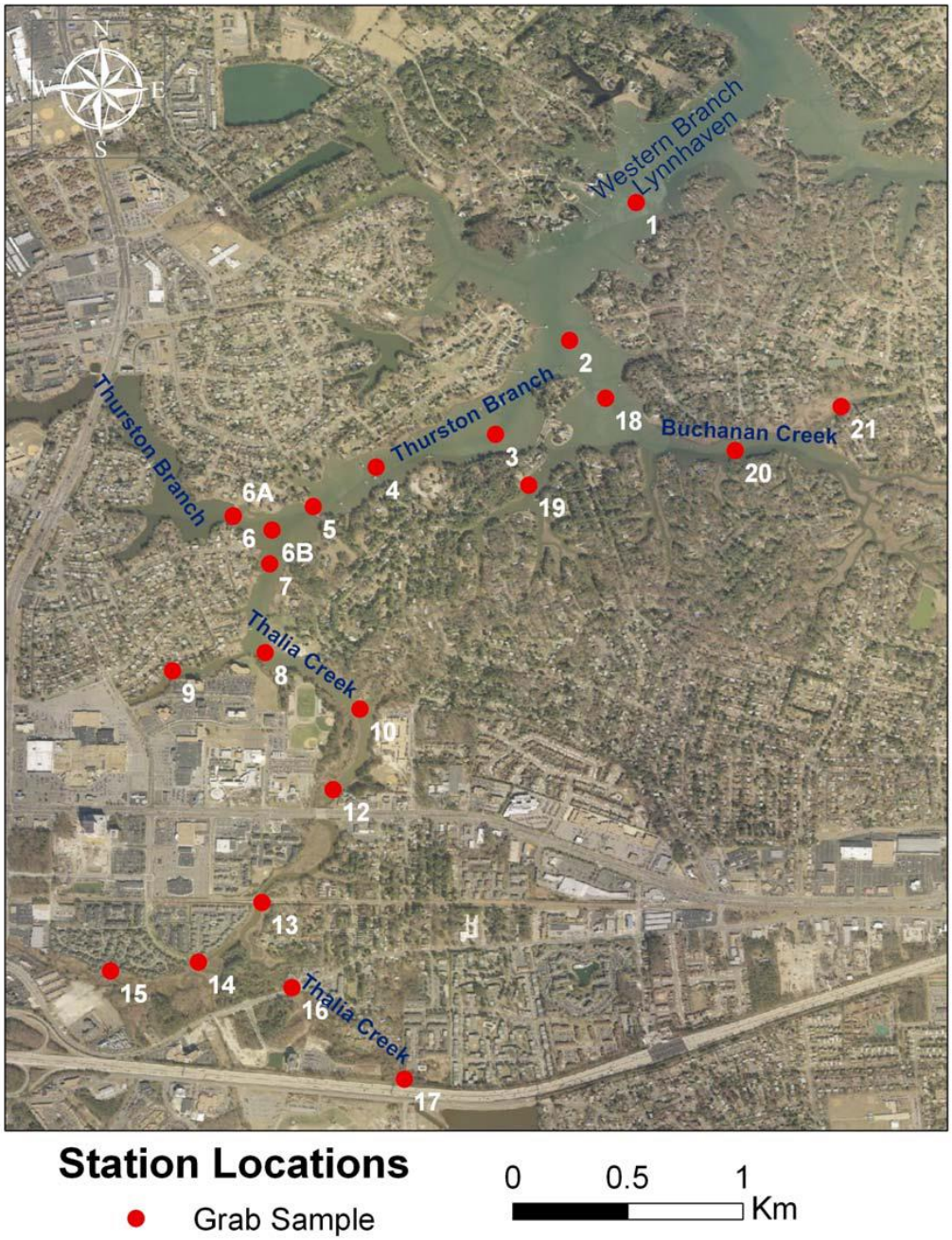

Figure 4. Locations of grab sample stations along the Thalia Creek

3. Scope of Work

VIMS will develop a watershed loading model for nutrients and bacteria to provide accurate daily loadings to both the 3D hydrodynamic and water quality models. VIMS will use hydrodynamic and water quality models to simulate eutrophication processes and transport and fate of bacteria. A series of numerical model simulations will be conducted to assist VB and HRSD in identifying the contribution of loading or pollutant sources from different sub-watersheds to overall water quality conditions in the Thalia Creek, and for evaluating the efficiency of pollutant source management and cost-effectiveness of implementation action in the watershed. We plan to complete the following tasks:

1. Analysis of pollutant sources in the watershed and water quality conditions in the TB-TC system:
   A data analysis using HRSD data collected in the watershed together with land use data, wildlife density data, population data, etc. will be conducted. The goal is to (1) determine both nutrient and bacteria sources to the land uses for the sub-watershed scale; (2) identify potential hot-spots and human-dominated sources; (3) determine loadings from stormwater runoff.

   Because water quality conditions are changing in the TB-TC system, we will analyze newly collected continuous DO and Chl-a data and compare these data to the data obtained from 2009, together with DEQ monthly data and other data collected during this project period. The goals are to (1) evaluate any changes of water quality conditions in the stream; (2) determine pelagic contribution (phytoplankton) and benthic contribution (benthic microalgae, macroalgae, seagrasses, marshes, and wetlands) to DO variations; (3) understand causes of eutrophication processes and transport of bacteria in the creek. (4) determine values of important rates for model (environmental metabolism, phytoplankton gross production and respiration, and die-off of bacteria).

2. Development of watershed model: Incorporate new loading rates for different land uses at the sub-watershed level to set up the watershed model. Process weather data for model simulation. The simulation period will be from 2006-present. The selection of the simulation period is for the purpose of using available data to calibrate hydrodynamics and water quality model. We will use both the VB SWMM model output and data corrected in the watershed to calibrate the model. The flow and loading will be adjusted with regard to the calibration of the hydrodynamic model (based on salinity) and the water quality model (nutrient and bacterial distribution) to reduce the uncertainty of loading estimation in the watershed.

3. Development of hydrodynamic model: the unstructured grid model (SCHISM) will be used for hydrodynamic and water quality simulations. High-resolution model grids will be used for this project to accurately represent complex shoreline and geometry of tributaries. All tributaries on the scale of Buchanan Creek will be simulated, which will

provide sufficient resolution to analyze local management scenarios. The model will be calibrated for surface elevation, salinity, and temperature.

4. Development of water quality model: the watershed loading will be discharged to the 3D model for simulation. The water quality model will simulate both eutrophication and transport of bacteria. The model will be calibrated using data collected in 2009 and 2018, DEQ monthly data, and other available data for DO, Chl-a, nutrients, and bacteria.

5. Conduct model simulation for management scenarios: VIMS will work with HRSD and VB to develop a series of management scenarios to address water quality and management issues. We propose to have a workshop to identify issues and needs. An initial consideration of the scenario runs is as follows. The final scenarios will be selected in consultation with VB and HRSD.

   (1) Conduct model simulation to determine overall reduction needs for reaching the goal for attaining water quality standards in the TB-TC system.
   (2) Conduct model simulations of loading from different regions (upstream, adjacent to the stream, downstream) of the watershed to determine changes of water quality conditions in the TB-TC system and their corresponding impacts to downstream.
   (3) Conduct simulations with respect to the loadings from hot-spots identified or individual stormwater to investigate the impacts of reductions of corresponding watershed loadings on water quality conditions.
   (4) Conduct simulations by revising land uses for implementation of improvement of stormwater discharge or IP to evaluate the impacts on local and the downstream streams.
   (5) Evaluate accumulative effects on changes of water quality conditions due to implementation of multiple IPs in the watershed.
   (6) Evaluate and compare different IP approaches for their impacts on water quality locally and downstream, and provide information for cost-effective benefits.

6. Prepare progress and final project reports

   Three reports will be completed and submitted to HRSD for each phase:

(1) Report 1: Data analysis and watershed model development
(2) Report 2: Development of hydrodynamic and water quality models
(3) Report 3: Management scenario runs and findings.

4. Phase Approach and Timeline

The entire project is divided into three phases:

Phase 1: Data collection, data analysis, and the development of a watershed model (March 2020-October 2020)

Phase 2: Development of hydrodynamic and water quality models (October 2020-May 2021)

Phase 3: Conduct of management scenarios (June 2021-October 2021)

5. Deliverables

The progress reports will be completed and submitted to HRSD for each phase:

(4) Report 1: data analysis and watershed model development report
(5) Report 2: development of hydrodynamic and water quality models
(6) Report 3: management scenario runs and findings.

6. Budget Justification

Two months are budgeted for a faculty member who will manage the project and conduct the watershed and water quality model study. Seven and one-half months are budgeted for a postdoctoral research associate for this project, who will work on the 3D numerical model and conduct model data analysis and model simulations. One month is budgeted for a faculty member to assist in obtaining observation data and historical data analysis (data collection cost will be provided by VIMS). All budgeted salaries include 5% annual increases as required by VIMS. Fringe benefits are charged at a rate of 40% for all full-time salaried personnel. We budgeted $500 for supplies for computer data storage. Travel totaling $400 is budgeted for trips to HRSD and Virginia Beach. The indirect cost rate of 25% is charged. The total budget is $126,371, which is listed below.

Personnel total cost	$100,197
Travel	$400
Supplies	$500
Indirect cost	$25,274
Total	$126,371

Appendix A. Available data

A summary of available data for the model development is listed in this Appendix.

DEQ has conducted routine water quality monitoring in the TB-TC system including nutrients, Chl-a, DO, and bacteria. The locations of these stations are shown in Figure A1. Data are collected monthly or bimonthly. There are 2 DEQ long-term monitoring stations (7-THA000.76 and 7-WES000.95). These two stations can be used for open boundary condition (7-WES000.95) and model calibration (7-THA000.76).

VIMS has conducted observation surveys in 2009 and 2018 for 2-month periods. One was during the summer of 2009, and the other one was during fall 2018. There, observations (three observations, each about 2 weeks) were conducted in 2009 and during a 3-week monitoring period in 2018. The locations of VIMS continuous monitoring stations are shown in Figure A2. Recently, VIMS has planned to take some nutrient samples in nearby Buchanan Creek. However, no time series data will be collected. The locations of stations are shown in Figure A2. Data include water depth, salinity, temperature, DO, Chl-a, and turbidity. These data will provide good information of DO and Chl-a variation and support model development.

Recently the USGS and VB have made operations on a continuous station in the Thalia Creek to measure surface elevation, precipitation, wind (from 2016-current) near Station 7-THA000.76). The precipitation data will be used for watershed model simulation.

For watershed model calibration, observation data collected in the watershed are needed. There are not many available time series data of nutrient observations in the watershed. During the first term of the VPDES permit, the City of Virginia Beach established five stations to measure stormwater. The locations were targeted to typically dominated land uses in the watershed including residential, commercial, and ‘clean’ industrial area. Two sites have BMPs and the results are not directly applicable as the nutrient removal due to BMPs is unknown. The sub-watersheds where three stations located are shown in Figures A1, V3, V4, reactively. The data collected are listed in Tables A1-A3, respectively. Stations V-1 and V-3 have a similar magnitude of nutrient concentrations. Station V-4 has relatively low nutrient concentrations. These measures occurred during the 1996-2001 period. These data can still be useful for current watershed model calibration. As watershed conditions have changed, collecting new water samples can provide better information for current conditions in the watershed.

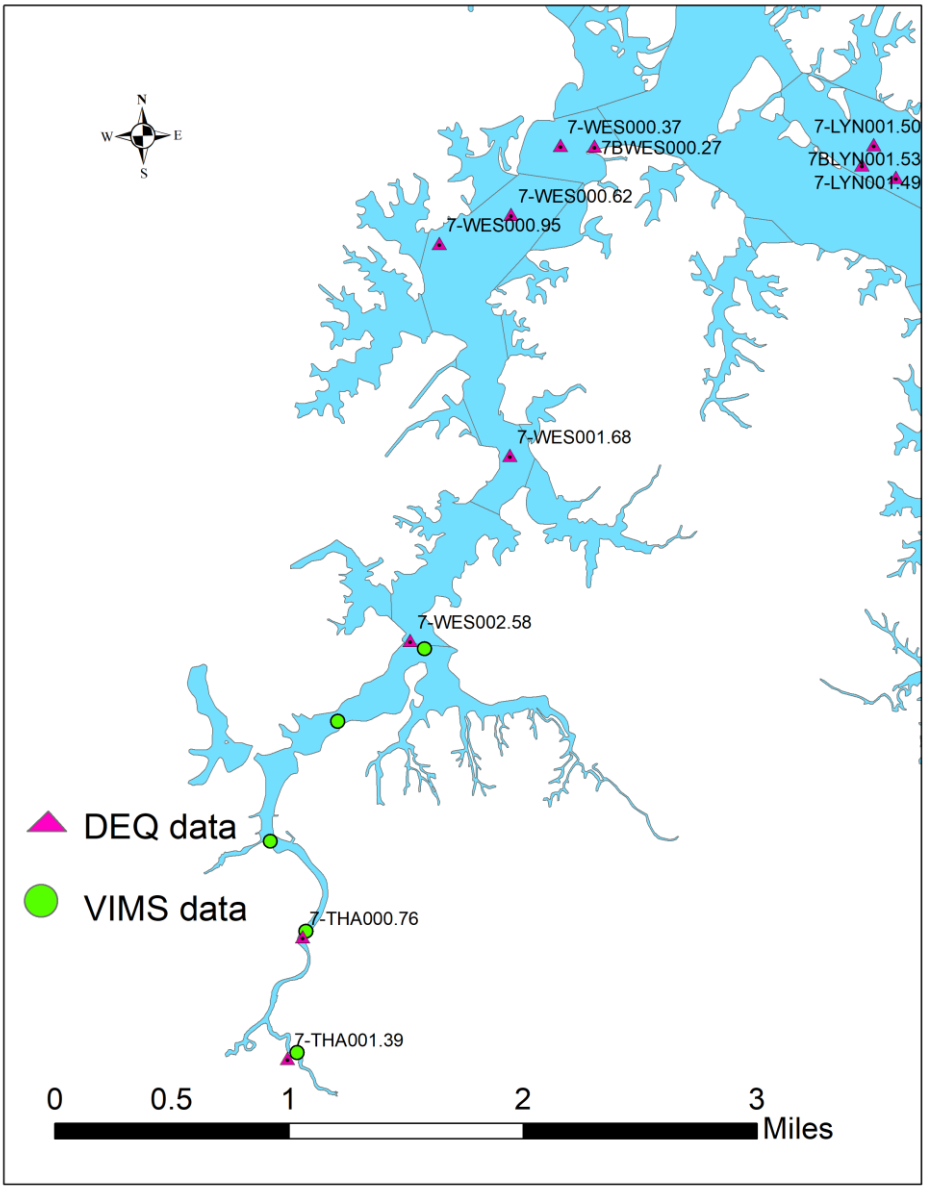

Figure A1. Locations of DEQ monthly stations.

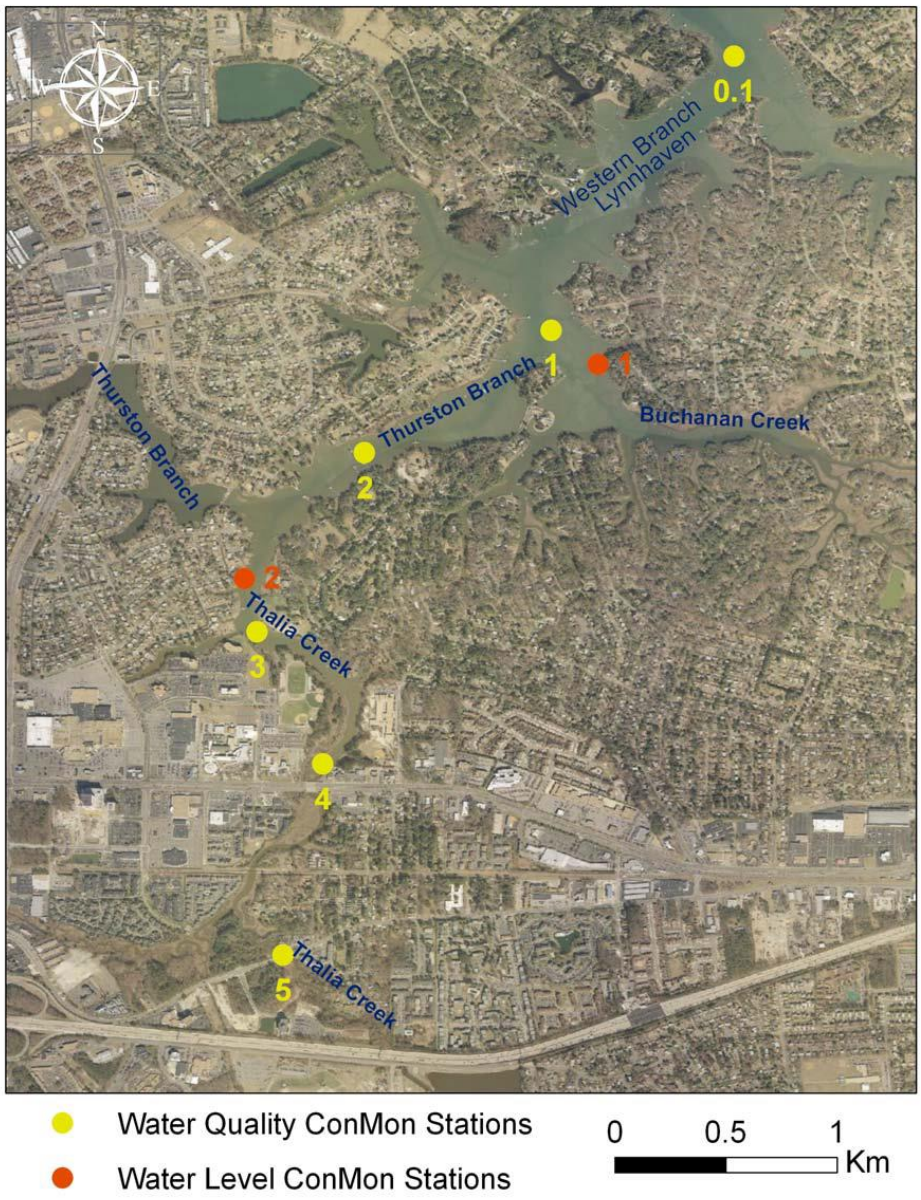

Figure A2. Sampling station of high-frequency, ConMon water level and water quality measurements conducted in 2009. Note: ConMON water quality Stations 4 and 5 correspond to VA-DEQ water quality Stations 7-THA000.76 and THA001.39, respectively.

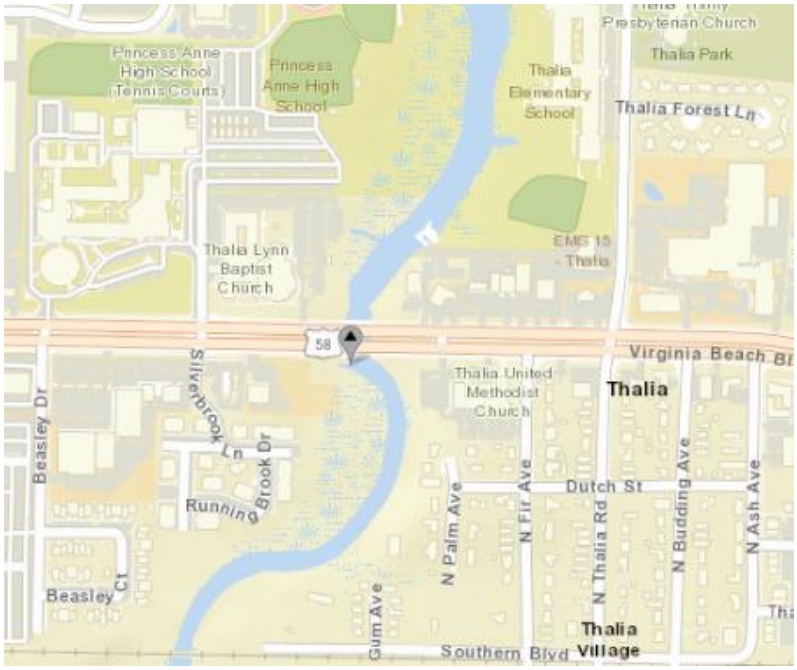

Figure A3. Location of a USGS Station

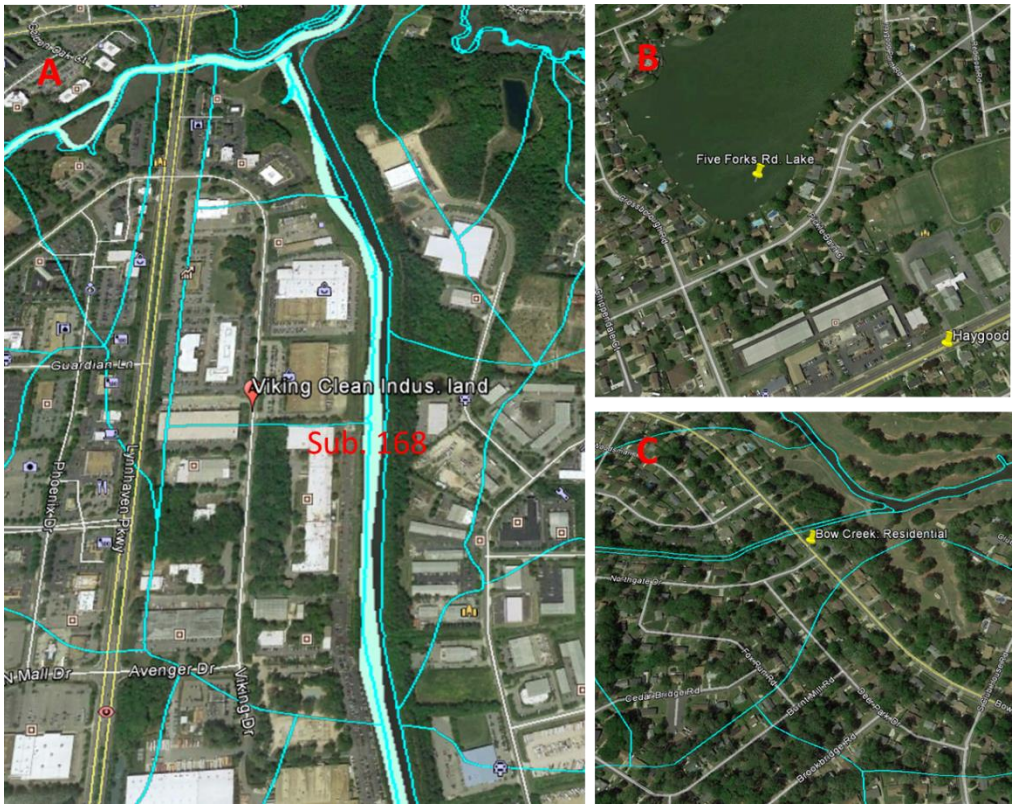

Figure A4. Locations of sub-watersheds for the measures (Stations: V-1 (A), V-3 (B), and V-4 (C))

Table A1. Site V-1 Sampling Dates and Pollutant Concentrations (mg/L) (Residential)

Date	BOD	TSS	TDS	COD	NOX	TKN	HN3	TP	DP	TN	NH3/TN	NO3/TN	DP/TP
2/14/1997	5	191	59	93	0.38	2.38		0.56	0.16	2.76	0.00	0.14	0.29
3/14/1997	7	183	73	114	0.41	1.9	0.71	0.51	0.18	2.31	0.37	0.18	0.35
4/28/1997	17	62	132	65	0.82	2.07	0.19	0.36	0.15	2.89	0.09	0.28	0.42
6/14/1997	14	191	108	116	0.93	1.81	0.78	0.53	0.17	2.74	0.43	0.34	0.32
7/16/1997	21	337	91	348	0.98	2.78	1.35	0.99	0.37	3.76	0.49	0.26	0.37
8/14/1997	17	52	62	83	1.08	2.99	0.81	0.83	0.65	4.07	0.27	0.27	0.78
9/11/1997	8	7	126	61	0.42	1.2	0.16	0.2	0.12	1.62	0.13	0.26	0.60
11/1/1997	5	36	53	40	0.41	0.98	0.13	0.34	0.22	1.39	0.13	0.29	0.65
12/1/1997	15	86	50	93	0.24	1.2	0.25	0.5	0.3	1.5	0.19	0.16	0.59

						9		1		3			
1/28/1998	4	50	61	34	0.41	1.03	0.31	0.27	0.18	1.44	0.30	0.28	0.67
2/12/1998	9	65	180	54	0.32	1.29	0.34	0.24	0.06	1.61	0.26	0.20	0.25
7/5/1998	11	51	62	77	0.72	1.99	0.62	0.42	0.21	2.71	0.31	0.27	0.50
7/5/1998	10	68	54	81	0.75	1.57	0.62	0.39	0.22	2.32	0.39	0.32	0.56
7/23/1998	22	118	70	91	0.93	2.07	0.57	0.5	0.3	3	0.28	0.31	0.60
8/11/1998	26	46	154	166	0.83	3.1	0.8	0.7	0.52	3.93	0.26	0.21	0.74
2/12/1999	11	85	88	80	0.87	1.77	0.64	0.46	0.08	2.64	0.36	0.33	0.17
2/28/1999	8	49	69	57	0.65	1.88	0.52	0.34	0.18	2.53	0.28	0.26	0.53
7/24/1999	7	32	153	69	0.72	1.25	0.59	0.35	0.24	1.97	0.47	0.37	0.69
8/25/1999	6	12	65	37	0.57	1	0.22	0.32	0.22	1.57	0.22	0.36	0.69
2/12/2000	9	26	109	51	1.12	1.39	0.53	0.21	0.06	2.51	0.38	0.45	0.29
2/12/2000	8	23	108	47	1.1	1.38	0.52	0.21	0.07	2.48	0.38	0.44	0.33
3/21/2000	6	12	114	50	0.4	1.31	0.33	0.19	0.07	1.71	0.25	0.23	0.37
7/15/2000	19	22	92	66	1.1	3.16	0.89	0.9	0.74	4.26	0.28	0.26	0.82
Avg	11.52	78.43	92.74	85.78	0.70	1.81	0.54	0.45	0.24	2.51	0.30	0.29	0.51
Std	6.18	78.75	36.95	64.63	0.28	0.68	0.29	0.23	0.18	0.87	0.12	0.08	0.19

Table A2. Site V-3 Sampling Dates and Pollutant Concentrations (mg/L) (Commercial)

Date	BOD	TSS	TDS	COD	NOX	TKN	HN3	TP	DP	TN	NH3/TN	NO3/TN	DP/TP
1/18/1996	8	72	28	60	0.47	1.15	0.57	0.27	0.13	1.62	0.50	0.29	0.48
1/19/1996	25	43	79	180	2.48	13.01	4.09	0.58	0.39	15.49	0.31	0.16	0.67
6/18/1996	8	72	82	60	0.47	1.15	0.57	0.27	0.13	1.62	0.50	0.29	0.48
8/13/1996	8	12	30	60	0.43	0.38	0.2	0.21	0.15	0.81	0.53	0.53	0.71
9/6/1996	6	19	58	49	0.3	0.91	0.37	0.22	0.16	1.21	0.41	0.25	0.73
12/6/1996	7	42	36	45	0.61	1.53	0.24	0.37	0.15	2.14	0.16	0.29	0.41
1/9/1997	7	13	26	38	0.4	0.71	0.2	0.15	0.13	1.11	0.28	0.36	0.87
1/9/1997	6	15	24	43	0.37	0.88	0.2	0.14	0.11	1.25	0.23	0.30	0.79
7/10/1997	17	40	77	82	1.28	3.06	1.2	0.51	0.36	4.34	0.39	0.29	0.71
7/30/1997	16	27	56	85	2.47	2	0.79	0.21	0.1	4.47	0.40	0.55	0.48
12/10/1997	19	18	20	62	0.38	0.98	0.57	0.15	0.31	1.36	0.58	0.28	2.07
1/13/1998	18	41	62	69	1.14	1.9	0.97	0.36	0.27	3.04	0.51	0.38	0.75
7/16/1998	15	33	36	77	0.72	1.84	0.83	0.33	0.2	2.56	0.45	0.28	0.61
8/16/1998	8	8	36	57	0.77	1.04	0.29	0.23	0.39	1.81	0.28	0.43	1.70
2/12/1999	24	34	86	100	1.48	2.59	1.41	0.51	0.36	4.07	0.54	0.36	0.71
2/13/1999	8	8	24	43	0.55	1.06	0.61	0.22	0.16	1.61	0.58	0.34	0.73
2/28/1999	7	12	16	38	0.44	1.11	0.61	0.22	0.16	1.55	0.55	0.28	0.73
8/20/1999	25	12	114	117	2.58	2.44	1.69	0.71	0.01	5.02	0.69	0.51	0.01
9/15/1999	31	10	84	88	1.31	2.44	0.95	0.64	0.55	3.75	0.39	0.35	0.86
12/6/1999	27	17	25	72	0.35	1.27	0.48	0.33	0.26	1.62	0.38	0.22	0.79
2/12/2000	24	34	86	108	1.4	2.59	1.41	0.51	0.39	3.99	0.54	0.35	0.76
7/15/2000	13	11	40	65	0.77	1.54	0.59	0.34	0.29	2.31	0.38	0.33	0.85
6/30/2001	18	90	68	89	1.08	2.38	1	0.44	0.23	3.46	0.42	0.31	0.52
Avg	15.00	29.70	51.87	73.35	0.97	2.09	0.86	0.34	0.23	3.05	0.43	0.34	0.76
Std	7.99	22.7	27.8	32.0	0.71	2.49	0.82	0.1	0.1	2.99	0.13	0.10	0.41

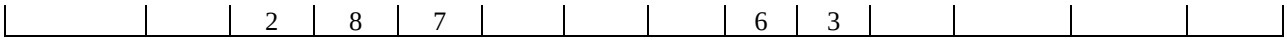
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Table A3. Site V-4 Sampling Dates and Pollutant Concentrations (mg/L) ('Clean' Industrial)

Date	BOD	TSS	TDS	COD	NOX	TKN	HN3	TP	DP	TN	NH3/TN	NO3/TN	DP/TP
8/13/1996	8.00	17.00	53.00	70.00	0.73	0.71	0.34	0.14	0.10	1.44	0.48	0.51	0.71
9/6/1996	5.00	29.00	59.00	53.00	0.30	0.75	0.28	0.07		1.05	0.37	0.29	
12/6/1996	7.00	28.00	22.00	54.00	0.70	0.84	0.08			1.54	0.10	0.45	
1/16/1997	5.00	69.00	30.00	67.00	0.26	1.05	0.11	0.12		1.31	0.10	0.20	
1/16/1997	11.00	40.00	44.00	66.00	0.69	1.31	1.10	0.23	0.13	2.00	0.84	0.35	0.57
8/14/1997	10.00	36.00	36.00	68.00	0.80	1.16	0.56	0.23	0.19	1.96	0.48	0.41	0.83
12/10/1997	7.00	26.00	20.00	53.00	0.29	0.49	0.17	0.10	0.05	0.78	0.35	0.37	0.50
1/13/1998	5.00	29.00	27.00	24.00	0.55	0.60	0.24	0.06		1.15	0.40	0.48	
1/13/1998	5.00	27.00	23.00	34.00	0.59	0.84	0.27	0.09	0.07	1.43	0.32	0.41	0.78
7/23/1998	11.00	25.00	41.00	53.00	0.82	1.19	0.42	0.15	0.11	2.01	0.35	0.41	0.73
8/16/1998	12.00	12.00	68.00	59.00	0.84	1.30	0.49	0.23	0.17	2.14	0.38	0.39	0.74
2/26/1999	8.00	7.00	82.00	30.00	2.36	1.50	0.79	0.12	0.06	3.86	0.53	0.61	0.50
3/10/1999	7.00	3.00	48.00	28.00	0.73	0.56	0.30	0.12	0.08	1.29	0.54	0.57	0.67
4/14/1999	5.00	15.00	37.00	40.00	0.89	0.66	0.40	0.07		1.55	0.61	0.57	
8/25/1999	8.00	55.00	7.00	44.00	0.92	0.93	0.27	0.13	0.09	1.85	0.29	0.50	0.69
9/15/1999	5.00	17.00	28.00	12.00	0.38	0.58	0.20	0.08	0.05	0.96	0.34	0.40	0.63
12/6/1999	19.00	13.00	115.00	71.00	1.46	1.66	0.73	0.19	0.12	3.12	0.44	0.47	0.63
2/18/2000	5.00	5.00	54.00	22.00	0.88	0.62	0.47	0.08	0.05	1.50	0.76	0.59	0.63
7/19/2000	13.00	9.00	84.00	61.00	1.35	1.99	0.73	0.15	0.01	3.34	0.37	0.40	0.07
1/30/2001	6.00	9.00	33.00	31.00	0.96	0.79	0.46	0.07	0.50	1.75	0.58	0.55	7.14
Avg	8.10	23.55	45.55	47.00	0.83	0.98	0.42	0.13	0.12	1.80	0.43	0.45	1.05
Std	3.65	16.93	26.05	18.23	0.48	0.41	0.26	0.06	0.12	0.80	0.18	0.11	1.69

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CONSENT AGENDA ITEM 1.c.1. – April 28, 2020

Subject: Atlantic Treatment Plant Influent Screens (1-3) Replacement Task Order (>$200,000)

Recommended Action: Approve a task order with HDR Engineering, Inc. in the amount of $335,439.

CIP Project: AT014500

Budget	$3,910,000
Previous Expenditures and Encumbrances	($0)
Available Balance	$3,910,000

Contract Status:	**Amount**
Original Contract with HDR	$0
Total Value of Previous Task Orders	$0
Requested Task Order	$335,439
Revised Contract Value	$335,439
Engineering Services as % of Construction	10%

Project Description: This project will install three new influent screens at the Atlantic Treatment Plant. Each new screen will include a new washer and compactor and a new platform to access the equipment. The new screens are needed to ensure the Atlantic Treatment Plant can properly handle the new flows coming from the Chesapeake-Elizabeth Treatment Plant. Also, the new screens will ensure the proper operation of the new Thermal Hydrolysis Process (CAMBI).

Task Order Description: This task order will provide design services for the removal of the existing screens and installation of the new influent screens, washers and compactors.

Analysis of Cost: The cost for this task order is based on the hourly rates included in the annual services contract with HDR Engineering. A fee was negotiated based upon the anticipated hours required to perform the design services. This cost is in agreement with similar efforts from other firms.

Schedule:

Design	May 2020
Construction	January 2021
Project Completion	December 2021

Resource: Bruce Husselbee

CONSENT AGENDA ITEM 1.c.2. – April 28, 2020

Subject: York River Isolation Valve Installation and Replacement Task Order (>$200,000)

Recommended Action: Approve a task order with Kimley-Horn in the amount of $348,800.

CIP Project: YR013900

Budget	$2,242,000
Previous Expenditures and Encumbrances	($70,400)
Available Balance	$2,171,600

Contract Status:	**Amount**
Original Contract with Kimley-Horn	$70,400
Total Value of Previous Task Orders	$0
Requested Task Order	$348,800
Total Value of All Task Orders	$348,800
Revised Contract Value	$419,200
Engineering Services as % of Construction	12.4%

Project Description: This project will install nine new valves and replace three existing valves. These valves are main line and branch isolation valves within the force main system from Coliseum Pressure Reducing Station to the proposed Tabb Pressure Reducing Station and will provide operational flexibility for isolation and flow diversion.

Task Order Description: This task order will provide for the design related services for the replacement of eight isolation valves and the construction related services for one isolation valve in accordance with the approved Preliminary Engineering Report.

Analysis of Cost: The design and construction fee are 10.2 percent of the construction estimate. This cost is in agreement with similar efforts from other firms.

Schedule:

Design	April 2020
Bid	September 2020
Construction	December 2020
Project Completion	December 2021

CONSENT AGENDA ITEM 1.d.1. – April 28, 2020

Subject: Secondary Clarifier Drive
Contract Change Order (>25% or $50,000)

Recommended Action: Approve a change order with EWT Holdings III DBA Evoqua Water Technologies LLC in the amount of $57,000.

Contract Status:	Amount	Cumulative % of Contract
Original Contract with EWT Holdings III DBA Evoqua Water Technologies LLC	$80,650	
Total Value of Previous Change Orders	$0	%
Requested Change Order No. 1	$57,000	
Total Value of All Change Orders	$57,000	71%
Revised Contract Value	$137,650	

Time (Additional Calendar Days)		0

Project Description: This contract is an agreement for the provision of Evoqua Envirex Drive and assembly parts for secondary clarifier #5 rake arm at the Virginia Initiative Plant (VIP).

Change Order Description: This change order includes modification to the original purchase order to include the purchase of an additional Evoqua Envirex secondary clarifier drive for VIP. The additional unit is required for secondary clarifier #4 after inspection revealed uneven drive wear.

Analysis of Cost: The cost of this change order is based on the original bid pricing.

Resource: Jim Pletl

CONSENT AGENDA ITEM 1.e.1. – April 28, 2020

Subject: Agilent UV-VIS Cary 60 Spectrometer Service Contract
Sole Source (>$10,000)

Recommended Action: Approve the use of Agilent Technologies, Inc. UV-VIS Cary 60 Spectrometer Annual Preventive Maintenance Services for the Central Environmental Laboratory.

Sole Source Justification:

- ☐ Compatibility with existing equipment or systems is required
- ☐ Support of a special program in which the product or service has unique characteristics essential to the needs of the program
- ☐ Product or service is covered by a patent or copyright
- ☒ Product or service is part of standardization program to minimize training for maintenance and operation, and parts inventory

Details: Services include annual preventive maintenance for the Agilent UV-VIS Cary 60 Spectrometer. The UV-VIS instrument is used for anionic surfactants (methylene blue active substances or MBAS) and absorbance/transmittance tests. The MBAS method is useful for estimating the anionic surfactants in water and wastewater. The absorbance/transmittance is a useful surrogate measure of organic constituents in water and wastewater.

The instrument was originally purchased from Agilent Technologies, Inc. via ProCard in 2019. The first year preventive maintenance was no charge.

Resource: Steve de Mik

CONSENT AGENDA ITEM 2.e.2. – April 28, 2020

Subject: Amwell Rotary Distributor Mechanism
Sole Source (>$10,000)

Recommended Actions: Approve the use of Amwell parts by Amwell a Division of McNish Corporation at the Small Communities Division.

Sole Source Justification:

- ☒ Compatibility with existing equipment or systems is required
- ☐ Support of a special program in which the product or service has unique characteristics essential to the needs of the program
- ☐ Product or service is covered by a patent or copyright
- ☐ Product or service is part of standardization program to minimize training for maintenance and operation, and parts inventory

Details:
Product includes the purchase of a rotary distribution mechanism for trickling filter #1 at the West Point Treatment Plant. The rotary distribution mechanism parts are molded and casted as ordered from Amwell. The original mechanism was purchased by the Town of West Point in 1991 prior to HRSD's acquisition of the treatment facility in 1999.

Resource: Steve de Mik

CONSENT AGENDA ITEM 1.e.3. – April 28, 2020

Subject: Dewatering Screw Conveyor Parts
Sole Source (>$10,000)

Recommended Action: Approve the use of Dewatering Screw Conveyor Parts by Custom Conveyor Corporation / Schwing Bioset Inc. at the Atlantic Treatment Plant.

Sole Source Justification:

- ☒ Compatibility with existing equipment or systems is required
- ☐ Support of a special program in which the product or service has unique characteristics essential to the needs of the program
- ☐ Product or service is covered by a patent or copyright
- ☐ Product or service is part of standardization program to minimize training for maintenance and operation, and parts inventory

Details: Product includes the purchase of screw conveyor parts. This is for a replacement shaftless flight weldment with torque tube as part of the screw conveyor. The entire conveyor and associated components like the shaftless flight were custom fabricated by Custom Conveyor Corp. as part of the Atlantic Treatment Plant Capital Improvement Project in September 2009.

The Atlantic Treatment Plant purchased original replacements parts via ProCard and the drawings are proprietary to Custom Conveyor Corp. Schwing Bioset Inc. is currently in the process of acquiring Custom Conveyor Corp.

CONSENT AGENDA ITEM 1.e.4. – April 28, 2020

Subject: Elucidating Nitrification Kinetics of Comammox Bacteria in Complex Nitrifying Systems Study
Sole Source (>$10,000)

Recommended Action: Approve Northeastern University in collaboration with HRSD for the elucidating nitrification kinetics of comammox bacteria in complex nitrifying systems. The study estimate is in the amount of $28,022.

Sole Source Justification:

- ☐ Compatibility with existing equipment or systems is required
- ☒ Support of a special program in which the product or service has unique characteristics essential to the needs of the program
- ☐ Product or service is covered by a patent or copyright
- ☐ Product or service is part of standardization program to minimize training for maintenance and operation, and parts inventory
- ☐ Only known source

Project Description: HRSD routinely develops and updates predictive models of its treatment plants in order to improve our understanding of process performance, to enhance process optimization efforts by Operations staff, and inform design efforts when upgrades are required. To develop a model that is suitably predictive of actual plant operations, we must have a good understanding of the microorganisms that are active within our treatment systems as well as how those microorganisms respond metabolically to varied environmental conditions that are inherent to our climate and influent stream or are imposed by operational and design decisions. Recent sample analysis performed under a Water Research Foundation (WRF) project (UR416), of which Dr. Ameet Pinto (Northeastern University) is lead Principal Investigator (PI) and Dr. Chris Wilson (HRSD) is co-PI, has suggested that nitrifying biomass from HRSD's King William Treatment Plant and James River Treatment Plant may be mainly comprised of a recently identified and little understood subset of nitrite-oxidizing bacteria (NOB) capable of complete ammonia oxidation (comammox) to nitrate. These results, including analysis from additional HRSD treatment plants and other biological nutrient removal (BNR) treatment facilities in the Eastern United States, have been summarized and accepted for publication (Cotto et al. 2020).

The proposed project continues this work by applying molecular biology and chemical analyses to better characterize biological nitrogen removal processes in the JRTP. This work will be performed under the co-mentorship of Dr. Ameet Pinto and Dr. Chris

Wilson. The overarching goal of the proposed project is to measure the in-situ activity of comammox bacteria and compare it to that of typically present nitrifiers under varying environmental conditions. Although we have measured the abundance of comammox and ammonia oxidizing bacteria (AOB) at JRTP, the correlations between their abundances and their potential nitrification activity are unclear. This research will combine newly developed DNA-based probing of various organisms responsible for nitrogen metabolism coupled with kinetic assays to provide an overview of nitrifying populations and activities under different environmental (e.g., temperature) and process conditions (e.g. loading rate, dissolved oxygen concentration, solids retention time). Finally, the existing nitrification model for JRTP will be updated by incorporating kinetics of comammox bacteria and validating the model by comparing with full-scale performance.

Elucidating nitrification kinetics of comammox bacteria in complex nitrifying systems.

Prof. Ameet J. Pinto (PI) & Ms. Irmarie Cotto (Graduate Student)
Department of Civil and Environmental Engineering, Northeastern University.

1. Summary.

The proposed supplement will enable Ms. Irmarie Cotto to conduct research at the James River Treatment Plant (JRTP) operated by the Hampton Roads Sanitation District (HRSD) to identify process parameters that induce proliferation of comammox bacteria and its resultant impact on nitrification performance. Ms. Cotto will be collaborating with operations and research personnel from HRSD to monitor full-scale integrated fixed film activated sludge (IFAS) system; one of the largest of its kind in the United States. Comammox bacteria were discovered three years ago [1-3] and little is known about their nitrification kinetics in complex microbial communities. This knowledge is critical for improving nitrification models that form the basis of nearly all nitrogen removal process design and operations. Ms. Cotto's research has demonstrated that comammox bacteria exist at high concentrations at JRTP and show temporally competitive dynamics with canonical nitrifiers. The key objectives of this internship are to (1) determine kinetic parameters associated with nitrification capacity of comammox bacteria and (2) model the competitive dynamics of comammox bacteria with canonical nitrifiers based using high-resolution full-scale observations. This research will be completed through full-scale experimentation and process level kinetic modeling at JRTP.

2. Motivation.

Nitrification is the first step in removal of reduced nitrogen during wastewater treatment. Aerobic nitrification has been considered a two-step process [4] involving ammonia oxidation by ammonia oxidizing bacteria (AOB) or archaea (AOA) followed by nitrite oxidation by nitrite oxidizing bacteria (NOB) [5]. This premise has been the foundation of nitrogen removal process design during wastewater treatment. However, the discovery of complete ammonia oxidizing (comammox) bacteria, microorganisms capable of perform complete nitrification [1-3], has completely changed our understanding of nitrification and more importantly of process design and control of nitrification reactors. Understanding comammox bacteria activity and incorporating their kinetics into design, control, and operation of nitrogen removal systems is of utmost importance to ensure the sustainability and effectiveness of nitrogen removal. To this end, we have developed novel qPCR assay for quantification of comammox bacteria and monitored multiple full-scale nitrogen removal systems for 12 months to identify process configurations and conditions where comammox bacteria contribute significantly to overall ammonia oxidation. Findings of this study demonstrated the presence and high abundance of comammox bacteria in systems with high solids retention times (SRT) and systems utilizing IFAS configuration (Figure 1). While comammox bacteria are present at equal or slightly lower abundances compared to canonical AOB in high SRT systems, they are present at much higher abundances in JRTP's IFAS systems. This represents the first reported case of comammox bacteria driving majority of the nitrification process in a full-scale municipal WWTP. The high levels of enrichment of comammox

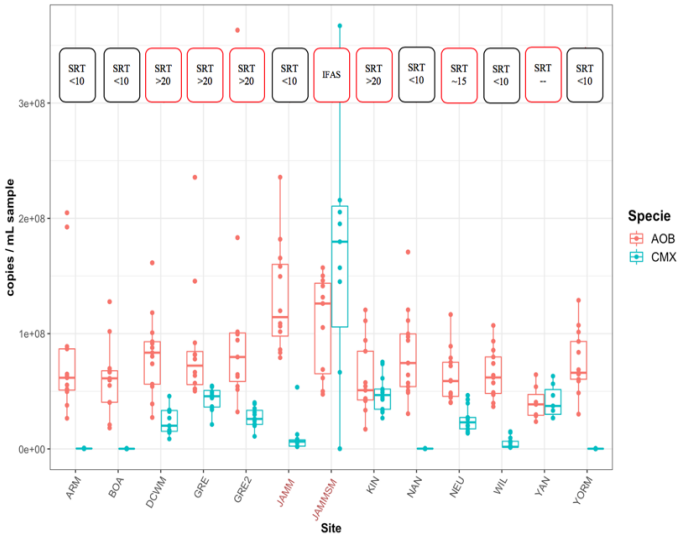


Figure 1: qPCR analysis for the estimation of the abundance of ammonia oxidizing organism, i.e. ammonia oxidizing bacteria (AOB) and comammox (CMX) in several nitrogen removal systems. Red squares represent systems with SRTs higher than 20 days or systems with IFAS while black squares represent systems with SRTs lower than 10 days. JAMM and JAMMSM are samples from the suspended growth and the attached growth of the nitrogen removal system of JRTP, respectively.

bacteria in the attached growth phase (JAMMSM) relative to the suspended phase (JAMM) also provides a unique opportunity to characterize the kinetics of comammox bacteria.

3. Approach.

The proposed plan is to use cutting-edge molecular biology and chemical analyses methods to better characterize biological nitrogen removal processes in the JRTP. This work will be performed under the co-mentorship of Dr. Ameet Pinto and Dr. Christopher A. Wilson (Chief of Process Engineering and Research at HRSD). The overarching goal of the proposed internship is to measure the in-situ activity of comammox bacteria and compare it to that of canonical nitrifiers under varying environmental conditions. Although we have measured the abundance of comammox and AOB at JRTP, the correlations between their abundances and their potential nitrification activity are unclear. To resolve this, we will couple full-scale observations with microcosm experiments involving DNA and RNA-based stable isotope probing (DNA/RNA-SIP) [6] to estimate kinetic parameters of comammox and AOB by tracking the incorporation of inorganic ^{13}C labelled substrate. We will combine DNA/RNA-SIP with newly developed qPCR assay for comammox bacteria to provide an overview of nitrifying populations and activities under different environmental (e.g., temperature) and process conditions (e.g. loading rate, DO concentration, SRT). Finally, the existing nitrification model for JRTP will be updated by incorporating kinetics of comammox bacteria and its performance validated by comparing with full-scale performance.

4. References.

(1) Daims, H., et al. (2015) Nature 528, 504–509. **(2)** van Kessel, M.A.H.J., et al. (2015) Nature 528, 555–559. **(3)** Pinto, A.J., et al. (2016) mSphere 1, e00054-15. **(4)** Santoro, A. E. (2016) Science 351, 342-343. **(5)** Jenkins, D. and Wanner, J. (2014) IWA Publishing. **(6)** Kai-Ling, P., et al. (2018) Water Research 145, 552 – 561.

HRSD COMMISSION MEETING MINUTES
April 28, 2020

ATTACHMENT #2

AGENDA ITEM 3. FINANCIAL POLICY REVISIONS

1.0 PURPOSE AND NEED

Hampton Roads Sanitation District (HRSD) was created in 1940 by the Virginia General Assembly as a political subdivision of the Commonwealth of Virginia and was established as a governmental instrumentality to provide for the public health and welfare. HRSD was created for the specific purpose of abating pollution in the Hampton Roads area of Virginia through the interception of existing wastewater outfalls, the construction of wastewater treatment facilities and the installation of interceptors throughout the service area.

HRSD operates under the direction of the Hampton Roads Sanitation District Commission (the Commission) comprised of eight members appointed by the Governor for staggered terms of four years.

Regulatory requirements to reduce nutrients, hydraulic expansion, aging infrastructure renewals and replacements, and increased treatment capacity are addressed through HRSD's Capital Improvement Program (CIP).

HRSD recognizes that ~~one of the keys~~*adherence to formal financial policies is critical* to sound financial management ~~is the development of formal financial policy~~. This sentiment is echoed by bond rating agencies, investors and the Government Finance Officers Association.

This Financial Policy (Policy) is designed to help protect HRSD's financial resources by:

a. Promoting sound financial management;

b. Ensuring the legal and prudent use of HRSD's debt issuance authority; and

c. Guiding HRSD and its managers in policy, investment and debt issuance decisions.

2.0 DEFINITIONS

2.1 Adjusted Days Cash on Hand. *Days Cash on Hand that excludes accrued debt service, the Risk Reserve, the Renewal and Replacement Reserve, and cash budgeted for the CIP in the next fiscal year.*

~~2.1~~***2.2*** **Annual Determined Contribution (ADC).** The annual contribution requirement determined by an actuary for a defined benefit plan.

~~2.2~~***2.3*** **Arbitrage.** The simultaneous purchase and sale of an asset in order to profit from a difference in the price. It is a trade that profits by exploiting price differences of identical or similar financial instruments in different markets or in different forms. For

the purposes of this Policy, Arbitrage refers to the difference between the interest paid on the tax-exempt securities and the interest earned by investing the security proceeds in higher-yielding taxable securities. The IRS Code governs arbitrage on the proceeds from issuance of tax-exempt municipal securities.

~~2.3~~***2.4*** **Asset Allocation.** An investment strategy that attempts to balance risk versus reward by adjusting the percentage of each asset in an investment portfolio according to the investor's risk tolerance, goals and investment time frame.

~~2.4~~***2.5*** **Balloon Maturity.** *As defined in the Trust Agreements,* a maturity ~~within an issue of bonds, which~~*that* contains twenty-five percent (25%) or more of the *original* principal amount of ~~the original issue~~*an issue and that is not required to be amortized by redemption prior to maturity*.

~~2.5~~***2.6*** **Bankers' Acceptance.** A draft or bill or exchange accepted by a bank or trust company. The accepting institution guarantees payment of the bill, as well as the issuer.

~~2.6~~***2.7*** **Basis Swap.** An agreement between two parties to exchange interest payments based on different variable-rate indices, e.g. SIFMA vs. LIBOR; a floating-to-floating swap.

~~2.7~~***2.8*** **Benchmark.** A comparative base for measuring the performance or risk tolerance of an investment portfolio. A benchmark should represent a close correlation to the level of risk and the average duration of the portfolio's investments.

~~2.8~~***2.9*** **Bond Anticipation Notes.** Notes which are generally repaid from the proceeds of the issuance of long-term indebtedness.

2.10 ***Bond Insurance.*** *Credit Enhancement provided by a bond insurer that insures the payment of the principal of and interest on one or more maturities of Bonds.*

~~2.9~~***2.11*** **Broker.** ~~Brings~~*Matches* buyers and sellers ~~together~~*of securities* for a commission.

~~2.10~~***2.12*** **Bullet Maturity.** A maturity within an issue of bonds for which there are no ~~principal and/or~~ sinking fund payments prior to the stated maturity date.

~~2.11~~***2.13*** **Call Provisions.** The term of a bond giving the issuer the right to redeem all or a portion of such bond prior to its stated ~~date of~~ maturity at a specific price, usually at or above par.

~~2.12~~***2.14*** **Capital Appreciation ~~Bonds~~*Bond*.** A *municipal security* on which the ~~investment return~~*interest* on an initial *principal* amount is reinvested at a stated

~~compounded~~*compounding* rate until~~.~~ *maturity.* At maturity the investor receives a single payment (the ~~"")~~*"maturity value")* representing both the initial principal amount and the total investment return.

~~2.13~~***2.15*** **Capital Asset.** A unit of property purchased by, constructed by or donated to HRSD that~~:~~ (1) was acquired or produced and has a value of $5,000 or more~~;~~ and (2) has an economic useful life of a minimum of 60 months. Capital Assets must be capitalized and depreciated for financial statement purposes. Assets constructed and paid by HRSD that improve the performance of the Wastewater System and subsequently transferred to a Locality constitute Locality Assets and will not be capitalized by HRSD for any purpose.

~~2.14~~***2.16*** **Capital Improvement Program (CIP).** ~~The CIP is~~ HRSD's planned program of capital projects (greater than $100,000), such as property, plant and equipment and related engineering, legal and construction services, and may consist of Capital Assets and Locality Assets.

~~2.15~~***2.17*** **Capitalized Interest.** A portion of the proceeds of a bond issue which is set aside to pay interest on one or more bond issues for a specific period of time. Interest ~~is commonly~~ capitalized for the construction period of the project *is typically treated as a capital cost under the IRS Code*.

~~2.16~~***2.18*** **Certificate of Deposit (CD).** A time deposit with a specific maturity evidenced by a certificate. Large-denomination CDs are typically negotiable.

~~**2.1 IRS Code**. The Internal Revenue Code of 1986, as amended, and the regulations promulgated thereunder.~~

~~2.17~~***2.19*** **Collateral.** Securities, evidence of deposit or other property, which a borrower pledges to secure repayment of a loan. Also refers to securities pledged by a bank to secure deposits of public monies.

~~2.18~~***2.20*** **Commercial Paper (CP).** Short-term, unsecured promissory notes issued by corporations or governments to finance receivables for a maturity specified by the purchaser that ranges from three days to 270 days. Notes are generally sold at a discount, and carry credit ratings issued by an NRSRO.

~~2.19~~***2.21*** **Competitive Sale.** A sale/auction of securities by an issuer in which underwriters or syndicates of underwriters submit ~~sealed~~ bids to purchase the securities.

~~2.20~~***2.22*** **Constant Maturity Swap.** An interest rate swap that is predicated upon the shape of the forward implied yield curve whereby counterparties exchange interest rate payments based on an anticipated future interest rate and a variable swap index

rate. The interest rate on one leg of the swap is reset periodically but with reference to a market swap rate rather than an index such as LIBOR~~.~~ *or a substitute.* The other leg of the swap is generally a market index, such as LIBOR *or a substitute*.

~~2.21~~*2.23* **Continuing Disclosure.** The principle that accurate and complete information material to ~~a transaction or HRSD, which potential investors would likely consider material in making investment decisions with respect to the~~*an issuer of* securities be made available on an ongoing basis. Pursuant to *SEC* Rule 15c2-12 ~~promulgated by the SEC~~, underwriters of HRSD's bonds are *generally* obligated to obtain a Continuing Disclosure Agreement (CDA) from HRSD prior to underwriting such bonds.

~~2.22~~*2.24* **Corporate Notes.** Unsecured promissory notes issued by corporations to raise capital for a maturity that is longer than 270 days. *Corporate* Notes are generally sold at a discount~~,~~ and carry credit ratings issued by an NRSRO.

~~2.23~~*2.25* **Credit Enhancement.** Credit support purchased by the issuer to raise the credit rating of a debt issue. The most common credit enhancements consist of Bond Insurance, direct or standby Letters of Credit, and Lines of Credit.

~~2.24~~*2.26* **Credit Support Annex.** A legal document ~~which~~*that* regulates credit support (collateral) for derivative transactions.

~~2.25~~*2.27* **Days Cash on Hand.** Measured by current and non-current *unrestricted* cash and investments, plus any restricted cash and investments, if available for general system purposes, divided by Operating ~~and maintenance expenses less depreciation, divided by 365. This calculation will exclude accrued debt service for the next fiscal year and all funds in the Risk Reserve and Renewal and Replacement Reserve.~~*Expenses, divided by 365.*

~~2.26~~*2.28* **Dealer.** Acts as a principal in ~~all~~*securities* transactions, buying and selling for ~~his~~*its* own account.

~~2.27~~*2.29* **Debenture.** ~~A~~*An unsecured* bond ~~secured~~*backed* only by the general credit of the issuer.

~~2.28~~*2.30* **Debt Service Coverage Ratio – GAAP.** Calculated in accordance with HRSD's Senior Trust Agreement, the ratio determined by dividing the Net Revenues by annual debt service. In such calculation, funds spent on Locality Assets are considered an expense. Annual debt service will be based on actual principal and interest payments during the year (i.e., not accrual based).

~~2.29~~*2.31* **Debt Service Coverage Ratio - Adjusted.** Calculated in accordance with HRSD's Subordinate Trust Agreement, the ratio determined by dividing the Net

Revenues by annual debt service. In such calculation, funds spent on Locality Assets may be excluded from the calculation of Net Revenues under the circumstances described within the definitions of Net Revenues and Operating Expenses. Annual debt service will be based on actual principal and interest payments during the year (i.e., not accrual based).

~~2.30~~*2.32* **Debt Service Reserve Fund.** The fund in which ~~moneys are~~*money is* placed that may be used to pay debt service if revenues available for debt service and Credit Enhancements, if applicable, are insufficient to pay debt service on HRSD's bonds secured by a Debt Service Reserve Fund as it becomes due and payable.

~~2.31~~*2.33* **Deep Discount Bonds.** Bonds which are priced for sale at a substantial discount from their face or par value.

~~2.32~~*2.34* **Delivery versus Payment.** Delivery of securities with an exchange of money for the securities. (See also Delivery versus Receipt)

~~2.33~~*2.35* **Delivery versus Receipt.** Delivery of securities with an exchange of a signed receipt for the securities. Also known as "**free**" delivery; (See also Delivery versus Payment).

~~2.34~~*2.36* ~~**Derivatives**~~***Derivative*.** A financial product whose value is derived from some underlying asset value.

~~2.35~~*2.37* **Designation Policies.** Outline how an investor's order is filled when a bond's maturity is oversubscribed when there is an underwriting syndicate. The senior managing underwriter and issuer decide how the bonds will be allocated among the syndicate. There are three primary classifications of orders which form the designation policy: Group Net orders; Net Designated orders and Member orders.

~~2.36~~*2.38* **Discount.** A bond that is issued for less than its par (or face) value, or a bond currently trading for less than its par value in the secondary market.

~~2.37~~*2.39* **Diversification.** A process of investing assets among a variety of security types by sector, maturity and quality rating.

~~2.38~~*2.40* **Enabling Act.** HRSD's Enabling Act is Chapter 66 of the Acts of Assembly of Virginia of 1960, as amended.

~~2.39~~*2.41* **Encumbrances.** Commitments related to unperformed contracts for goods and services (i.e., purchase orders, contracts and commitments). Encumbrance accounting is utilized to the extent necessary to assure effective budgetary control and accountability and to facilitate effective cash planning and control.

~~2.40~~***2.42*** **Escrow.** A fund established to hold ~~moneys~~*money* pledged and to be used to pay debt service on ~~a~~ one or more ~~series~~*maturities* of HRSD's *defeased* bonds or other indebtedness.

~~2.41~~***2.43*** **Federal Agency.** Government sponsored/owned entity created by the U.S. Congress, generally for the purpose of acting as a financial intermediary by borrowing in the marketplace and directing proceeds to specific areas of the economy considered to otherwise have restricted access to credit markets, also referred to as Government Sponsored Enterprises (GSEs). The largest *GSEs* are Government National Mortgage Association (GNMA), Federal National Mortgage Association (FNMA), Federal Home Loan Mortgage Corporation (FHLMC), Federal Home Loan Bank (FHLB), Federal Farm Credit Bank (FFCB), and Tennessee Valley Authority (TVA).

~~2.42~~***2.44*** **Federal Funds Rate.** The rate of interest at which Federal Funds are traded. This rate is currently set by the Federal Reserve through open~~—~~-market operations.

~~2.43~~***2.45*** **Federal Funds.** Funds placed in Federal Reserve Banks by depository institutions in excess of current reserve requirements, and frequently loaned or borrowed on an overnight basis between depository institutions.

~~2.44~~***2.46*** **FINRA.** The Financial Industry Regulatory Authority.

2.47 Fitch. *Fitch Ratings is an NRSRO.*

~~2.45~~***2.48*** **Forward Swap.** A swap executed today, the exchange of interest payments on which starts at some future date (the Effective Date), based on rates and terms determined and agreed upon today. On the **Effective Date** of a Forward swap begin net exchange of swap payments. On the **Trade Date** of the swap:

- Enter into Forward swap agreement
- Set terms of the swap
- Pay commitment fees for swap and bond insurance (if done in conjunction with a synthetic forward refunding of bonds)

~~2.46~~***2.49*** **Interest Rate Cap.** An option that pays its holder when and if the floating interest rate index is above the pre-determined fixed rate (strike price).

~~2.47~~***2.50*** **Interest Rate Collar.** The simultaneous purchase and sale of an Interest Rate Cap and an Interest Rate Floor on a floating index.

~~2.48~~***2.51*** **Interest Rate Floor.** An option that pays its holder when and if the floating interest rate index is below the pre-determined fixed rate (strike price).

~~2.49~~***2.52*** **Interest Rate Swap.** A contract between two parties, referred to as "counterparties", to exchange interest rate payments at specified dates in the future. One party under the swap contract normally makes payments based on a fixed rate while the other party makes payments based on a variable (floating) rate.

~~2.50~~***2.53*** **Internal Controls.** Systematic measures (such as reviews, checks and balances, methods and procedures) instituted by an organization to: conduct its business in an orderly and efficient manner; safeguard its assets and resources; deter and detect errors, fraud, and theft; ensure accuracy and completeness of its accounting data; produce reliable and timely financial and management information; and ensure adherence to its policies and plans. An important concept in establishing appropriate internal controls is that the cost of the controls should not exceed their anticipated benefits.

2.54 ***IRS Code****. The Internal Revenue Code of 1986, as amended, and the regulations promulgated thereunder.*

~~2.51~~***2.55*** **Knock-in Option.** An option the existence of which is conditional upon a pre-set trigger price trading before the option's designated maturity. If the trigger is not touched before maturity, then the option is deemed not to exist.

~~2.52~~***2.56*** ~~Letters~~***Letter*** **of Credit.** A bank ~~credit~~ facility wherein the bank agrees to ~~lend a specified amount of~~ *deliver* funds *to a third party* for ~~a limited term. Letters~~*the benefit of the account party, upon the presentation of the documents described in the Letter of Credit. A Letter* of Credit may be used as Credit Enhancement *or a Liquidity Facility* for HRSD's indebtedness.

~~2.53~~***2.57*** **Line of Credit.** A bank facility wherein the bank permits the borrower to access funds at any time, subject to a maximum loan balance. *A Line of Credit may be used as Credit Enhancement or a Liquidity Facility for HRSD's indebtedness.*

~~2.54~~***2.58*** **Liquidity.** The ability of ease with which an asset can be converted into cash without a substantial loss of value. *May also refer to unrestricted cash or investments of an issuer.*

~~2.55~~***2.59*** **Liquidity Facility.** A type of bank credit facility wherein the bank agrees to purchase securities, typically variable rate debt, that cannot be immediately remarketed to investors. The Liquidity Facility provider purchases the securities until ~~such time as~~ they can be remarketed.

~~2.56~~***2.60*** **Locality Assets.** Assets constructed and paid for by HRSD and subsequently transferred to a locality. A Commission Resolution is required to

exclude these costs from the calculation of the Operating Expenses for purposes of the calculation of the Debt Service Coverage Ratio – Adjusted.

~~2.57~~***2.61*** **London InterBank Offered Rate** (**LIBOR).** LIBOR is the rate on U.S. dollar denominated deposits with maturities from one day to 12 months transacted between banks in London. LIBOR is generally the benchmark floating index in the taxable or corporate swap market. *This index is expected to be discontinued after 2021. The leading replacement is the Secured Overnight Financing Rate (SOFR), which is based on the cost of overnight borrowing using U.S. treasury securities as collateral.*

~~2.58~~***2.62*** **Management Fee.** The fixed percentage of the gross spread which is paid to the senior managing underwriter for ~~the~~ structuring ~~phase of~~ a bond issue.

~~2.59~~***2.63*** **Market Value.** The price at which a security is trading and could presumably be purchased or sold.

~~2.60~~***2.64*** **Master Repurchase Agreement.** A written contract covering ~~all~~ future transactions between the parties to repurchase ~~—~~/reverse repurchase agreements that establishes each party's rights in the transactions. A master agreement will often specify, among other things, the right of the buyer-lender to liquidate the underlying securities in the event of default by the seller borrower.

~~2.61~~***2.65*** **Maturity.** The date upon which the principal or stated value of an investment becomes due and payable.

~~2.62~~***2.66*** **Members.** Underwriters in a syndicate other than the senior underwriter.

~~2.63~~***2.67*** **Moody's**. Moody's Investors Service, Inc. is ~~a~~*an* NRSRO.

~~2.64~~***2.68*** **Nationally Recognized Statistical Rating Organization (NRSRO).** A credit rating agency ~~which~~*registered with the SEC that* issues credit ratings that the SEC permits other financial firms to use for certain regulatory purposes. Examples include Moody's*, Fitch* and S&P.

~~2.65~~***2.69*** **Negotiated Sale.** A method of ~~sale~~*selling bonds* in which the issuer chooses an underwriter to negotiate terms pursuant to which such underwriter will purchase and market the bonds.

~~2.66~~***2.70*** **Net Revenues.** All revenues received by HRSD less Operating Expenses.

2.71 ***Net Revenues Available for Debt Service.*** *Under the Subordinate Trust Agreement, means all Net Revenues less debt service on Senior Bonds.*

~~2.67~~*2.72* **Nominal Interest Rate.** The interest rate before taking inflation into account. Generally, it is the stated or quoted rate in a loan or deposit agreement.

~~2.68~~*2.73* **Normal Cost.** The annual current cost of a member's future retirement benefit.

~~2.69~~*2.74* **Operating Expenses.** As defined by the Enabling Act and as used in the Senior Trust Agreement, operating expenses includes the cost of maintaining, repairing and operating such system or systems or sewer improvements and to provide such reserves therefor as may be provided in the resolution providing for the issuance or such revenue bonds or in the trust agreement securing the same. As defined in the Subordinate Trust Agreement, Operating Expenses includes those expenses required to pay the cost of maintaining, repairing and operating the Wastewater System, including, but not limited to, reasonable and necessary usual expenses of administration, operation, maintenance and repair, costs for billing and collecting the rates, fees and other charges for the use of or the services furnished by the Wastewater System, insurance premiums, credit enhancement and liquidity support fees, legal, engineering, auditing and financial advisory expenses, expenses and compensation of the Trustee, and deposits into a self-insurance program. Operating Expenses shall exclude allowance for depreciation and amortization and expenditures for extraordinary maintenance or repair or improvements. Operating Expenses shall also exclude expenses for improvements that will not be owned by HRSD*,* but which will, in the reasonable determination of the Commission, as evidenced by a resolution thereof, maintain or improve the integrity of the Wastewater System.

~~2.70~~*2.75* **Original Issue Discount.** *In general,* the amount by which the original par amount of *a bond or* an issue exceeds its public offering price at the time it is originally offered to an investor.

~~2.71~~*2.76* **Percentage of (% of) LIBOR Swap.** A swap whose floating rate is reset based on a percentage of a taxable rate (e.g. 67% of LIBOR) rather than a ~~true~~ tax-exempt rate, e.g. the SIFMA Index. A Percentage of LIBOR swap generally carries a lower expected or nominal fixed rate than a comparable SIFMA swap to compensate the fixed payer (issuer) for the assumption of basis and tax risk.

~~2.72~~*2.77* **Portfolio.** Collection of securities held by an investor.

~~2.73~~*2.78* **Premium.** The difference between the higher price paid for a fixed-income security and the security's face amount at issue.

~~2.74~~*2.79* **Present Value.** The current value of a future cash flow.

~~2.75~~***2.80*** **Primary Dealer.** A group of government securities dealers who submit daily reports of market activity and positions and monthly financial statements to the Federal Reserve Bank of New York and are subject to its informal oversight. Primary dealers include SEC~~,~~ -registered securities broker-dealers, banks, and a few unregulated firms.

~~2.76~~***2.81*** **Private Placement.** The placement of an issue of indebtedness directly with one or more qualified or institutional investors.

~~2.77~~***2.82*** **Prudent Person Rule.** An investment standard outlining the fiduciary responsibilities of public funds invested relating to investment practices.

~~2.78~~***2.83*** **Rate Lock.** An interest rate hedge that is cash-settled at maturity based on the prevailing level of an agreed upon underlying index. (e.g. the SIFMA 'AAA' scales)

~~2.79~~***2.84*** **Rate of Return.** The yield obtainable on a security based on its purchase price or its current market price. This may be the amortized yield to maturity on a bond or the current income return.

~~2.80~~***2.85*** **Rebate.** A requirement imposed by the ~~Tax Reform Act of 1986~~*IRS Code* whereby the issuer of tax -exempt bonds must*, under certain circumstances,* pay the ~~IRS~~*United States Treasury* an amount equal to its profit earned from investment of tax-exempt bond proceeds at rates exceeding the tax-exempt borrowing rate. The tax-exempt borrowing rate (or bond yield) is calculated pursuant to the IRS Code together with all income earned on the accumulated profit pending payment.

~~2.81~~***2.86*** **Repurchase Agreement (RP or REPO).** An agreement under which the holder of securities sells ~~these securities~~*them* to an investor with a contract to repurchase the securities at a fixed price on a fixed date. The security "buyer" in effect lends the "seller" money for the period of the agreement, and the terms of the agreement are structured to compensate ~~him~~*the buyer* for this.

~~2.82~~***2.87*** **Revenue ~~(Limited Liability)~~ Bonds.** Bonds issued by HRSD secured by ~~a specific revenue pledge of rates, rents~~*Net Revenues* or ~~fees~~*Net Revenues Available for Debt Service*.

~~2.83~~***2.88*** **Revenue Anticipation Notes.** Notes issued in anticipation of receiving revenues at a future date.

~~2.84~~***2.89*** **Safekeeping.** A service to customers rendered by banks for a fee whereby securities and valuables of all types and descriptions are held in the bank's vaults for protection.

~~2.85~~***2.90*** **Securities and Exchange Commission (SEC).** Agency created by Congress to protect investors in securities transactions by administering securities legislation.

~~**SEC Rule 15C3-1.** See Uniform Net Capital Rule.~~

~~2.86~~***2.91*** **Securities Industry and Financial Markets Association (SIFMA).** SIFMA is a high grade market index of 7-day variable rate demand notes that is produced by Municipal Market Data. SIFMA is the benchmark swap floating index in the tax-exempt swap market.

~~2.87~~***2.92*** **Self-Liquidity.** A term used in connection with *variable rate* bond financings whereby the *issuer* agrees to repurchase*,* with its own capital*,* bonds that have been *tendered* but not yet *remarketed* without procuring a third-party Liquidity Facility. In this instance, the issuer uses its own funds to purchase securities.

~~2.88~~***2.93*** **Selling ~~Groups.~~** ~~The~~***Group.*** *A* group of securities dealers ~~who~~*that* participate in an offering not as underwriters but rather ~~who receive~~*receiving* securities less ~~the~~*a* selling concession from the managing underwriter for distribution at the public offering price.

~~2.89~~***2.94*** **Senior Bonds.** Bonds and other indebtedness issued by HRSD secured by the Senior Trust Agreement.

~~2.90~~***2.95*** **Senior Trust Agreement**. The Trust Agreement, dated March 1, 2008, as the same may be amended and supplemented from time, between HRSD and a trustee. The Senior Trust Agreement secures HRSD's Senior Bonds. *No additional Senior Bonds may be issued under the Senior Trust Agreement.*

~~2.91~~***2.96*** **Serial Bond.** A bond ~~issue in which a portion of the outstanding bonds~~ *that* matures ~~at regular intervals until eventually all of the bonds have matured.~~ *on one date with no mandatory sinking fund redemptions that is part of an issue containing multiple Serial Bonds.*

~~2.92~~***2.97*** **Standard & Poor's (S&P)**. ~~Standard & Poor's~~*S&P* Global Ratings is ~~a~~*an* NRSRO.

~~2.93~~***2.98*** **Stripped Security**. ~~Security that has been transformed from a~~*Securities for which the rights to receive* principal ~~amount with periodic~~ *and* interest ~~coupons into a series of zero-coupon bonds, with the range of maturities matching the coupon payment dates and the redemption date of the principal amount~~*payments have been decoupled and separately sold*.

~~2.94~~***2.99*** **Subordinate Bonds**. Bonds and other indebtedness issued by HRSD and secured by the Subordinate Trust Agreement.

~~2.95~~***2.100*** **Subordinate Trust Agreement**. The Trust Agreement, dated October 1, 2011, as amended and restated as of March 1, 2016, as ~~the same may be~~ amended and supplemented from time to time, between HRSD and a trustee. The Subordinate Trust Agreement secures HRSD's Subordinate Bonds.

~~2.96~~***2.101*** **Swaption.** An option on a forward swap. The purchaser of a swaption (counterparty) has the right, but not the obligation, to compel the swaption seller (usually an issuer) to enter into a pre-negotiated swap agreement at some future date (exercise date). In exchange for this right, the swaption purchaser pays the swaption seller a premium amount. This amount can be paid up front, at some future date, or as an annuity over time.

~~2.97~~***2.102*** **Syndicate Policies.** The contractual obligations placed on the underwriting group relating to distribution, price limitations and market transactions.

~~2.98~~***2.103*** **Term ~~Bonds.~~** ~~Bonds from the same issue that share the same maturity dates and interest rate. A term bond is the opposite of a serial bond, which has various maturity schedules at regular intervals until the issue is retired.~~***Bond.*** *A Bond whose principal is amortized based on sinking fund redemption.*

~~2.99~~***2.104*** **Termination Payment Risk.** The risk that an issuer is forced to liquidate a swap when it owes a termination payment to its counterparty.

~~2.100~~***2.105*** **Treasury Bills.** A non-interest bearing discount security issued by the U.S. Treasury to finance the national debt. Most *Treasury* Bills are issued to mature in three months, six months, or one year.

~~2.101~~***2.106*** **Treasury Bonds.** Long-term ~~coupon~~*interest*-bearing U.S. Treasury securities issued as direct obligations of the U.S. Government and having initial maturities of more than 10 years.

~~2.102~~***2.107*** **Treasury Inflation Protected ~~Securities~~*Security* (TIPS).** The principal of a TIPS increases with inflation and decreases with deflation, as measured by the Consumer Price Index. When a TIPS matures, the adjusted principal or original principal, whichever is greater*,* is paid.

~~2.103~~***2.108*** **Treasury Notes.** Medium-term ~~coupon~~*interest*-bearing U.S. Treasury securities issued as direct obligations of the U.S. Government and having initial maturities from ~~two~~*one* to 10 years.

~~2.104~~***2.109*** **Trust Agreements**. Collectively, the Senior Trust Agreement and the Subordinate Trust Agreement.

~~2.105~~***2.110*** **Underwriter.** A dealer that purchases new issues of municipal securities from the Issuer and resells them to investors.

~~2.106~~***2.111*** **Underwriter's Discount.** The difference between the price at which bonds are bought by the Underwriter from the Issuer and the price at which they are offered to investors.

~~2.107~~***2.112*** **Underwriter's Expenses.** Compensates senior managers for out-of-pocket expenses*, generally* including~~:~~ underwriter's counsel~~;~~ DTC charges, travel, syndicate expenses, dealer fees, ~~overtime expenses,~~ communication expenses, ~~computer time~~*CUSIP fees* and postage. *Underwriter's expenses are subject to negotiation and can vary from transaction to transaction.*

~~2.108~~***2.113*** **Uniform Net Capital Rule.** SEC requirement that member firms as well as nonmember broker-dealers in securities maintain a maximum ratio of indebtedness to liquid capital*,* also called net capital rule ~~and~~*or* net capital ratio. Indebtedness covers all money owed to a firm, including margin loans and commitments to purchase securities, one reason new public issues are *often* spread among members of underwriting syndicates. Liquid capital includes cash and assets easily converted into cash.

~~2.109~~***2.114*** **Variable Rate Debt (VRD).** An interest rate on a security ~~which~~*that* changes at intervals according to an index or a formula or other standard of measurement ~~as stated~~*or that changes* in ~~the bond contract~~*connection with a mandatory tender and remarketing or where interest is not set to maturity*.

2.115 VRA Master Financing Agreement. *The Amended and Restated Master Financing Agreement, as amended and supplemented from time to time, between Virginia Resources Authority and HRSD.*

2.116 Water Infrastructure Finance and Innovation Act (WIFIA) *- The Water Infrastructure Finance and Innovation Act of 2014, as amended (WIFIA), established the WIFIA, a federal credit program administered by EPA for eligible water and wastewater infrastructure projects. The WIFIA program provides long-term, low-cost supplemental loans for up to 49% of the total cost of an eligible project.*

~~2.110~~***2.117*** **Yield.** The rate of annual income return on an investment, expressed as a percentage. Income/current yield is obtained by dividing the current dollar income by the current market price for the security. Net yield or yield to maturity is the current income yield minus any premium above par or plus any discount from par in purchase price, with the adjustment spread over the period from the date of

purchase to the date of maturity of the bond. *In addition, Yield may, for certain purposes, be calculated in accordance with the IRS Code.*

3.0 GUIDING PRINCIPLES

3.1 RESERVES. An important metric of HRSD's financial flexibility is its liquidity position as measured by available cash and investments. Setting a minimum liquidity position for known risks and obligations will provide funding in emergency or other unexpected situations as they arise. The reserves represent an earmarking, for budgetary and Policy purposes, of cash and liquid investments (current and non-current). These reserves are in addition to existing reserves required by the Trust Agreements, if any, and any funds earmarked for *debt service,* capital improvements or budget carryover amounts.

3.1.1 General Reserve. HRSD will maintain sufficient liquidity to ensure adequate working capital for HRSD's operations. These funds are intended to help HRSD cover unanticipated expenses that cannot be paid from the current fiscal year's budgetary resources. Liquidity will be determined in terms of Days Cash on Hand ~~which will be measured by current~~ and ~~non-current cash and investments, plus any restricted cash and investments, if available for general system purposes, divided by operating and maintenance expenses less depreciation, divided by 365. This calculation will exclude accrued debt service for the next fiscal year and all funds in the Risk Reserve and Renewal and Replacement Reserve, described below.~~ *Adjusted Days Cash on Hand. Adjusted* Days Cash on Hand at the end of a fiscal year may not be less than 270 ~~or more than~~. *HRSD will target Adjusted Days Cash on Hand to be below* 365 days.

In the event the cash and investments are used to provide funding for unanticipated expenses and the *Adjusted* Days Cash on Hand falls below the 270 day minimum, the General Manager will submit a plan in writing to the Commission that will restore ~~the Days Cash on Hand~~*it* to the policy level over a period not to exceed five fiscal years.

3.1.2 Risk Reserve. HRSD maintains a self-insurance program for some of its risk exposures.

A. HRSD will maintain a Risk Reserve as of the end of the fiscal year of not less than 25 percent of projected annual self-insured claims costs for known, retained risks.

B. In the event the Risk Reserve is used and reduced to a level that is less than the 25 percent minimum to provide funding of unanticipated self-insured expenses, the General Manager will submit a plan in writing to the

Commission that will restore the reserve to the policy level over a period not to exceed five fiscal years.

3.1.3 Renewal and Replacement Reserve. As ~~required~~*permitted* by the Enabling Act, HRSD's Trust Agreements establish a reserve to finance "anticipated renewals, replacements, extensions, additions and extraordinary repairs" to wastewater system the extent needed. Under the Trust ~~Agreement~~*Agreements*, the funding of the Renewal and Replacement Reserve is discretionary.

3.2 BUDGETARY PRINCIPLES.

3.2.1 Long-Range Financial Forecast. Each fiscal year the General Manager will submit to the Commission a 20-year financial forecast of anticipated annual revenues and expenses and capital improvements.

This forecast will serve as the foundation for the General Manager's annual budget proposal to the Commission.

3.2.2 Annual Operating Budget Proposals. The Commission is required to adopt an operating budget no later than June 30 each fiscal year.

The Commission will adopt an operating budget that:

A. Is structurally balanced whereby current budgetary revenues are sufficient to meet current budgetary expenses (those that are ongoing in nature);

B. Considers the affordability of rates within the context of local wealth and income indicators;

C. Is at a level necessary to ensure the adequate maintenance and operations of the wastewater system *and ensure material compliance with all applicable regulatory requirements*;

D. Is sufficient to meet Actuarially Determined Contribution (ADC) for HRSD's defined benefit plans;

E. Includes amounts necessary to maintain the required reserves in amounts at least equal to the minimum balances as defined in this Policy;

F. Enables HRSD to meet the debt service coverage targets defined in these policies *and the covenants contained in its Trust Agreements*; and

G. Annually funds at least 15 percent of its capital improvement program in cash.

3.2.3 Capital Improvement Program (CIP). Each year HRSD will adopt a ten-year CIP that identifies projects to be undertaken over *the* next ten years to meet projected needs for *regulatory compliance,* infrastructure renewal, expansion, replacing old or new facilities*, principally Capital Assets and Locality Assets*.

~~A capital project by definition involves expenditures to acquire or add assets of a relatively permanent nature such as property, plant and equipment. The CIP is typically for capital projects (not less than $100,000), new facilities, expansions and improvements requiring engineering and/or construction services.~~

3.2.4 Budgetary Accounting and Control. HRSD operates in accordance with annual operating and capital budgets prepared on a basis of accounting that is different from generally accepted accounting principles.

A. The operating budget is adopted by department, with budgetary controls exercised administratively by management at the department level. The General Manager is authorized to transfer funds among departments without further approval by the Commission. Appropriations lapse at the end of the fiscal year. Valid, outstanding encumbrances (those for which performance under a contract is expected in the next year) are re-appropriated without further approval by the Commission and become part of the subsequent year's budget.

B. The capital budget is a ten-year plan of CIP spending based on estimated project costs and prioritized schedules. Prior to the commencement of construction for any project, the Commission must appropriate funding for the total project cost. If a project is expected to exceed its initial appropriation, the Commission must approve any additional funding through a revised appropriation.

3.3 DEBT ~~AFFORDABILITY~~*SERVICE COVERAGE*. HRSD will comply with the debt service coverage ratios included in its Trust Agreements. Beyond the Trust Agreements' minimums, HRSD will adopt operating and capital budgets that it projects will enable HRSD to maintain a Debt Service Coverage Ratio – Adjusted at a minimum of 1.5 times on Senior ~~lien debt~~*Bonds* and 1.4 times on total debt.

3.4 DERIVATIVES. The Derivatives section outlined herein is intended to provide general ~~procedural~~ direction regarding the use, procurement and execution of ~~interest rate swaps and options~~*Derivatives* by HRSD. The Policy is intended to relate to the use of various interest rate hedging techniques, including the contractual exchange of different fixed and variable rate payment streams through interest rate swap agreements. The Policy is not intended to relate to other derivative products, such as hedges for fuel or other commodities that HRSD may consider for hedging exposures other than to interest rates.

3.5 ACCOUNTING AND FINANCIAL REPORTING. ~~HRSD will comply with~~*Except as permitted by the Subordinate Trust Agreement, HRSD will adhere to* all Generally Accepted Accounting Principles (GAAP). As permitted by the Subordinate Trust Agreement, HRSD may present, or cause to be presented, certain calculations that reflect certain adjustments that are not in accordance with GAAP.

HRSD will maintain a comprehensive framework of internal controls, and policies and procedures.

Over a period of not more than every five years, HRSD under the direction of the Finance Committee of the Commission will seek proposals from qualified *firms of* certified public ~~accountant firms~~*accountants*, including the current auditors~~,~~ if their performance has been satisfactory*,* to perform an annual audit of HRSD's financial statements.

3.6 RISK MANAGEMENT. HRSD will make diligent efforts to protect and preserve HRSD assets through a Risk Management program that selectively transfers risk (purchase insurance) for high severity-low frequency exposures and retains risk (self-insurance) for low severity-high frequency exposures.

3.7 INTERNAL AUDIT. HRSD or its designee will conduct internal audits using a risk-based approach. Such audit efforts will be approved and directed by the Finance Committee of the Commission.

4.0 PROCEDURES

4.1 DEBT MANAGEMENT. HRSD's debt management program represents an effort to smooth out the fiscal impact of major capital investments while aligning the costs of utility service with the payment of those who will actually use the service.

The proceeds of long-term indebtedness will not be used to finance current operations or expenses for normal maintenance. Long-term indebtedness will be structured such that financial obligations do not exceed the aggregate expected useful lives of the assets financed. Short-term borrowing may be utilized for the temporary funding of operational cash flow deficits or interim construction requirements.

The most appropriate instrument for a proposed sale of debt shall be determined ~~by~~*in light of* financing needs and expected market conditions at the time of sale.

4.1.1 Permitted Debt by Type.

A. **Lease Financing.** HRSD may use leasing for facilities or equipment if (1) it can be demonstrated that this is the most cost effective or appropriate way to

secure financing, or (2) on small projects that do not warrant entry into the bond market.

B. **Installment Purchases or Conditional Sale Contracts.** HRSD may utilize installment purchase or conditional sale contracts having an original term of one year or less.

C. **Bond Anticipation Notes, Commercial Paper (CP) and Lines of Credit.** Each are typically short duration debt instruments issued to provide interim financing and*,* due to their short duration, expose HRSD to interest rate risk and market access risk upon renewal. Bond Anticipation Notes, Commercial Paper and Lines of Credit may be used ~~to~~

~~(1) To finance small projects until such time as the project or projects can be incorporated into a larger bond sale~~

(1) to provide interim financing designed to reduce the frequency of bond sales, thereby reducing cost of issuance;

~~(1)~~*(2)* during times of high interest rates and when the expectation is that interest rates will stabilize in the future or trend downward*;*

~~(2)~~*(3)* when market conditions are such that a Bond Anticipation Notes, Commercial Paper or Lines of Credit may be more readily received in the market than long-term debt~~, or (4) as an interim financing tool during the construction period for a project(s) until such time as the project(s) is placed into service and / or HRSD sells long-term debt.~~*; or*

(4) as an interim financing tool during the construction period for a project(s) until the project(s) is placed into service and / or HRSD sells long-term debt or is reimbursed through a clean water revolving loan or WIFIA loan.

D. **Long-Term Revenue Bonds.** HRSD may issue long-term revenue bonds to fund Capital Assets and Locality Assets.

E**.** **Revenue Anticipation Notes.** May be issued to meet HRSD's operational cash flow needs.

4.1.2 Guidelines on Debt Issuance.

A**.** **Trust Agreements**~~.~~ ***and VRA Master Financing Agreement.*** HRSD will abide by the covenants contained in its Trust Agreements~~.~~ *and VRA Master Financing Agreement. As a matter of prudence,* HRSD considers ~~these~~*its*

financial covenants to be minimum requirements ~~and generally expects~~ to ~~exceed the requirements of each covenant~~*be exceeded*.

B. **Authorization.** Prior to the issuance of debt, the Commission will pass a resolution authorizing the financing arrangements and setting appropriate limits and parameters for the anticipated financing.

C. **Lowest Cost Financing.** Generally, HRSD intends to pursue the lowest cost of financing within the parameters of this Policy, the Trust Agreements*, the VRA Master Financing Agreement* and the Enabling Act.

D. **Cash Financing from Available Sources.** HRSD ~~will~~*intends to* contribute at least 15 percent of each year's *programmed* CIP in cash.

E. **Project Costs Prior to Debt Issue.** If project costs are incurred prior to the issuance of debt, the Commission will pass a resolution documenting its intent to be reimbursed from bond proceeds. *As a general practice, the Commission will consider and adopt a reimbursement resolution in connection with the adoption of each fiscal year's CIP.*

F. **Variable Rate Debt ~~(VRD)~~ and Bond Anticipation Notes.** VRD and Bond Anticipation Notes carry inherent interest rate risk. Such securities ~~historically~~*typically* have interest rates lower than fixed rate securities and offer the potential for lower debt service costs over the term of the bond issue~~.~~ *without regard to the cost of Credit Enhancement.* HRSD will consider using VRD when it improves matching of assets and liabilities, potentially lowers debt service costs, adds flexibility to HRSD's capital structure, or diversifies HRSD's investor base.

(1) Debt service on VRD will be budgeted at a conservative rate based on historical fluctuations in interest activity and current market assumptions. Before issuing VRD, HRSD will determine how potential ~~spikes~~*volatility* in the debt service will be funded and consider the impact of various interest rate scenarios on its financial position and on various debt ratios.

(2) HRSD ~~will~~*does* not *intend to* issue VRD in excess of 15 percent of its total debt portfolio. This limitation, however does not apply to ~~Bond Anticipation Notes with a maturity greater than nine months from the date of issue or Bond Anticipation Notes~~*debt* issued as part of an interim financing program *(e.g. Bond Anticipation Notes, Lines of Credit, Commercial Paper) nor does it apply to hedged variable rate debt*. In addition, if HRSD can demonstrate historical and projected sufficiency of offsetting principal and interest coverage from short-term

and variable rate investment assets held in unrestricted, non-operating accounts, these assets may be netted from variable rate liabilities.

G. **Derivative Products.** HRSD recognizes that the use of Derivatives may aid HRSD in reducing the cost of capital and gaining flexibility in structuring its debt portfolio. The use of such products ~~are~~*is* governed by the Derivatives section of this policy.

H. **Method of Sale.** HRSD will select a method of sale it believes is the most appropriate and economically advantageous in light of financial, market, transaction-specific and HRSD-related conditions. Acceptable methods of sale may include a competitive sale, a negotiated sale, ~~or~~ a private placement*, or a direct institutional investor purchase*.

I. **Duration of Debt.** HRSD will not issue debt for a period longer than ~~aggregate~~*the weighted* useful lives of the projects being financed. Pursuant to the Enabling Act, HRSD cannot issue debt with a final maturity more than 40 years from ~~the~~*their* date ~~of issuance.~~*or dates, as may be determined by the Commission.* Factors to be considered when determining the final maturity of debt include~~:~~ the average life of the assets being financed, relative level of interest rates, and the ~~year-to-year differential in interest rates~~*HRSD's overall outstanding debt service*.

4.1.3 Debt Structure

A. **Interest Rate Structure.** HRSD may make use of both ~~variable~~*VRD* and fixed ~~-~~rate debt in accordance with limitations set forth in this Policy.

B. **Tax Status.** Tax-exempt debt will be used whenever possible and appropriate.

C. **Maturity Structure.** HRSD's long-term debt may include serial and term bonds. Other maturity structures may also be considered when demonstrated to be advantageous to HRSD.

D. **Coupon Structure.** Fixed ~~-~~rate debt may include par, discount, *and* premium *bonds, and may include current interest bonds* and Capital Appreciation Bonds.

E. ~~**Redemption Features**~~***Call Provisions*.** In order to preserve flexibility and refinancing opportunities, HRSD debt shall generally be issued with Call Provisions. HRSD may consider Call Provisions that are shorter than traditional ~~and/~~or non-~~call~~*callable* debt *or debt with yield maintenance features* when warranted by market conditions. For each transaction, various

call option scenarios will be evaluated so that the most beneficial can be utilized.

F. **Credit Enhancement.** HRSD may use ~~bond insurance and/or line and letters of credit for~~ Credit Enhancement when it is economically advantageous to do so.

(1) When considering the use of Bond Insurance, HRSD will perform a maturity-by-maturity analysis. The economic feasibility of *Bond* Insurance will be analyzed based on the value of insurance as priced to the earlier of each maturity's' first applicable call date and the maturity date of such maturity. ~~Enhancement~~ *Bond Insurance* will be used when present value savings result or when such use permits HRSD to incorporate less restrictive covenants into a transaction which results in greater flexibility or lower user charges. HRSD may insure bonds in maturities that are borderline from an economic feasibility standpoint if warranted by other factors (e.g., use of insurance to attract investor interest where certain bond maturities might otherwise be difficult to sell).

(2) When considering the use of a Letter of Credit or *Line of Credit as a Credit Enhancement or* Liquidity Facility, HRSD will examine the economic feasibility ~~of a credit facility~~*thereof* by taking into account the trading spread, the cost of the ~~credit~~*Letter of Credit or Liquidity* Facility and the *effect on* interest costs of HRSD's debt ~~if enhanced~~.

G. **Debt Service Reserve Fund.** The Senior Trust Agreement requires HRSD to fund a Debt Service Reserve Fund when certain debt service coverage and liquidity ratios are not met. HRSD will fund such reserve when and if it is required. The Subordinate Trust Agreement permits, but does not require, the funding of a Debt Service Reserve Fund.

H. **Capitalized Interest.** ~~By definition, capitalization of~~*Capitalized* Interest increases the amount of debt that is issued. If HRSD capitalizes interest on one or more series of indebtedness, it will do so only ~~until such time as~~*for the period prior to* the project being financed is expected to be placed in service.

I. **Refinancing of Debt.** HRSD will refinance debt from time to time to achieve debt service savings as market opportunities arise~~.~~ *or if it determines that it is beneficial for another compelling business reason. To refinance debt, HRSD may use a range of financing tools including but not limited to tax-exempt current refundings, taxable advance refundings, and forward delivery bonds. HRSD's Director of Finance will determine the appropriate financing tool*

based on tax law, market conditions and the risks associated with each tool (in addition to present value savings and refunding efficiency considerations).

~~Since federal regulations limit~~*When* a ~~tax-exempt issue to one advance refunding (a~~ refinancing ~~prior to a bond's call provision),~~*is undertaken to achieve debt service savings,* HRSD will ~~ensure that the advance refunding results in a significant present value savings. A proposed refinancing should achieve a~~*target* minimum ~~cumulative,~~ net present value savings of three percent of the amount refinanced~~, provided~~*. As set forth above,* HRSD may refinance debt that does not meet this threshold ~~if it obtains other benefits, financial or otherwise, from the refinancing and only if the Commission determines that the issuance of such bonds will be in the District's best interests.~~*for another compelling business reason.* In addition, HRSD may consider the efficiency of a proposed refinancing transaction~~. The efficiency evaluation considers the value realized by HRSD when exercising its option to redeem its bonds early calculated under a variety of different interest rate environments versus the savings garnered.~~ *and any changes to the callability of debt after such refinancing.* In ~~general, HRSD believes a weighted average aggregate efficiency of 70 percent or greater is a reasonable benchmark.~~

~~In~~ any refinancing ~~transaction~~*of long-term debt*, HRSD maintains a bias to not extend maturities.

J. **Escrow Structuring.** HRSD will utilize the least costly securities available in structuring refinancing escrows. Unless State and Local Government Securities (SLGS) are used, a certificate will be provided by a third party agent stating that the securities were procured through an arms-length, competitive bid process (in the case of open market securities), and that the price paid for the securities was reasonable within federal guidelines. Under no circumstances will an underwriter, agent or financial advisor sell escrow securities to HRSD from its own account. *HRSD will consult with Bond Counsel in connection with any defeasance escrows.*

K. **Hiring of Professionals.** All *key* members of the financial advisory team including underwriter, financial advisor, bond counsel, and other professionals will be selected in a manner consistent with HRSD's procurement policy for professional services.

4.1.4 Underwriter Selection.

A. **Senior Manager Selection.** HRSD will select a senior manager for any proposed negotiated sale. The selection criteria will include but not be limited to the following:

(1) The firm's ability and experience in managing transactions similar to that contemplated by HRSD*;*

(2) Prior knowledge and experience with HRSD*;*

(3) The firm's ability and willingness to risk capital and demonstration of the firm's capital availability and underwriting of unsold balances*;*

(4) Quality and experience of personnel assigned to HRSD's engagement*;*

(5) Financing plan presented*; and*

(6) Cost*,* including underwriting fees and anticipated pricing*.*

B. **Co-Manager Selection.** Co-managers may be selected on the same bases as the senior manager with the exception of underwriting fees, which are determined by the senior manager. In addition to their qualifications, co-managers appointed to specific transactions will be a function of transaction size and the necessity to ensure maximum distribution of HRSD's bonds.

C. **Selling Groups.** HRSD may establish selling groups in certain transactions. To the extent that selling groups are used, HRSD may make appointments to selling groups, as the transaction dictates.

D. **Underwriter's Counsel.** In any negotiated sale of HRSD debt in which ~~legal counsel is required to represent~~ the underwriter *desires legal counsel*, the appointment will be made by the senior ~~Manager~~*managing underwriter*.

E. **Underwriter's Discount.** HRSD will evaluate the proposed underwriter's discount against other proposals and/or comparable issues in the market. ~~If there are multiple underwriters in the transaction, HRSD will determine the allocation of underwriting liability and management fees. The allocation of fees will be determined prior to the sale date; a cap on management fees, expenses and underwriter's counsel fee will be established and communicated to all parties by HRSD. Any additional expenses~~ *Any additional expenses payable to an underwriter and paid out of the Underwriter's Discount* must be substantiated.

F. **Evaluation of Underwriter Performance.** HRSD will evaluate each bond sale after completion to assess the following: costs of issuance including underwriters' compensation, pricing of the bonds in terms of the overall interest cost and on a maturity-by-maturity basis, ~~and~~ the distribution of bonds and sales credits*, and the use of capital by the underwriters to take down bonds*.

G. **Syndicate Policies.** For each negotiated transaction, HRSD will establish syndicate policies that will describe the priority of orders and designation policies governing the upcoming sale.

H. **Designation Policies.** To encourage the pre-marketing efforts of each member of the underwriting team, orders for HRSD's bonds will be net designated, unless otherwise expressly stated. HRSD shall require the senior manager to:

(1) Fairly allocate bonds to other managers and the selling group.

(2) Comply with the Municipal Securities Rulemaking Board's (MRSB) regulations governing the priority of orders and allocations.

(3) Within 10 working *business* days after the sale date, submit to HRSD a detail of orders, allocations and other relevant information pertaining to HRSD's sale.

4.1.5 Consultants.

A. **Financial Advisor.** HRSD will select a financial advisor (or advisors) to assist in its debt issuance and debt administration processes. Such financial advisor(s) will be an Independent Registered Municipal Advisor within the meaning of the Securities Exchange Act of 1934, as amended. Selection of HRSD's financial advisor(s) will be based on, but not limited to, the following criteria:

(1) Experience in providing consulting services to entities similar to HRSD

(2) Knowledge and experience in structuring and analyzing bond issues

(3) Experience and reputation of assigned personnel*; and*

(4) Fees and expenses

B. **Bond Counsel.** HRSD debt will include a written opinion by legal counsel affirming that HRSD is authorized to issue the proposed debt, that HRSD has met all legal requirements necessary for issuance, and, if the interest on the debt to be issued is to be exempt under the IRS Code, a determination consistent therewith. The approving opinion and other documents relating to the issuance of debt will be prepared by counsel with extensive experience in public finance and tax issues. The Bond Counsel will be selected by HRSD.

C. **Conflicts of Interest.** HRSD requires that its consultants and advisors provide objective advice and analysis, maintain the confidentiality of HRSD

financial plans, and be free from any conflict of interest. In no case will HRSD's financial advisor be permitted to underwrite any portion of HRSD's bond issues, whether sold competitively or negotiated.

D. **Disclosure by Financing Team Members.** All financing team members will be required to provide full and complete disclosure, relative to agreements with other financing team members and outside parties. The extent of disclosure may vary depending on the nature of the transaction. However, in general terms, no agreements will be permitted which could compromise the firm's ability to provide independent advice which is solely in HRSD's best interests or which could reasonably be perceived as a conflict of interest.

4.1.6 Communication and Disclosure.

A. **Rating Agencies~~.~~** ***[NRSROs].*** HRSD seeks to maintain the highest ~~possible~~ credit ratings it believes appropriate for its debt without compromising the delivery of its basic core services. The Director of Finance will manage relationships with the rating analysts assigned to HRSD~~.~~ *by the NRSROs*

B. **Investors, Bond Insurers, Liquidity Providers.** The Director of Finance will manage relationships using both informal and formal methods to disseminate information.

C. **Continuing Disclosure.** HRSD recognizes that ~~accurate and complete~~*ongoing* disclosure is imperative to maintaining the high credit quality of its debt. HRSD will comply with all of its contractual obligations and applicable law and will meet such disclosure requirements in a timely and thorough manner.

D. **Arbitrage Compliance.** HRSD will maintain a system of record keeping and reporting in order to comply with the Arbitrage Rebate Compliance Requirements of the ~~Internal Revenue~~*IRS* Code ~~of 1986, as amended~~.

E. **Post-Issuance Compliance Procedures.** Separate from this policy, HRSD will maintain and follow post-issuance compliance procedures. Such procedures will include provisions regarding continuing disclosure and arbitrage compliance, among others.

4.2 <u>DERIVATIVES.</u>

4.2.1 Approach and Objectives. Interest Rate Swaps and options (swaps) are ~~tools~~*Derivatives* that can help HRSD meet important financial objectives. Properly used, these instruments can increase HRSD's financial flexibility, provide

opportunities for interest rate savings or enhanced investment yields, and help HRSD manage its balance sheet through better matching of assets and liabilities.

A. **Specific Objectives for ~~Utilizing~~*Using Interest Rate* Swaps**. HRSD may consider the use of specific *Interest Rate* Swaps if they meet one or more of the benefits previously described in this Policy or if they:

(1) Result in an expected lower net borrowing cost than traditional debt alternatives;

(2) Result in an improved capital structure (e.g., altered pattern of debt service payments or to create variable rate exposure) or better asset/liability matching;

(3) Cap, limit, or hedge HRSD's exposure to changes in interest rates on a particular financial transaction; or

(4) Provide a specific benefit not otherwise available.

(5) Swaps must not be speculative or create unreasonable risk. Each swap will be reviewed on a case-by-case basis to determine whether or not the level of risk is appropriate for HRSD. Examples of swaps that HRSD considers speculative and which create unreasonable risk include, without limitation:

- Basis Swaps;
- Constant Maturity Swaps;
- Knock-in Options on Swaps;
- *Interest Rate* Swaps that including a floating index multiplier *greater than 1.0* (e.g., three times SIFMA); and
- *Interest Rate* Swaps that are not associated with a specific bond issue.

(6) HRSD prefers Swaps that meet the "consistent critical terms method" for evaluating the effectiveness of *Interest Rate* Swaps as defined by the Governmental Accounting Standards Board in Statement #53: Accounting and Financial Reporting for Derivative Instruments.

B. **Prohibited *Interest Rate* Swap Features.** HRSD will not use *Interest Rate* Swaps that:

(1) Are speculative or create extraordinary leverage or risk;

(2) Lack adequate liquidity to terminate without incurring a significant bid/ask spread;

(3) Provide insufficient price transparency to allow reasonable valuation; or

(4) Are not reasonably uniform to the risk evaluation criteria by this Policy.

C. **Legal Authority.** As stated in Section 29 of HRSD's Enabling Act, as ~~approved~~*amended* by the Virginia General Assembly on March 11, 2008,

> *"With respect to contracts concerning interest rates, currency, cash flow and other basis, the District may enter into any contract that the Commission determines to be necessary or appropriate to place any obligation or investment of the District, as represented by bonds or the investment of their proceeds, in whole or in part, on the interest rate, cash flow or other basis desired by the Commission. Such contracts may include, without limitation, contracts commonly known as interest rate swap agreements, rate locks, forward purchase agreements, and futures or contracts providing for payments based on levels of, or changes in, interest rates. Such contracts or arrangements may be entered into by the District in connection with, or incidental to, entering into or maintaining any (i) agreement that secures bonds or (ii) investment, or contract providing for investment, otherwise authorized by law. These contracts and arrangements may contain such payment, security, default, remedy, and other terms and conditions as determined by the Commission, after giving due consideration to the creditworthiness of the counterparty or other obligated party, including any rating by any nationally recognized rating agency."*

All ~~derivatives~~*Derivative* contracts require Commission approval *prior to execution*.

D. **Permitted Instruments.** HRSD may utilize the following financial products on a current or forward basis, after identifying the objective(s) to be realized and assessing the attendant risks.

(1) Interest Rate Swaps, including fixed and floating rate swaps.

(2) Options, including Swaptions, Interest Rate Caps, Interest Rate Floors, and Interest Rate Collars.

HRSD prefers *Interest Rate* Swaps that have strong price transparency and which are of a type referred to as "plain vanilla," e.g., a fixed to floating rate SIFMA -based Interest Rate Swap.

Interest Rate Swaps will be subject to the legal provisions set forth in HRSD's Trust ~~Agreement~~*Agreements*, applicable debt documents, and statutory requirements.

E. **Procedure for Submission and Execution.** HRSD may consider *Interest Rate* Swaps that are either presented as proposals or that are developed by HRSD in consultation with its financial advisor and legal counsel. HRSD will give detailed consideration only to proposals that HRSD, in its sole discretion, believes will offer the projected savings or other benefits and will have the ability to meet one or more of the objectives outlined herein.

(1) When feasible, *Interest Rate* Swaps should be competitively procured either under a competitive sealed bid or competitive negotiation (e.g. *initiated via* RFP). On a product-by-product basis, HRSD will have authority to negotiate the procurement of financial instruments that have customized or specific attributes designed for HRSD.

(2) For both competitive and negotiated procurements, the execution of any *Interest Rate* Swap transaction will be subject to receipt of a fairness opinion from HRSD's financial advisor, finding that the terms and conditions of the swap reflect a fair market value of such transaction as of the date and time of its execution.

(3) The execution of all *Interest Rate* Swaps will be subject to receipt of an opinion from a law firm with extensive experience in public finance and tax issues that the contract is a legal, valid and binding obligation of HRSD ~~and~~*that* complies with applicable law *and has no adverse effect on the tax status of any related bonds*.

F. ***Interest Rate*** **Swap Analysis and Participant Requirements.** In connection with any *Interest Rate* Swap, HRSD, its financial advisor and legal counsel will review the proposed transaction and outline considerations associated with the transaction. Such a review will include the following:

(1) The identification of the proposed benefit and potential risks, which will include, but not necessarily be limited to, those risks outlined in this Policy;

(2) Analysis of potential savings and stress testing of the proposed transaction;

(3) Fixed versus variable rate and *Interest Rate* Swap exposure;

(4) To the extent HRSD deems relevant, any rating reports or criteria regarding *Interest Rate* Swaps by rating agencies; and

(5) Legal constraints.

G. ***Interest Rate*** **Swap Risks.** In reviewing proposed or possible *Interest Rate* Swaps, HRSD will consider at a minimum each of the following types of risks, as applicable:

(1) **Counterparty Risk.** The risk of a payment default on a *an Interest Rate* Swap by a ~~swap~~ counterparty.

(2) **Termination Risk.** The risk that ~~a~~*an Interest Rate* Swap has a negative value and HRSD owes a "breakage" fee if the contract has to be terminated.

(3) **Tax Risk.** A mismatch between changes in the rate or price on HRSD's underlying debt and the *Interest Rate* Swap caused by a reduction or elimination in the benefits of the tax exemption for municipal bonds, e.g. a tax cut that results in an increase in the ratio of tax-exempt to taxable yields.

(4) **Basis Risk.** A mismatch between the rate on HRSD's underlying debt and the rate paid under the ~~swap, e.g. a~~ *Interest Rate Swap (for example, an issue of* tax-exempt Variable Rate ~~issue which trades~~*Debt that bears interest* at *a variable rate equal to* 67% of LIBOR while HRSD receives 80% of LIBOR under the swap.

(5) **Liquidity/Remarketing Risk.** The risk that HRSD cannot secure a cost-effective renewal of a Letter or Line of Credit or suffers a failed remarketing with respect to its Variable Rate Debt.

(6) **Rollover Risk.** The risk that ~~a swap~~*the* maturity *of an Interest Rate Swap* does not match maturity of the related debt or asset.

H. **Counterparty Risk Assessment.** HRSD will only enter into ~~a~~*an Interest Rate* Swap with highly rated financial institutions. Credit criteria for financial institutions are as follows:

(1) The institutions' long-term, unsecured and unsubordinated obligations are rated at the time of execution of the *Interest Rate* Swap by at least one rating agency at least "Aa3" by Moody's ~~Investors Services, Inc. ("Moody's")~~ or "AA" by ~~Standard & Poor's Rating Services ("~~S&P~~"),~~, or "AA" by Fitch

~~Ratings ("Fitch")~~ and by at least one other rating agency at no lower than "A2" by Moody's, "A" by S&P, or "A" by Fitch; or

(2) The institutions' obligations under the *Interest Rate* Swap and the Credit Support Annex are unconditionally guaranteed by a bank or non-bank financial institution the long-term, unsecured and unsubordinated obligations of which are rated at the time of execution of the swap by at least one credit agency at least "Aa3" by Moody's or "AA" by S&P or "AA" by Fitch and by at least one other rating agency at no lower than "A2" by Moody's, "A" by S&P, or "A" by Fitch.

In the event of downgrade of ~~a~~*an Interest Rate* Swap counterparty below the minimal rating standard set forth above, the counterparty will be required to:

a. Provide a substitute guarantor or assign the swap contract to an acceptable counterparty meeting the rating criteria, or

b. Provide collateral as described in the Collateral section of this Policy.

I. **Benefit Expectation.** Financial transactions using *Interest Rate* Swaps or other ~~derivative products~~*Derivatives* related to a debt issue should generate at least two percent or greater projected debt service savings than a traditional debt alternative. Such savings analysis will include, where applicable, the consideration of the probability (based on historical interest rate indices, where applicable, or other accepted analytic techniques) of the realization of savings for the Derivative structure. The savings target requirement is intended to reflect the complexity and risk of derivative financial instruments, and should include a risk adjustment for other factors. For example, if the underlying debt is callable and the *Interest Rate* Swap is not, then the analysis should include a risk adjustment for this factor.

In determining any benefit in implementing ~~a~~*an Interest Rate* Swap, the cost of remarketing, in addition to the cost of credit enhancement or liquidity fees, will be added to the projected variable rate. Such a calculation should consider the trading performance of comparable indebtedness and any trading premium resulting from a specific form of credit enhancement or liquidity and/or any impact related to broader industry trends.

J. **Hedging Derivatives.** When utilizing a Derivative to cap, limit or hedge HRSD's exposure to changes in interest rates, HRSD will evaluate various interest rate scenarios and the estimated impact on projected wastewater rates.

K. **Legal and Contractual Requirements.** HRSD will use standard International Swap and Derivatives Association, Inc. swap documentation, including the Schedule to the Master Agreement and a Credit Support Annex, and related protocols. HRSD may use additional documentation if the product is proprietary or HRSD deems in its sole discretion that such documentation is otherwise in its interest. The *Interest Rate* Swap agreement between HRSD and each counterparty will include payment, term, security, collateral, default, remedy, termination, and other terms, conditions, provisions and safeguards as HRSD, in consultation with its legal counsel, deems necessary ~~and~~*or* desirable.

L. **Legal Terms of Swaps.** Terms and conditions of any ~~swap~~*Interest Rate Swap agreement* will be negotiated by HRSD in the best interests of HRSD. Swap documentation and terms should include the following:

(1) Downgrade provisions triggering termination based on HRSD's credit rating will in no event be less advantageous than those permitting termination based on a downgrade of the counterparty.

(2) Governing law for swaps will be New York law to the extent permitted by law, but should reflect that HRSD's authorization of the related agreement is governed by Virginia law.

(3) The specified debt related to credit events in any swap agreement should be narrowly drafted and refers only to specific debt.

(4) Collateral thresholds will be set on a sliding scale reflective of credit ratings (see Collateral Section).

(5) Eligible collateral will be as set forth in the Collateral Section.

(6) Termination value will be established by "market quotation" methodology, which involves the solicitation of quotations from unrelated brokers regarding the valuation of the swaps.

M. **Notional Amount.** HRSD will limit the aggregate notional amount of derivatives to an amount not to exceed 20 percent of aggregate outstanding debt.

To the extent that HRSD is party to multiple derivatives contracts at any given time, HRSD will seek to diversify its counterparty credit risk by limiting its credit exposure to any single counterparty.

N. **Final Maturity.** The final maturity of any ~~swap agreement~~*Interest Rate Swap* will not extend beyond the lesser of the final maturity date of HRSD's related

debt and the expiration date of any Letter of Credit or Liquidity Facility on the related bonds unless HRSD has the right to cancel the swap agreement without cost on such expiration date.

O. **Termination Provisions.** *Interest Rate* Swaps will contain provisions granting HRSD the right to optionally terminate ~~a swap agreement~~*an Interest Rate Swap* at any time over ~~the~~*its* term ~~of the agreement~~. Such a provision will be required even if the termination is at market. In general, exercising the right to terminate an agreement should produce a benefit to HRSD, either through the receipt of a payment from a termination or, if the termination payment is made by HRSD, in conjunction with the conversion of the related indebtedness to a more beneficial interest rate mode or mitigates a risk to HRSD, as will be determined by HRSD in its sole discretion.

Any termination payment will be established by a "market quotation" methodology, unless HRSD deems an alternate methodology to be appropriate. HRSD's Director of Finance will provide a written report to the Commission with respect to any termination, including the reason(s) why the swap was terminated.

P. **Collateral.** As part of any swap, HRSD will require collateralization or other forms of credit enhancement to secure any or all swap payment obligations. As appropriate, HRSD, in consultation with its financial advisor *and legal counsel*, will require collateral or other credit enhancement to be posted by each swap counterparty as follows:

(1) Each counterparty to HRSD will be required to post collateral if the long-term credit rating of the counterparty or its guarantor falls below the requirements outlined in the Counterparty Risk Assessment section of this Policy. Additional collateral for further decreases in credit ratings of a counterparty will be posted by the counterparty in accordance with the provisions contained in the related Collateral Support Annex. Threshold amounts for collateral posting will be determined by HRSD on a case-by-case basis.

(2) In determining maximum uncollateralized exposure, HRSD will consider financial exposure that it may have to the same corporate entities through other forms of financial dealings, such as commercial paper investments.

(3) Collateral will be deposited with a third party trustee, or as mutually agreed upon between HRSD and the counterparty.

(4) A list of acceptable securities that may be posted as collateral and the valuation of such collateral will be determined and mutually agreed upon during negotiation of the swap agreement with each swap counterparty. A complete list of acceptable securities and valuation percentages is included in the Acceptable Collateral section of the Policy.

(5) The market value of the collateral will be determined on at least a weekly basis, or more frequently if HRSD determines it is in its best interest given the specific collateral.

Q. **Ongoing Management.** HRSD will seek to maximize the benefits and minimize the risks it carries by actively managing its *Interest Rate* Swap program. This will entail frequent monitoring of market conditions for emergent opportunities and risks. Active management may require modification of existing positions including, for example:

- Early full or partial termination;
- Shortening or lengthening the term of *Interest Rate* Swaps; or
- Sale or purchase of options.

Legal modification to an existing swap will require approval from the Commission. In modifying any swap, HRSD will fulfill all terms of this Policy and refer back to the original procurement and execution procedures outlined in this Policy.

R. **Ongoing Reporting Requirements.** HRSD will take steps to ensure that there is full and complete disclosure of all Swaps to ~~HRSD's~~*the* Commission, to Rating Agencies *and to EMMA*. HRSD will also present a summary description of its swaps in its disclosure documents.

HRSD will provide a written report regarding the status of all Swap agreements to the Commission at least on a semi-annual basis and will include the following:

(1) A description of all outstanding swap agreements, including, if and when applicable, bond series, type of Swap, rates paid and received by HRSD, total notional amount, average life of each swap agreement, remaining term of each Swap agreement and covenant compliance~~.~~*;*

(2) Highlights of all material changes to swap agreements or new swap agreements entered into by HRSD since the last report~~.~~*;*

(3) The credit rating of each Swap counterparty and credit enhancer insuring swap payments, if any~~.~~*;*

(4) A summary of Swap agreements that were terminated or that have expired~~.~~*;*

(5) A mark-to-market valuation of swap agreements and the source of the valuation, which HRSD may use for financial reporting purposes~~.~~*; and*

(6) A summary of Collateral postings.

S. **Acceptable Collateral.**

Security	**Collateral Requirement**	
	Valuation Percentage*	**Example: $ Value Based on $1.0 Million**
Cash	100%	$1.0 million
(x) Negotiable debt obligations issued by the U.S. Treasury Department or GNMA, or		
(y) Mortgage-backed securities issued by GNMA (but with respect to either (x) or (y) excluding interest only or principal only Stripped Securities, securities representing residual interests in mortgage pools, or securities that are not listed on a national securities exchange or regularly quoted in a national quotation service) and in each case having a remaining maturity of:		
• less than one year	98%	$1.02 million
• greater than one year	95%	$1.05 million

*To calculate the dollar amount required to satisfy the collateral requirement, divide the collateral requirement by the valuation percentage shown above.

T. **Conformance with Dodd-Frank Act.** It is the intent of HRSD to conform to the requirements relating to legislation and regulations for over-the-counter derivatives transactions under Title VII of the Dodd-Frank Wall Street Transparency and Accountability Act of 2010, as amended from time to time, and the regulations promulgated thereunder (herein collectively referred to as Dodd-Frank). It is the policy of HRSD that (i) each swap advisor engaged or

to be engaged by HRSD will function as the designated qualified investment representative of HRSD (Designated Qualified Independent Representative or QIR); (ii) each swap advisor agrees to meet and meets the requirements specified in the Commodity Futures Trading Commission Regulation 23.450(b)(1) or any successor regulation thereto (hereinafter referred to as the QIR Regulation); (iii) each swap advisor provide a written certification to HRSD to the effect that such swap advisor agrees to meet and meets the requirements specified in the QIR Regulation; (iv) HRSD monitor the performance of each swap advisor consistent with the requirements specified in the QIR regulation; (v) HRSD exercise independent judgment in consultation with its swap advisor in evaluating all recommendations, if any presented by any counterparty with respect to transactions authorized pursuant to this Financial Policy; (vi) HRSD rely on the advice of its swap advisor with respect to transactions authorized pursuant to this Financial Policy and not rely on recommendations, if any, presented by any counterparty with respect to transactions authorized pursuant to this Financial Policy; (vii) HRSD comply with all recordkeeping reporting and certification requirements for end-users as applicable under the Commodity Exchange Act.

4.3 INVESTMENT

4.3.1 Ethics and Conflicts Of Interest. The Director of Finance and other employees involved in the investment process will comply with the Code of Virginia Section ~~§~~2.2-3100 et seq., the State and Local Government Conflict of Interests Act~~.~~ *(the "Conflict of Interests Act").*

A. Specifically, no officer or employee will:

(1) Accept any money, loan, gift, favor, service, or business or professional opportunity that reasonably tends to influence him in the performance of his official duties; ~~or~~

(2) Accept any business or professional opportunity when he knows there is a reasonable likelihood that the opportunity is being afforded to influence him in the performance of his official duties~~.~~*; or*

(3) Violate any of the provision of the Conflict of Interests Act.

B. All employees involved in the investment process will refrain from personal business activity that could conflict with the proper execution and management of the investment program, or that could impair their ability to make impartial decisions.

C. All employees involved in the investment process will disclose to the Director of Finance and the General Manager any material interest in financial institutions with which they conduct business. They will further disclose any personal financial or investment positions that could be related to the performance of the investment portfolio.

D. All employees involved in the investment process will refrain from undertaking personal investment transactions with the same individual with whom business is conducted on behalf of HRSD.

4.3.2 Operating Funds

A. **Scope.** Except for funds maintained in trust for retirement and health and welfare benefits for employees and/or retirees, this Policy applies to all HRSD's cash and investments (the Investment Portfolio). The Policy will apply to such monies from the time of receipt until the time the monies leave HRSD's accounts. Although these assets may be pooled for investment purposes, they may be segregated as necessary for accounting and budgetary reporting purposes.

B. **Objectives.**

(1) All investments will be in compliance with the Code of Virginia Sections §2.2-4400 et seq. and §2.2-4500 et seq. and the Trust Agreements.

(2) The cash management and investment activities of HRSD will be conducted in a manner which is consistent with applicable law and prevailing prudent business practices which may be applied by other public organizations of similar size and financial resources.

(3) The Investment Portfolio will be managed to accomplish the following fundamental goals:

a. **Safety of Principal.** The single most important objective of the investment program is the preservation of principal of those funds within the Investment Portfolio.

b. **Maintenance of Liquidity.** The Investment Portfolio will be managed at all times with sufficient Liquidity to meet all daily and seasonal needs, to fund special projects and other operational requirements which are either known or which might reasonably be anticipated, and to provide adequate Self-Liquidity, if applicable.

c. **Maximizing Return.** The Investment Portfolio will be managed so as to maximize the return on investments within the context and parameters set forth by the safety and liquidity objectives above.

C. **Standard of Prudence.** All investments will be in compliance with the Code of Virginia Sections ~~§~~2.2-4400 et seq. and ~~§~~2.2-4500 et seq. and the Trust ~~Agreement~~*Agreements*. Public funds held and invested by HRSD are held for the benefit of its ~~rate payers~~*ratepayers* and any investment of such funds will be made solely in the interest of the ~~rate payers~~*ratepayers* and with the care, skill, prudence, and diligence under the circumstances then prevailing that a person acting in a like capacity and familiar with such matters would use in the conduct of an enterprise of a like character and with like aims.

The Director of Finance and other HRSD employees acting in accordance with written procedures ~~and~~*, including* this Policy and exercising due diligence will be relieved of personal responsibility for an individual security's performance, provided that deviations from expectations are reported in a timely fashion to the Commission.

D. **General Account Structure.** In order to meet HRSD's general objectives, the Investment Portfolio is divided into three major investment strategies: an Operating Liquidity Strategy, a Total Return Strategy and a Capital Investment Strategy.

(1) The **Operating Liquidity Strategy** consists of funds that are expected to provide for HRSD's day-to-day disbursement and operational needs. As such, Liquidity is the emphasis in this strategy. This strategy will be funded to meet all known operating needs. Selection of investment maturities will be consistent with the cash requirements of HRSD in order to minimize the forced sale of securities prior to maturity. It is expected that a portion of the Operating Liquidity Strategy will be invested in highly liquid funds such as money market funds, overnight repurchase agreements, bank deposit accounts, or other short-term investment vehicles. *Funds invested pursuant to* this strategy may be utilized to provide Self-Liquidity on debt financings.

(2) The **Total Return Strategy** consists of operating funds that are not expected to be a major source of HRSD's day-to-day disbursement requirements and operational needs. The Total Return Strategy may therefore be invested in longer-term securities in order to generate an investment return, which, over time, is higher than the total return of the Operating Liquidity Strategy. *Funds invested pursuant to* this strategy may be utilized to provide Self-Liquidity on debt financings.

(3) The **Capital Investment Strategy** is the source for capital improvement disbursements. The strategy will consist of unspent debt proceeds and unspent HRSD cash contributions to its CIP. It is anticipated that investments will be made in the Capital Investment Strategy with maturity dates matching the anticipated expenditures or invested in highly liquid funds such as money market funds, overnight repurchase agreements, bank deposits or other short-term investment vehicles.

E. **Authorized Investments.** Under the Trust ~~Agreement~~*Agreements*, the Director of Finance may invest in *such of* the following securities that are in compliance with ~~applicable law.~~ *the Investment of Public Funds Act (Code of Virginia Section 2.2-4500 et seq.), the Government Non-Arbitrage Investment Act (Code of Virginia Section 2.2-4700 et seq.) and any successor statues as from time to time amended.* The Director of Finance, however, may impose additional requirements and restrictions in order to ensure that HRSD's goals are met. ~~Permitted investments for the Investment Portfolio include:~~

(1) **U.S. Treasury Obligations.** ***TIPS,*** *Treasury* Bills, ~~notes~~*Treasury Notes and Treasury Bonds,* and any other obligation or security issued by or backed by the full faith and credit of the United States of America. The final maturity will not exceed a period of five years from the time of purchase.

(2) **Federal Agency** ~~**Obligations**~~***Obligation*.** Bonds, notes and other obligations of ~~the United States, and securities issued by any federal government agency or instrumentality or government sponsored enterprise~~*Federal Agencies*, provided that such investments must be rated in one of the two highest rating categories by at least one NRSRO and or the have the same rating as those of U.S. Treasury obligations. The final maturity will not exceed a period of five years from the time of purchase.

(3) **Municipal Obligations.** Bonds, notes and other general obligation indebtedness, upon which there is no default, with a rating of at least *"*AA*"* from S&P and *"*Aa*"* from Moody's ~~Investor Services~~, maturing within five years of the date of purchase, and otherwise meeting the requirements of Code of Virginia ~~§~~*Section* 2.2-4501. However, HRSD is prohibited from purchasing its own debt for the purpose of investing its Operating Funds. Please see the *Self-Liquidity* section of this policy for important ~~language~~*information* related to Self-Liquidity and HRSD's purchase of its own debt.

(4) **Commercial Paper.** ~~Prime quality commercial paper, with a maturity of 270 days or less,~~*Commercial Paper* issued by domestic corporations (corporations organized and operating under the laws of the United States or any state thereof) provided that the issuing corporation, or its guarantor, has a short-term debt rating of no less than "A-1" (or its equivalent) from at least two of the NRSROs.

(5) ~~**Bankers Acceptance.**~~***Bankers' Acceptances.*** Issued by domestic banks or a federally chartered office of a foreign bank, which are eligible for purchase by the Federal Reserve System with a maturity of 180 days or less. The issuing corporation, or its guarantor, must have a short-term debt rating of no less than "A-1" (or its equivalent) from at least two of the NRSROs.

(6) **Corporate Notes.** ~~High quality~~ Corporate Notes with a rating of at least "Aa" by Moody's and at least "AA" by S&P. *[*The final maturity will not exceed a period of five years from the time of purchase~~.~~*.]*

(7) **Negotiable Certificates of Deposit and Bank Deposit Notes.** Negotiable ~~certificates of deposit~~*CDs* and negotiable bank deposit notes of domestic banks and domestic offices of foreign banks with ratings of at least *"*A-1*"* from P-1 from Moody's, for maturities of one year or less, and a rating of at least *"*AA*"* from S&P and *"*Aa*" from* Moody's, for maturities over one year. The final maturity may not exceed a period of five years from the time of purchase.

(8) **Money Market Mutual Funds (Open-Ended Investment Funds).** Shares in open-end, no-load investment funds provided such funds are registered under the Federal Investment Company Act of 1940, provided that the fund is rated at least "AAAm" or the equivalent by an NRSRO. The mutual fund must comply with the diversification, quality and maturity requirements of *SEC* Rule 2(a)-7, or any successor rule~~, of the SEC~~, provided the investments by such funds are restricted to investments otherwise permitted by the Code of Virginia for political sub-divisions.

(9) **Local Government Investment Pool.** A specialized fund ~~created in the 1980 session of the General Assembly~~*pursuant to Code of Virginia Section 2.2-4000 et seq.* designed to offer a convenient, liquid, and cost-effective investment vehicle for public entities. The Fund is administered by the Treasury Board of the Commonwealth of Virginia.

(10) ~~**SNAP**~~***State Non-Arbitrage Pool*** **Fund.** ~~Any~~*The* pooled investment vehicle established for the investment of bond proceeds under the

Government Non-Arbitrage Investment Act (~~Chapter 47 of Title 2.2 of the Code of~~ Virginia~~).~~ *Code Section 2.2-4700 et seq.).*

(11) **Repurchase Agreements.** In overnight, term and open repurchase agreements provided that the following conditions are met:

a. The contract is fully secured by deliverable U.S. Treasury ~~and~~*Bills, Bonds or Notes or* Federal Agency obligations as described in paragraph 1 and 2 above (with a maximum maturity of five years), having a market value at all times of at least 102 percent of the amount of the contract;

b. A Master Repurchase Agreement or specific written Repurchase Agreement governs the transaction;

c. The securities are free and clear of any lien and held by an independent third-party custodian acting solely as agent for HRSD, provided such third party is not the seller under the Repurchase Agreement;

d. A perfected first security interest under the Uniform Commercial Code in accordance with book entry procedures prescribed at 31 C.F.R. 306.1 et seq. or 31 C.F.R. 350.0 et seq. in such securities is created for the benefit of HRSD;

e. For Repurchase Agreements with terms to maturity of greater than one day, HRSD will value the collateral securities daily and require that if additional collateral is required then that collateral must be delivered within one business day (if a collateral deficiency is not corrected within this time frame, the collateral securities will be liquidated);

f. The counterparty is a:

(1) Primary government securities dealer who reports daily to the Federal Reserve Bank of New York; or

(2) A bank, savings and loan association, or diversified securities broker-dealer having at least $5 billion in assets and $500 million in capital and subject to regulation of capital standards by any state or federal regulatory agency; and

(3) The counterparty meets the following criteria: A long-term credit rating of at least ‘AA’ or the equivalent from

an NRSRO; has been in operation for at least five years; is reputable among market participants.

(12) **Collateralized Bank Deposits.** ~~Certificates of deposit~~*CDs* and other evidence of deposit as permitted by Section 2.2.4400 et seq. of the Code of Virginia.

(13) **U.S. Dollar Denominated Supra Sovereign Agency Bonds.** Bonds and other obligations issued, guaranteed or assumed by the International Bank for Reconstruction and Development, by the Asian Development Bank or by the African Development Bank, provided that the obligation is rated by an NRSRO the higher of "AA" or the rating on U.S. Treasury obligations.

(14) **Virginia Investment Pool Trust Fund (VIP) Stable NAV Liquidity Pool.** This pool supports the cash management needs of municipalities, other governmental agencies and political subdivisions in Virginia that must manage investments conservatively. The objective of the fund is to obtain a competitive market yield on available financial assets consistent with the constraints imposed by the safety objectives, cash flow considerations and the laws of the Commonwealth of Virginia that govern the placement of public funds while facilitating daily liquidity and the maintenance of a stable Net Asset Value, with the price of shares in the portfolio targeted to maintain a value of $1.00. The fund is governed by the Board of Trustees of the VIP.

(15) **VIP 1-3 Year High-Quality Bond Fund.** This fund is a fixed income investment portfolio designed to provide another pooled investment alternative to those Participants that have excess funds and that have an investment horizon greater than that of money market instruments, typically one year or longer. The investment objective is to:

a. Exceed the return of the Bank of America Merrill Lynch One-to Three-Year U.S. Corporate & Government Index over three-year periods

b. Preserve capital

The VIP 1-3 Year High Quality Bond Fund will generally invest in securities with greater potential returns and risk than those offered by money market type instruments. The fund is governed by the Board of Trustees of the VIP.

E. **Portfolio Diversification.** The Investment Portfolio will be diversified by security type and institution. The maximum percentage of the portfolio permitted in each eligible security is as follows:

Permitted Investment	Sector Limit	Issuer Limit
Treasury Bonds, Notes and Bills	100%	100%
Federal Agency Obligations	100%	35%
Municipal Obligations	15%	5%
Commercial Paper	25%	5%
Bankers' Acceptances	25%	5%
Corporate Notes	25%	3%
Negotiable CDs and Bank Deposit Notes	25%	3%
Permitted Investment	**Sector Limit**	**Issuer Limit**
Money Market Mutual Funds	100%	100%
LGIP	100%	100%
SNAP Fund (bond proceeds only)	100%	100%
Repurchase Agreements	35%	35%
Collateralized Bank Deposits	100%	100%
Supra Sovereign Agency Bonds	15%	10%
VIP Stable NAV Liquidity Pool	100%	100%
VIP 1-3 Year High-Quality Bond Fund	100%	100%

The Sector Limit and Issuer Limit will be applied to the total Investment Portfolio value at the date of acquisition.

F. **Maximum Maturity.** Maintenance of adequate Liquidity to meet the cash flow needs of HRSD is essential. Accordingly, to the extent possible, the investment portfolio will be structured in a manner that ensures sufficient cash is available to meet anticipated Liquidity needs. Whenever practical, selection of investment maturities will be consistent with the known cash requirements of HRSD in order to minimize the forced sale of securities prior to maturity. For the purposes of the Investment Policy:

(1) *The Funds Invested under* the **Operating Liquidity Strategy** will be invested in short-term investments maturing in 12 months or less. Because of the difficulties inherent in accurately forecasting all cash flow requirements, at least 25 percent of *the funds invested under* this strategy will be continuously invested in readily available funds such as bank deposit accounts, money market funds and overnight

repurchase agreements and at least 75 percent of this strategy will be invested in securities with maturities less than 180 days.

(2) ~~The~~*The Funds Invested in pursuant to* **Total Return Strategy** will be invested in permitted investments with a stated maturity of not more than five years from the date of purchase. To manage volatility, the Director of Finance will from time-to-time determine an investment duration target which will not exceed three years and which will be comparable to the selected performance standards as identified under the Performance Standards section of this Policy.

(3) *The Funds invested under* the **Capital Investment Strategy** will be invested in compliance with the specific requirements of the Trust Agreements. However, in no case will bond proceeds, or funds set aside for capital projects, be invested in securities with a term to maturity that exceeds the expected disbursement date of those monies.

(4) *Accounts credited to* Debt Service Reserve funds with longer term investment horizons may be invested in securities exceeding five years, provided that such investments will mature no later than the first call date for the related bonds.

G. **Security Downgrades.** ~~In the event that~~*If* any security held in the Investment Portfolio is downgraded below "AA" or equivalent rating by any NRSRO, the security will be sold within 180 days of such downgrade.

H. **Self-Liquidity**. In the event that HRSD determines to provide Self-Liquidity for any issuance of CP, VRDs, or related indebtedness ~~investments of~~*, funds invested under* the Operating Liquidity Strategy and the Total Return Strategy may be used to support such obligations, if necessary, provided that HRSD will not be legally obligated to pledge such funds for such purpose. The investments identified to provide Self-Liquidity coverage will be sufficient to meet the quality, volatility, liquidity, and maturity guidelines of the NRSRO's then providing ratings on HRSD's debt obligations. If needed, HRSD is permitted to purchase its own debt on a temporary basis or for the retirement of the debt. Such purchase will not be limited to the sector and issuer diversification limits as set forth in the Portfolio Diversification section of this policy or the maximum maturity requirement as set forth in the Capital Investment Strategy section of this Policy.

I. **Investment of Bond Proceeds**. HRSD intends to comply with all applicable sections of the Internal Revenue Code as it relates to Arbitrage Rebate and

the investment of bond proceeds. All investment records will be maintained to ensure compliance with all regulations.

J. **Collateralization of Bank Deposits.** All bank deposits of HRSD should be considered Public Deposits as defined by Code of Virginia Security for Public Deposits Act (Section 2.2-4400 et seq.) and all deposits must be made with Qualified Public Depositories within the meaning of such law.

K. **Selection of Broker/Dealers.** All broker/dealers who desire to provide investment services to HRSD will be provided with current copies of HRSD's Financial Policy. Before an organization can provide investment services to HRSD, it must confirm in writing that it has received and reviewed HRSD's Financial Policy.

(1) At the request of the Director of Finance, broker/dealers will supply HRSD with information sufficient to adequately evaluate their financial capacity and creditworthiness. The following information will be provided:

(a) Audited financial statements;

(b) Regulatory reports on financial condition;

(c) Proof of Financial Institution Regulatory Authority (FINRA) certification and of state registration;

(d) A sworn statement by an authorized representative of the broker/dealer pledging to adhere to Capital Adequacy Standards established by the Federal Reserve Bank and acknowledging the broker/dealer understands that HRSD has relied upon this pledge; and

(e) Any additional information requested by the Director of Finance in evaluating the creditworthiness of the institution.

(2) Only firms meeting the following requirements will be eligible to serve as broker/dealers for HRSD:

(a) "Primary" dealers and regional dealers that qualify under ~~Securities and Exchange Commission~~*SEC* Rule 15c3-1 (Uniform Net Capital Rule);

(b) *Unrestricted* Capital of at least $10,000,000;

(c) Registered as a dealer under the Securities Exchange Act of 1934;

(d) Member of the FINRA;

(e) Registered to sell securities in the Commonwealth of Virginia; and

(f) Engaged in the business of effecting transactions in U.S. government and agency obligations for at least five consecutive years.

(3) HRSD will designate broker/dealers on an annual basis.

L. **Competitive Selection of Investment Instruments.** All securities purchases and sales will be transacted only with designated broker/dealers through a formal and competitive process requiring the solicitation and evaluation of at least three bids/offers, taking into consideration current market conditions~~.~~ *and any applicable provisions of the IRS Code.* Electronic bids will be accepted. HRSD will accept the bid which, in the sole judgment of the Director of Finance or his/her designee: (1) *can be accepted under applicable provisions of the IRS Code; (2)* offers the highest rate of return within the maturity required; and (~~2~~*3*) optimizes the investment objective of the overall investment portfolio, including diversification requirements. When selling a security, HRSD will select the bid that generates the highest sale price, consistent with the diversification requirements~~.~~ *and any applicable provisions of the IRS Code.*

M. **Safekeeping and Custody.** All investment securities purchased by HRSD or held as collateral on deposits or investments will be held by HRSD or by a third-party custodial agent that may not otherwise be counterparty to the investment transaction.

(1) All securities in HRSD's investment portfolio will be held in the name of HRSD and will be free and clear of any lien. Further, all investment transactions will be conducted on a delivery versus payment basis. On a monthly basis, the custodial agent will provide reports that list all securities held for HRSD, the book value of holdings, and the market value as of month-end.

(2) HRSD officials and representatives of the custodial agent responsible for, or in any manner involved with, the safekeeping and custody process of HRSD will be bonded in such a manner as to protect HRSD from losses from malfeasance and misfeasance.

~~(3) Original copies of non-negotiable certificates of deposit and~~ *(3)* Confirming copies of all other investment transactions must be delivered to HRSD or its custodial agent.

N. **Internal Controls.** The Director of Finance will establish a framework of internal controls governing the administration and management of HRSD's investment portfolio, and these controls will be documented in writing. Such controls will be designed to prevent and control losses of HRSD monies arising from fraud, employee error, and misrepresentation by third parties, unanticipated changes in financial markets, or imprudent actions by any personnel. The internal control structure will be designed to provide reasonable assurance that these objectives are met. The concept of reasonable assurance recognizes that: (1) the cost of a control should not exceed the benefits likely to be derived, and (2) the valuation of costs and benefits ~~require~~*requires* estimates and judgments by management.

O. **Records and Reports.** The Director of Finance will prepare an investment report on at least a quarterly basis for the Commission.

P. **Performance Standards.** The investment portfolio will be designed to obtain at least a market level rate of return, given budgetary and economic cycles, commensurate with HRSD's investment risk and cash flow needs. HRSD's portfolio management approach will be active, allowing periodic restructuring of the investment portfolio to take advantage of current and anticipated interest rate movements.

(1) The returns on HRSD's investments will be compared on a quarterly basis to indices of U.S. Treasury securities having similar maturities or to other appropriate benchmarks.

(2) The applicable benchmarks for each of HRSD's three major Investment strategies are listed below:

Fund	**Benchmark**
Operating Liquidity	3-Month Treasury Bill or Effective Federal Funds rate
Total Return	Merrill Lynch 1-3 Year U.S. Corporate & Government Index over three-year periods
Capital Investment	3-Month Treasury Bill, Effective Federal Funds rate, Virginia LGIP or similar index appropriate to the duration of the expected cash flows

Q. **Engagement of Investment Managers.** The Director of Finance may engage one of more qualified firms to provide discretionary investment management services in compliance with this Policy for HRSD. All investment management firms who desire to provide investment services to HRSD will be provided with current copies of HRSD's Investment Policy. Before an organization can provide investment services to HRSD, it must confirm in writing that it has received and reviewed HRSD's Investment Policy. The Director of Finance will conduct appropriate due diligence in the selection of qualified investment management firms and will periodically confirm a manager's qualifications by visiting that manager's operational facilities that provide services to HRSD.

(1) Only firms meeting the following requirements will be eligible to serve as investment manager for HRSD:

(a) Registered with the SEC under the Investment Advisers Act of 1940;

(b) Must provide to HRSD an annual updated copy of Form ADV, Part II;

(c) Must be registered to conduct business in the Commonwealth of Virginia; and

(d) Must have proven experience in providing investment management services under Code of Virginia ~~§~~Sections 2.2-4500 et seq.

(2) Any firm engaged by HRSD to provide investment services will:

(a) Maintain a list of approved security brokers/dealers selected by creditworthiness who are authorized to provide investment services in the Commonwealth of Virginia;

(b) Provide monthly reports of transactions and holdings to the Director of Finance;

(c) Provide performance reports, at least quarterly, that display investment performance in comparison to HRSD's investment benchmarks; and

(d) Not collect any soft dollar fees from any broker/dealer or other financial firm in relation to services provided to HRSD.

4.3.3 Retiree Health Plan Trust

A. **Background.** HRSD established the Hampton Roads Sanitation District Retiree Health Plan Trust (the Trust) originally effective July 1, 2002, and amended and restated effective January 22, 2008 and November 25, 2008. The Trust provides for funding of non-pension~~/~~ *and* Other Post-Employment Benefits *(OPEB),* for employees who meet the age and service requirements outlined in the Hampton Roads Sanitation District Health Benefits Plan (the Plan) originally effective July 1, 2002, as it may be amended from time to time.

B. **Purpose.** The main investment objective of the Trust is to achieve long-term growth of Trust assets by maximizing long-term rate of return on investments and minimizing risk of loss in order to fulfill HRSD's current and long-term OPEB obligations. The purpose of the Policy is to achieve the following:

(1) Document investment objectives, performance expectations and investment guidelines for Trust assets.

(2) Establish an appropriate investment strategy for managing all Trust assets, including an investment time horizon, risk tolerance ranges and asset allocation to provide sufficient diversification and overall return over the long-term time horizon of the Trust.

(3) Establish investment guidelines to control overall risk and liquidity.

(4) Establish periodic performance and cost reporting requirements that will effectively monitor investment results and ensure that the investment policy is being followed.

(5) Comply with all fiduciary, prudence, due diligence and legal requirements for Trust assets.

C. **Investment Authority.** HRSD, as Plan Administrator (the Administrator), has oversight authority of certain policies and procedures related to the operation and administration of the Trust. Pursuant to the terms of the Trust, the Trustee is to hold title to the trust assets held for the Plan and to operate exclusively in the capacity as a directed Trustee. HRSD, as the named Administrator, has the authority not only to direct the Trustee but to appoint one or more investment managers. The Administrator will have authority to implement the investment policy and guidelines in the best interest of the Trust to best satisfy the purposes of the Trust.

(1) The Administrator has a fiduciary duty to the Trust and the participants and beneficiaries, which requires integrity and competence. Integrity requires management of the Trust and the assets for the exclusive benefit of the Trust's participants and beneficiaries. The required level of competence is that of a prudent person acting in like capacity and familiar with such matters would act. This standard of competence extends to the retention and supervision of expert investment advice and all other areas of Trust's management.

(2) In implementing this Policy, the Administrator, in accord with the provisions of the Trust, may delegate certain functions to:

(a) An investment advisor (the Investment Advisor) to assist the Administrator in the investment process and to maintain compliance with this Policy. The Investment Advisor may assist the Administrator in establishing investment policy objectives and guidelines. The Investment Advisor will adjust asset allocation for the Trust subject to the guidelines and limitations set forth in this Policy. The Investment Advisor will also select investment managers (Managers) and strategies consistent with its role as a fiduciary for the Trust. The investment vehicles allowed may include mutual funds, commingled trusts, separate accounts, limited partnerships and other investment vehicles deemed to be appropriate by the Investment Advisor. The Investment Advisor is also responsible for monitoring and reviewing investment managers; measuring and evaluating performance; and other tasks as deemed appropriate in its role as Advisor for Trust assets. The Investment Advisor may also select investment managers with discretion to purchase, sell, or hold specific securities, such as Exchange Traded Funds, that will be used to meet the Trust's investment objectives. The Investment Advisor shall never take possession of securities, cash or other assets of the Trust, all of which shall be held by the custodian. The Investment Advisor must be registered with the SEC. The Director of Finance will conduct appropriate due diligence in the selection of the Investment Advisor and will periodically confirm the Investment Advisor's qualifications by visiting its operational facilities that provide services to the Trust and HRSD.

(b) A custodian to physically maintain possession of securities owned by the Trust, collect dividend and interest payments, redeem maturing securities, and effect receipt and delivery following purchases and sales, among other things. The

custodian may also perform regular accounting of all assets owned, purchased, or sold, as well as movement of assets into and out of the Trust.

(c) A trustee appointed by the Trust, such as a bank trust department, if the Trust does not have its own Trustees, to assume fiduciary responsibility for the administration of Trust assets; provided, however, that if the Administrator shall have appointed an investment advisor, then any trustee appointed under this paragraph shall have no authority with respect to selection of investments.

(d) Specialists such as attorneys, auditors, actuaries and, retirement plan consultants to assist the Administrator in meeting its responsibilities and obligations to administer Trust assets prudently.

(3) HRSD ~~members~~*Commissioners*, staff, investment advisors, consultants and managers will refrain from engaging in any activity that impairs (or has the potential to impair) their ability to make impartial investment decisions for the Trust. Persons who nevertheless engage in such conduct will immediately disclose the conduct to the Administrator. HRSD members, staff, investment managers and advisers will also immediately disclose to the Administrator any activity engaged in by their respective firms, employers, employees and agents which conflicts (or has the potential to conflict) with the execution of HRSD's investment program for the Trust.

D. **Statement of Investment Objectives.** The investment objectives of the Trust are as follows:

(1) **Funding.** The primary objective of the Administrator is to maintain the assets of the Trust at the funding level necessary to provide a pool of funds to be used to provide post-retirement welfare benefits to Plan participants. To obtain this objective the Administrator will diversify Trust assets and adopt an investment strategy consistent with the Trust's investment objectives.

(2) **Safety.** In order to maintain the safety of Trust assets the Administrator will:

(a) Invest assets of the Trust in a manner consistent with the following fiduciary standards: all transactions undertaken must

be for the sole interest of Trust beneficiaries and defray reasonable expenses in a prudent manner, and assets are to be diversified in order to minimize the impact of large losses in individual investments.

(b) Conserve and enhance the value of Trust assets in real terms through asset appreciation and income generation, while maintaining a moderate investment risk profile.

(c) Minimize principal fluctuations over the Time Horizon (as defined below).

(d) Achieve a long-term level of return commensurate with contemporary economic conditions and equal to or exceeding the investment objective set forth in this policy under the Performance Expectations section of the Policy.

(3) **Liquidity.** The Trust's Investment Portfolio in combination with the projected net cash flows will provide sufficient Liquidity to enable the Plan to meet all operating requirements which may be reasonably anticipated.

E. **Investment Guidelines.** Within this section of the Policy, several terms will be used to articulate various investment concepts. The descriptions are meant to be general and may share investments otherwise considered to be in the same asset class. They are:

(1) Growth Assets - a collection of investments and/or asset classes whose primary risk and return characteristics are focused on capital appreciation. Investments within ~~the Growth Assets~~*this* category can include income and risk mitigating characteristics, so long as the predominant investment risk and return characteristic is capital appreciation. Examples of such investments or asset classes are: domestic and international equities or equity funds, private or leveraged equity, certain real estate investments, and hedge funds focused on equity risk mitigation or equity-like returns.

(2) Income Assets - a collection of investments and/or asset classes whose primary risk and return characteristics are focused on income generation. Investments within the Income Assets category can include capital appreciation and risk mitigating characteristics, so long as the primary investment risk and return characteristic is income generation. Examples of such investments or asset classes are: fixed income securities, guaranteed investment contracts, certain real estate

investments, and hedge funds focused on interest rate risk mitigation or income investment-like returns.

(3) Real Return Assets - a collection of investments and/or asset classes whose primary risk and return characteristics are focused on real returns after inflation. Investments within ~~the Real Return~~*this* category can include inflation protected securities, commodities, certain real estate investments and hedge funds.

F. **Time Horizon.** The Trust's investment objectives are based on a market-cycle investment horizon so that interim fluctuations should be viewed with appropriate perspective. HRSD has adopted a long-term investment horizon such that the chances and duration of investment losses are carefully weighed against the long-term potential for appreciation of assets.

G. **Liquidity and Diversification.** Trust will hold an adequate amount of protected liquidity needs for benefit payments and expenses in cash or cash equivalents, as determined necessary. The liquidity assets will be invested in accordance with statutory requirements applicable to liquid assets, as determined by the Administrator. The remaining assets will be invested in longer-term securities.

Investments will be diversified with the intent to minimize the risk of long-term investment losses. The total portfolio will be constructed and maintained to provide prudent diversification with regard to the concentration of holdings in individual issues, issuers, countries, governments or industries.

H. **Asset Allocation.** The Administrator recognizes that asset allocation is one of the most important investment decisions that an investor makes. The Administrator or Investment Advisor, as appropriate, will allocate Trust assets in keeping with the Prudent Person Rule. The Administrator or Investment Advisor has determined that to achieve the greatest likelihood of meeting the applicable investment objectives and achieving the best balance between risk and return for optimal diversification, the Trust should allocate assets into two broad classes called Investment Assets and Liquidity Assets.

(1) The Investment Assets will be invested in accordance with the targets for each asset class as follows to achieve an average total annual rate of return that is equal to or greater than the Trust's actuarial discount rate as described in the Section titled "Performance Expectations." The Liquidity Assets will be held in cash equivalent investments and used to pay for benefits and expenses of the Trust.

(2) The Administrator, Investment Advisor, or Managers will have discretion to temporarily invest a portion of the assets in cash reserves when they deem it appropriate. However, the Investment Advisor and each Manager will be evaluated against their peers on the performance of the total funds under their direct management.

INVESTMENT ASSETS

Asset Classes	Asset Range	Weightings Target
Growth Assets		
Domestic Equity	19% - 59%	39%
International Equity	1% - 41%	21%
Other	0% - 10%	0%
Income Assets		
Fixed Income	20% - 60%	40%
Other	0% - 10%	0%
Real Return Assets	0% - 20%	0%
Cash Equivalents	0% - 20%	0%

LIQUIDITY ASSETS

Asset Classes	Asset Range	Weightings Target
Cash Equivalents	0% - 100%	100%

I. **Rebalancing Philosophy.** The asset allocation range established by this Policy represents a long-term perspective. For that reason, rapid unanticipated market shifts or changes in economic conditions may cause the asset mix to fall outside the Policy range. When these divergences occur, the Administrator or Investment Advisor, as appropriate, will rebalance the asset mix to its appropriate targets and ranges. Rebalancing will typically occur on at least a quarterly basis, unless the divergence is deemed an appropriate tactical strategy by the Administrator or Investment Advisor. Similarly, if the cash requirement to handle liquidity needs falls to a level at which near-term distributions (over the following six months or less) cannot be met and no contributions are anticipated, the Administrator or Investment Advisor will rebalance the fund to its appropriate targets and ranges.

Regarding allocating contributions to the Trust, the Administrator or Investment Advisor will review the Trust allocation and fill the liquidity allocation first and the remaining investment allocations last.

J. **Risk Tolerance.** The Trust will be managed in a style that seeks to minimize principal fluctuations over the established Time Horizon and that is consistent with the Trust's investment objectives.

K. **Performance Expectations.** Over the long-term, a rolling five- year period, the performance objective for Trust assets will be to achieve an average total annual rate of return that is equal to or greater than the Trust's current actuarial discount rate. Additionally, it is expected that the annual rate of return on Trust assets will be commensurate with the then prevailing investment environment. Measurement of this return expectation will be judged by reviewing returns in the context of industry standard benchmarks, peer universe comparisons for individual Trust investments and blended benchmark comparisons for the Trust in its entirety. Costs will be reviewed by the Administrator and Investment Advisor to determine that they are minimized to the extent possible and are reasonable when compared to benchmarks.

L. **Selection of Investment Managers.** The Administrator or Investment Advisor will prudently select appropriate investment managers to manage the assets of the Trust. Managers must meet the following criteria:

(1) The investment manager must be a bank, insurance company, or investment adviser as defined by the Investment Advisers Act of 1940.

(2) With respect to Trust assets invested in a mutual fund, the *investment* manager must provide historical quarterly performance data for the mutual fund compliant with SEC and ~~Financial Industry Regulatory Authority (FINRA)~~*FINRA* standards.

(3) The investment manager must provide historical quarterly performance data compliant with Global Investment Performance Standards, SEC, FINRA or industry recognized standards, as appropriate, calculated on a time-weighted basis, based on a composite of all fully discretionary accounts of similar investment style and reported net of fees.

(4) The investment manager must provide detailed information on history of the firm, key personnel, key clients, fee schedule (including most favored nation clauses) and support personnel.

(5) The investment manager must clearly articulate the investment strategy that will be followed and document that the strategy has been successfully adhered to over time.

(6) The investment professionals making the investment decisions must have a minimum of three years of experience managing similar strategies either at their current or at previous firms.

(7) The investment manager for portfolios other than Pooled Vehicles (see the following Guidelines for Portfolio Holdings) must confirm that it has received, understands and will adhere to this policy and any manager specific policies by signing a consent form.

M. **Guidelines for Portfolio Holdings.** The Administrator will make every effort to prudently select funds that follow the guidelines listed below.

(1) Until the Trust reaches a size for which investment in separate accounts is viable and appropriate, the Trust will invest in pooled vehicles such as commingled and/or mutual funds. Pooled vehicles are regulated by either the Office of the Comptroller of the Currency (OCC) or the SEC and provide the Trust the ability to appropriately diversify its holdings in a cost-effective manner. Inherent within the Pooled Vehicle structure is the limitation on customizing the underlying security selection based on Trust specific economic, social or other screens.

(2) **Direct Investments by Advisor.** Every effort shall be made, to the extent practical, prudent and appropriate, to select investments that have investment objectives and policies that are consistent with this Policy ~~Statement~~ (as outlined in the following sub-sections of the Guidelines for Portfolio Holdings). However, given the nature of the investments, it is recognized that there may be deviations between this Policy ~~Statement~~ and the objectives of these investments.

(3) **Limitations on Investment Manager's Portfolios.**

(a) **Growth Assets.**

Equities. Not more than five percent or weighting in the relevant index (Russell 3000 Index for U.S. issues and MSCI All County World Index (ACWI) ex-U.S. for non-U.S. issues) of the total equity portfolio valued at market may be invested in the common stock of any one corporation. MSCI is a publically traded company that is an independent provider of research-

driven insights and tools for institutional investors. The MSCI ACWI is an index that captures all sources of equity returns in 23 developed and 23 emerging markets. Ownership of the shares of one company will not exceed two percent of those outstanding. Not more than 25 percent of stock valued at market may be held in any one sector, as defined by the Global Industry Classification Standard.

(1) **Domestic Equities.** Other than these constraints, there are no quantitative guidelines suggested as to issues, industry or individual security diversification. However, prudent diversification standards should be developed and maintained by the investment manager(s).

(2) **International Equities.** The overall non-U.S. equity allocation, if any, should include a diverse global mix that is comprised of the equity of companies from multiple countries, regions and sectors.

(b) **Income Assets.**

Fixed Income. Fixed income securities, other than U.S. Treasury~~/~~ *Bonds/Note/Bills or* Federal Agency issues, of any one issuer *or obligation* will not exceed five percent of the total bond portfolio at time of purchase. The five percent limitation does not apply to issues of the U.S. Treasury.

The overall weighted rating of the fixed income assets will be at least "A", based upon the ratings of such assets from a NRSRO.

(c) **Other Assets (Growth and Income Assets).**

Other Assets (Alternatives). Alternatives may consist of non-traditional asset classes such as real estate and commodities, when deemed appropriate. The total allocation to this category may not exceed 10 percent of the overall portfolio.

Real Estate. Consists of publicly traded Real Estate Investment Trust (REIT) securities and/or non-publicly traded private real estate and shall be diversified across a broad array of property types and geographic locations. Investments of this type are designed to provide a stable level of income combined with potential for price appreciation, particularly in periods of

unexpected inflation. For private real estate, the illiquid, long-term nature should be considered. For purposes of asset allocation targets and limitations, publicly traded REITs will be categorized as "Other" under the Growth Assets category. Depending on the investment characteristics of a private real estate fund, the fund will be categorized as "Other" under either the Income Assets category, for example, a core real estate fund, or under the Growth Assets category, for example, an opportunistic real estate fund where capital gains are expected to make up a significant portion of the total return.

Portfolio Risk Hedging. Portfolio investments designed to hedge various risks including volatility risk, interest rate risk, etc. are allowed to the extent that the investments are not used for the sole purpose of leveraging Trust assets. One example of a hedge vehicle is an Exchange Traded Fund ("ETF") which takes short positions.

(d) **Real Return Assets.**

Inflation Hedge. Shall consist of pooled vehicles holding among other assets: TIPS, commodities or commodity contracts, index-linked derivative contracts, certain real estate or real property funds and the equity of companies in businesses thought to hedge inflation. Inflation hedge assets will be reported in the Real Return Assets category.

If the credit quality of any one issue should drop below investment grade (as defined by *at least* two of the *following* three ~~rating agencies~~*NRSROs* – Fitch, Moody's and ~~Standard & Poor's~~*S&P*), the investment manager should notify the Administrator and Investment Advisor immediately detailing a plan of action regarding the security.

(e) **Cash Equivalents.** Liquidity and temporary cash equivalent reserves will be invested according to the provisions of Code of Virginia Sections 2.2-4500 through 2.2-4518 applicable to liquid assets.

(f) **Additional Limitations.**

(1) **Prohibited Investments.** Except for purchase within authorized investments, the following investments and transactions are not authorized and will not be purchased:

- Letter stock and other unregistered securities,
- Direct commodities or commodity contracts,
- Short sales,
- Margin transactions,
- Private placements (with the exception of Rule 144A securities),
- Venture capital funds,
- Private equity,
- Hedge funds;

Further, derivatives, options or futures for the sole purpose of portfolio leveraging (portfolio leveraging refers specifically to investments which can lead to losses in excess of 100 percent of initial invested capital) are also prohibited. Direct ownership of real estate, natural resource properties such as oil, gas or timber and the purchase of collectibles is also prohibited.

(2) **Safekeeping.** All securities will be held by a third-party custodian selected through a public procurement process by the Administrator, pursuant to contract approval, for safekeeping. The custodian will produce statements monthly listing the name and value of all assets held, and the dates and nature of all transactions. Assets of the Trust held as liquidity or investment reserves will, at all times, be invested in interest-bearing accounts. Investments and portfolio securities may not be loaned.

(g) **Control Procedures.**

(1) **Legal Requirements, Controls, and Investment Policy Statement Review.** At all times the Administrator will comply with all ~~local,~~ State, and federal reporting requirements. The Administrator will establish, maintain and review prudent internal controls for the assets of the Trust, including those used by HRSD staff, and the Trust's Investment Advisor and custodian. The Administrator will provide for annual review of the adequacy and compliance of these control procedures.

(2) The Administrator will review the Financial Policy no less than annually and provide documentation to HRSD when their review is complete. Specifically, the

investment component of the Financial Policy will be reviewed when any one of the following occurs:

- Change in investment advisors
- Initial use of investment vehicles other than mutual funds
- Significant change in Trust assets
- Significant change in funded status
- Significant change in market conditions

(3) **Review of Investment Objectives.** The Administrator will review annually the appropriateness of ~~the~~*this* Policy for achieving the Trust's stated objectives. It is not expected that the Policy will change frequently. In particular, short-term changes in the financial markets should not require an adjustment in the investment policy.

(4) **Review of Investment Performance.** The Administrator, on a quarterly basis, will review the total Trust investment performance, including all fees and costs and provide a report to the Commission. In addition, should investment functions be delegated, the Investment Advisor will be responsible for keeping the Administrator advised of any material change in investment strategy, investment managers, and other pertinent information potentially affecting performance of the Trust.

The Administrator will compare the investment results, including all fees and costs, on a quarterly basis to appropriate benchmarks, as well as to market index returns in both equity and debt markets. Examples of benchmarks and indexes that will be used include the:

- Russell 3000 Index for broad U.S. equity strategies;
- S&P 500 Index for large cap U.S. equities,
- Russell 2000 Index for small cap U.S. equities,
- MSCI ACWI ex-U.S. Index for broad based non-U.S. equity strategies;
- MSCI Europe, Australasia, and Far East (EAFE) Index for developed markets international equities,
- Barclays Capital Aggregate Bond Index for fixed income securities, and

- U.S. 91 Day ~~T-~~*Treasury* Bill for cash equivalents
- Russell 3000 Index will be used to benchmark the U.S. equities portfolio;
- MSCI ACWI ex-U.S. Index will be used to benchmark the non-U.S. equities portfolio;
- Barclays U.S. Aggregate Bond Index will be used to benchmark the fixed income portfolio.

The categories "Other" will be benchmarked against appropriate indices depending on the specific characteristics of the strategies and funds used. The Administrator will also compare investment results with the Virginia Retirement System at the end of each fiscal year.

(5) **Voting of Proxies.** The Administrator recognizes that proxies are a significant and valuable tool in corporate governance. The voting rights of individual stocks held in separate accounts or collective, common, or pooled funds will be exercised by the investment managers in accordance with their own proxy voting policies. The voting rights of funds will be exercised by the Investment Advisor.

Investment manager(s) are expected to be aware of corporate provisions that may adversely affect stockholdings, including but not limited to "golden parachutes," "super majorities," "poison pills," "fair price" provisions, staggered boards of directors, and other tactics. Proxies should be vigorously voted with the interest of preserving or enhancing the security's value.

The investment manager(s) of a commingled trust or mutual fund that holds the assets of the Trust along with assets of other funds with conflicting proxy voting policies must reconcile the conflicting policies to the extent possible, and, if necessary, to the extent legally permissible, vote the proxies to reflect the policies in proportion to each fund's interest in the pooled fund.

(6) **Review of Actuarial Data.** The Administrator will review the Trust's actuarial data at least once every two years or more frequently if deemed necessary, to determine whether any substantive change in the

investment policy is appropriate. The Administrator will provide for an actuarial valuation in compliance with GAAP, at least ~~bi-annually.~~*every two years.*

4.4 ASSET CAPITALIZATION

4.4.1 Notifications. Accounting must be notified when any *Capital* Asset is placed in service or is in the process of disposal to ensure accurate asset records are kept.

A. **Cost.**

(1) Property, plant and equipment purchased, donated or constructed is recorded at historical cost as of the date acquired.

(2) Cost includes capitalized interest borrowed to finance the construction of major capital additions.

(3) Generally, for projects funded with both debt proceeds and other resources, it is HRSD's policy to use available debt proceeds to pay project expenditures prior to using its own resources.

(4) Assets costing below the $5,000 threshold amount are recorded as an expense in HRSD's financial statements. (5) Routine repairs and maintenance are expensed as incurred.

(6) Vehicles, office furniture, equipment, software and intangible assets are reviewed monthly to determine whether the asset meets the capitalization threshold.

(7) Assets that are constructed over a period of time, such as capital projects, treatment plants, buildings and facilities, and interceptor systems, are reviewed at completion to determine the appropriate capitalization value, which may include interest costs.

B. **Useful Life.**

(1) Assets with an economic useful life of less than 60 months are required to be expensed for financial statement purposes, regardless of the acquisition or production cost.

(2) Major repairs that substantially extend the life of an asset or expand its service capacity may be capitalized. For example, if a roof repair or coating is expected to extend the asset's useful life 20 years or beyond, the cost may be capitalized.

(3) The service lives for Capital Assets are as follows:

Treatment plants, buildings and facilities	30 years
Interceptor systems	50 years
Office furniture, computer hardware and equipment	5-10 years
Software and intangible assets	5-7 years
Automotive	5 years

5.0 RESPONSIBILITY AND AUTHORITY

These financial policies were created after much study and evaluation and were specifically adopted by the Commission. They were developed subject to the ~~confines~~*requirements* of HRSD's Trust *Agreements, the VRA Master Financing* Agreement, ~~its~~*the* Enabling Act and the Code of Virginia. Any changes and exceptions to these policies will be made in writing and approved by the Commission.

HRSD's General Manager and Director of Finance are the designated administrators of these policies. The Director of Finance shall have the day-to-day responsibility and authority for implementing the provisions of these policies.

HRSD understands that changes in the capital markets or other unforeseen circumstances may from time to time produce situations that are not covered by the Policy and will require modifications or exceptions to achieve the Policy goals. In these cases, HRSD's management flexibility is appropriate provided specific authorization from the ~~HRSD~~ Commission is obtained. *This Policy is not a contract or other obligation of HRSD, and no party shall have any right or standing to enforce any provision of this Policy.* Failure to comply in any manner with ~~the~~*this* Policy will not result in any liability on the part of HRSD to any party.

HRSD, together with HRSD's financial advisor and legal counsel, will no less than ~~bi-annually~~*every two years* review the Policy and recommend appropriate changes.

Approved: _____ _____
Frederick N. Elofson Date
Commission Chair

Attest: _____ _____
Jennifer L. Cascio Date
Commission Secretary

HRSD COMMISSION MEETING MINUTES
April 28, 2020

ATTACHMENT #3

AGENDA ITEM 12. CAPITAL IMPROVEMENT PROGRAM (CIP) QUARTERLY UPDATE PRESENTATION

HRSD

Cleaning wastewater every day for a better Bay.

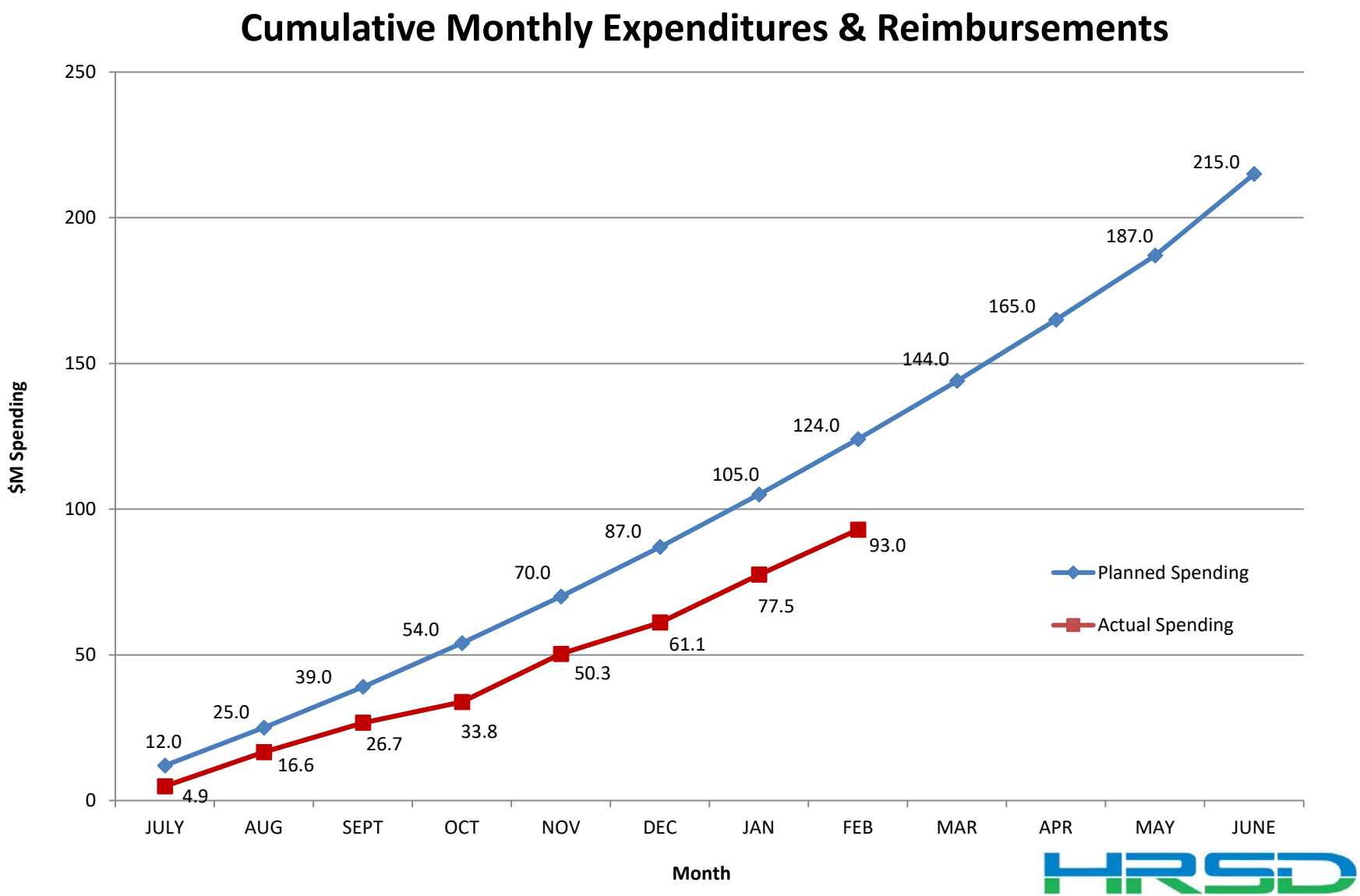
Capital Improvement Program
Commission Briefing

April 28, 2020

Outline

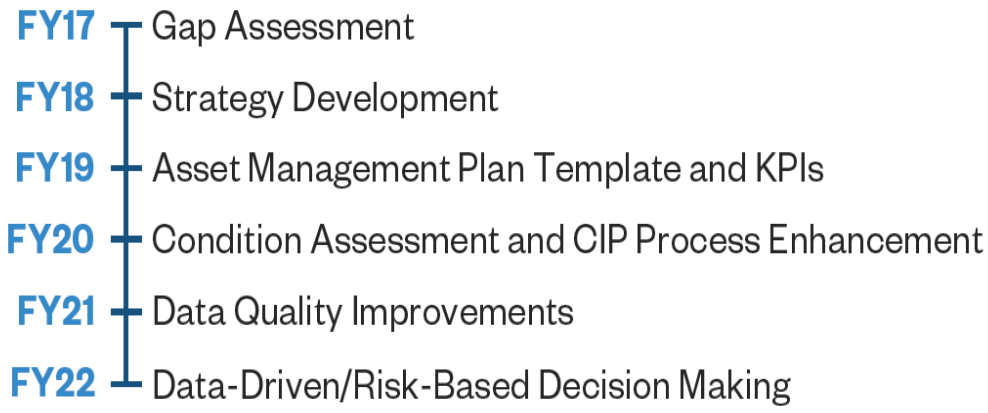
- CIP Expenditures for FY-2020
- Asset Management Program Update
- Consent Decree/Sewer Rehabilitation Plan – Project Updates
- Significant Project Updates
- Focus:
  - ➢ COVID-19 Impacts

CIP Expenditures for FY-2020

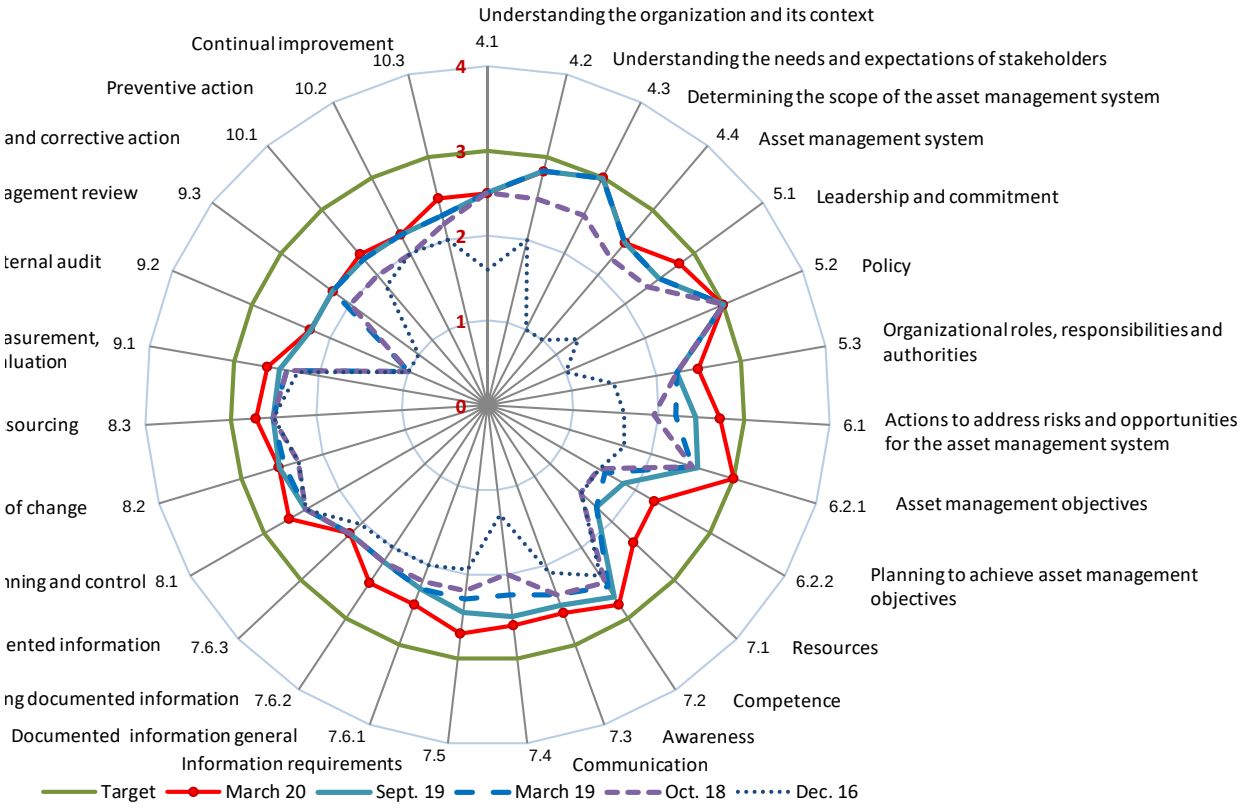


Asset Management Program Roadmap

- AM Vision: “Making the right investment at the right time”
- Purpose of Asset Management: Extending the life of assets at the lowest life cycle cost
- Asset Management Plan: A structured approach for managing an organization’s assets throughout the life cycle (Planning, design, construction, operation, maintenance, disposal).
- Key elements of AMP:
  - Risk Management
  - Maintenance Management
  - Condition Assessment
  - Data Management
  - Replacement Planning



ISO 55001 Asset Management Maturity Score

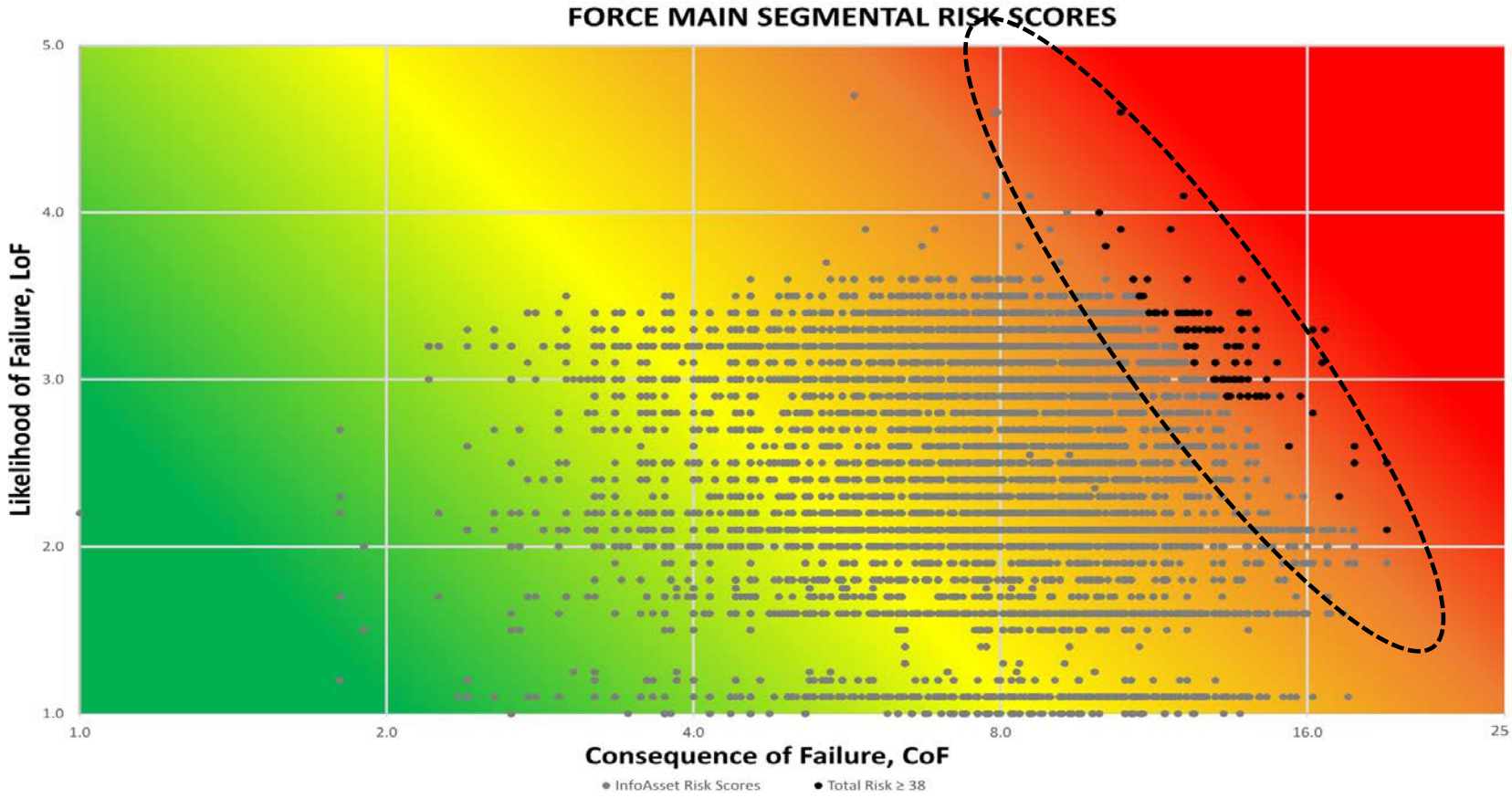


Assessment Date	Average Score
December 16	1.7
October 18	2.2
March 19	2.3
October 19	2.4
March 20	2.6

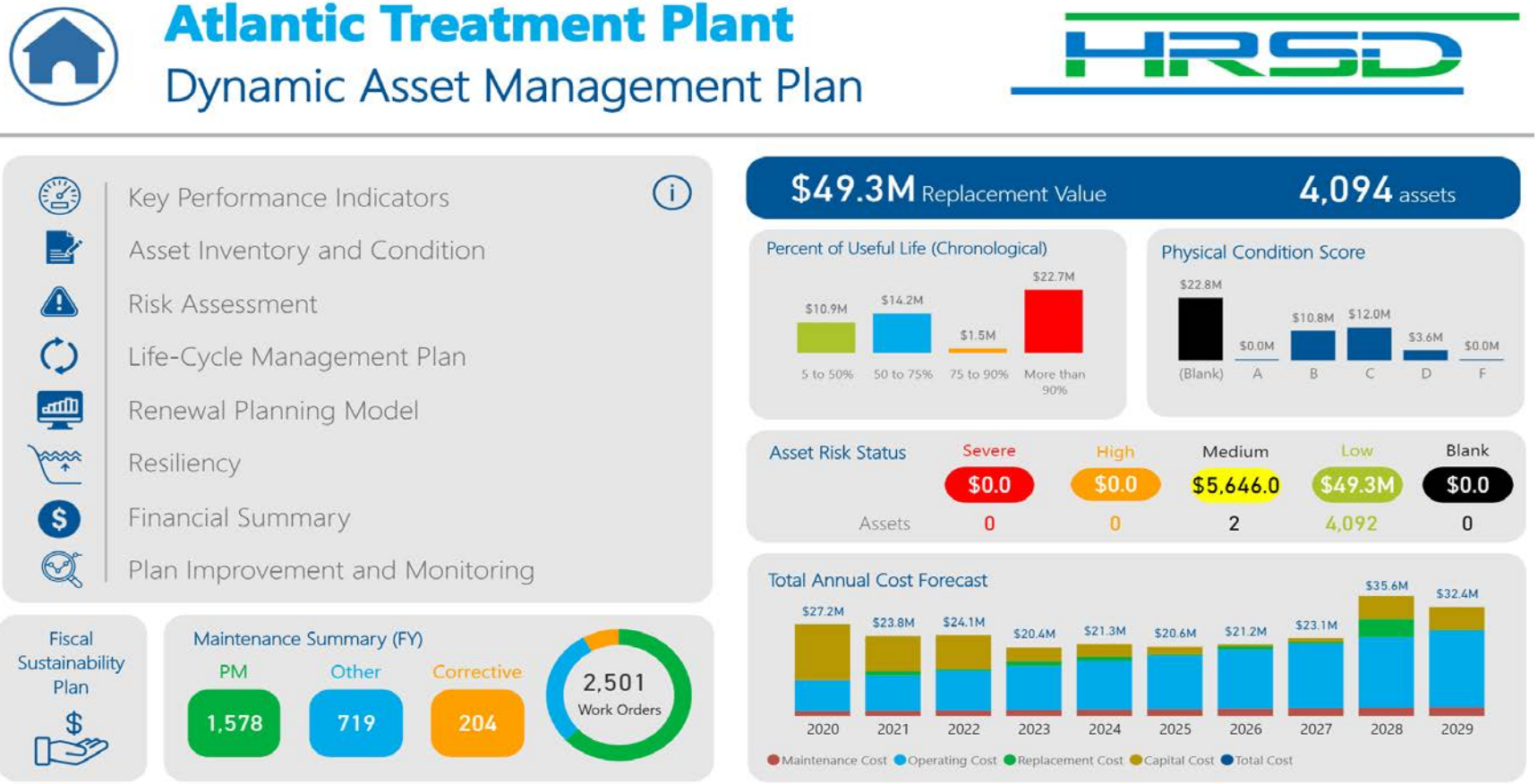
Key:

Score	Maturity Level
0	Innocent
1	Aware
2	Developing
3	Competent
4	Optimizing / Excellent

Interceptor System Risk Assessment



AM Dashboard



HRSD

Atlantic TP Replacement Planning Model

Replacement Methodology Comparison

Reset

Select Asset Class

All

Select Installation Year Range

2020 2039

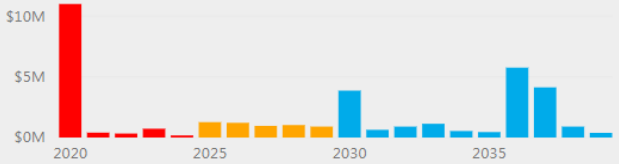
Asset Hierarchy

- A - Administrative Facilities
- B - Plant Utilities
- D - Preliminary Treatment
- E - Primary Treatment
- G - Secondary Treatment
- J - Disinfection
- K - Effluent Pumping/Water Reclamatio
- L - Scum Disposal
- M - Biosolids Thickening
- N - Biosolids Anaerobic Digestion
- P - Biosolids Storage
- Q - Biosolids Dewatering
- T - Biosolids Land Application
- U - Odor Control

Chronological Age-Based Replacement

Planned Replacement Cost by Planning Period (2019 $)

Planning Period 2020 to 2024 2025 to 2029 2030 to 2039

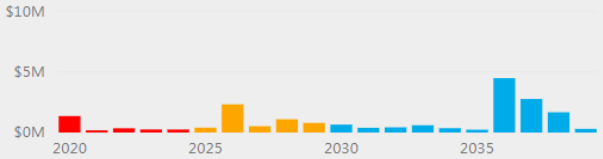


Percent of Useful Life Category (Chronological)	Count of Assets	Replacement Value
Less than 5%	492	$15,817,858
5 to 50%	783	$6,771,844
50 to 75%	538	$2,633,578
75 to 90%	265	$1,439,866
More than 90%	1,308	$20,669,466
Total	**3,386**	**$47,332,612**

Effective Age (Modified) Replacement

Planned Replacement Cost by Planning Period (2019 $)

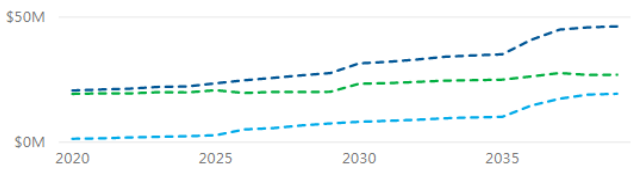
Planning Period 2020 to 2024 2025 to 2029 2030 to 2039



Percent of Useful Life Category (Effective)	Count of Assets	Replacement Value
Less than 5%	581	$17,674,899
5 to 50%	1,973	$21,107,206
50 to 75%	230	$3,811,724
75 to 90%	100	$1,472,281
More than 90%	502	$3,266,502
Total	**3,386**	**$47,332,612**

Cumulative Replacement Cost

Chronological Effective Difference



NPV Summary

Chronological Age-Based
$38.7M

Effective Age-Based
$13.9M

NPV Savings
$24.8M

Plan for Next 6 Months

- Complete condition and criticality assessments at all treatment plants
- Develop comprehensive list of asset replacement and rehab costs
- Develop Dynamic Asset Management Plans for all facilities/assets
- Optimize preventative maintenance schedules with asset risk data
- Develop predictive maintenance toolset to improve critical asset monitoring

Consent Decree/Sewer Rehabilitation Plan – Project Updates

- Consent Decree Condition Assessment Program (CAP) identified condition defects in the regional sanitary sewer system.
- EPA/VDEQ approved the Rehabilitation Action Plan (RAP) in May 2015.
- RAP addresses improvements to gravity mains, force mains, pump stations and associated system compounds.
- RAP will be implemented in three phases:
  - Phase 0 (June 2017)
  - Phase 1 (May 2021)
  - Phase 2 (May 2025)

Consent Decree/Sewer Rehabilitation Plan Project Updates (Phase 0)

CIP	Project Name	Project Status	Total CIP Cost
GN014300	North Shore Operations Unvented High Spot Correction	Complete	$945,486
VP012100	State Street Pump Station Electrical Modifications	Complete	$2,158,629

Consent Decree/Sewer Rehabilitation Plan Project Updates (Phase 1)

CIP	Project Name	Project Status	Total CIP Cost
BH012700	Hampton Trunk Sewer Extension Division B - Claremont Force Main Replacement	Complete	$4,715,273
BH014700	Boat Harbor Outlet Sewer Improvements	Design	$6,520,791
BH014800	Jefferson Avenue Extension Gravity Improvements	Construction	$3,067,392
BH015000	Orcutt Avenue and Mercury Blvd Gravity Sewer Improvements	Construction	$9,452,686
CE010400	Independence Boulevard Pressure Reducing Station Modifications	Construction	$4,127,452
CE011700	Western Trunk Force Main Replacement	Design	$4,286,000
GN011700	Pump Station Generators and Standby Pump Upgrades	Construction	$7,106,000
GN012130	Manhole Rehabilitation-Replacement Phase I and North Shore Siphon Chamber Rehabilitation Phase I	Construction	$10,853,969
GN012140	Pump Station Wet Well Rehabilitation Phase I	**Complete**	$3,219,388
GN015100	Arctic Avenue Pump Station and Newtown Road Pump Station Electrical Improvements	Complete	$364,708
JR012100	Huxley to Middle Ground Force Main Extension	Construction	$5,185,885
NP011300	Suffolk Interceptor Force Main Section I Main Line Valving Replacement	Design	$1,060,000
NP012600	Deep Creek Interceptor Force Main Replacement	Construction	$6,233,000
WB012200	North Trunk Force Main Part B Replacement	Construction	$2,004,539

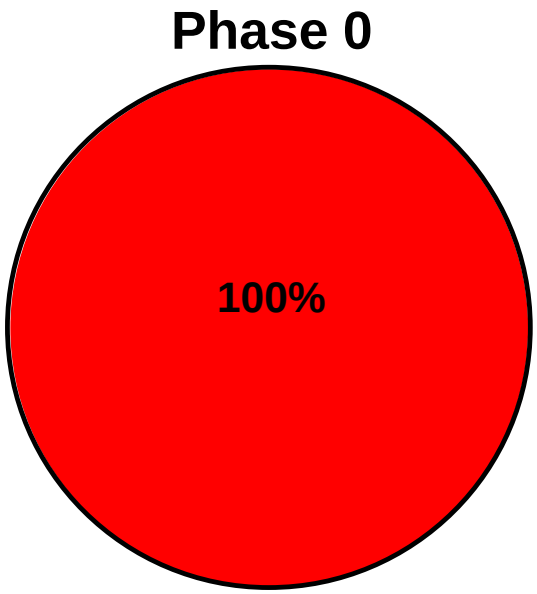
Consent Decree/Sewer Rehabilitation Plan Project Updates (Phase 2)

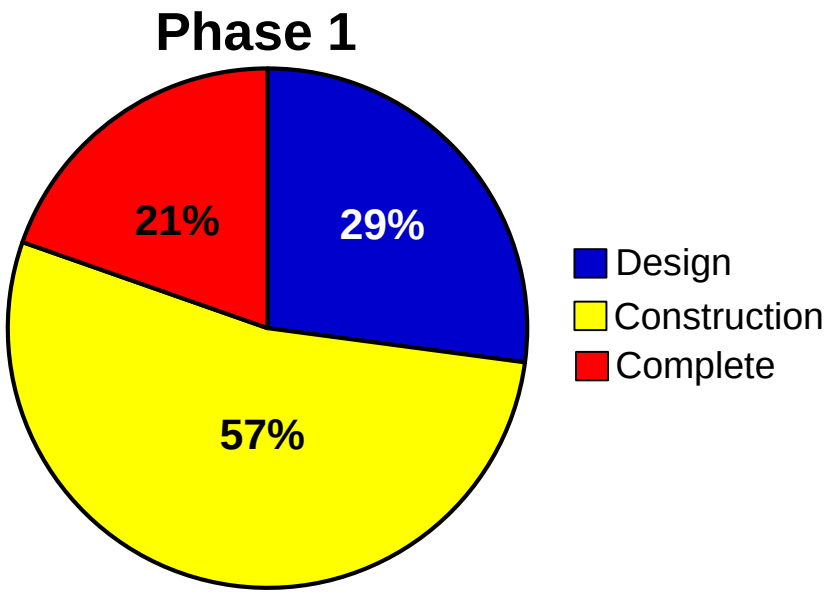
CIP	Project Name	Project Status	Total CIP Cost
AB010000	Army Base 24-Inch and 20-Inch Transmission Main Replacements	Design	$27,343,000
AT011510	Shipps Corner Interim Pressure Reducing Station	Complete	$3,622,921
AT011520	Shipps Corner Pressure Reducing Station Modifications	Proposed	$1,794,131
AT011900	Great Bridge Interceptor Extension 16-Inch Replacement	Proposed	$5,472,744
AT013000	Washington District Pump Station Area Sanitary Sewer Improvements	Design	$2,496,266
AT013100	South Norfolk Area Gravity Sewer Improvements	Proposed	$6,666,942
AT013200	Doziers Corner Pump Station and Washington District Pump Station Flooding Mitigation Improvements	Proposed	$314,358
BH014000	West Avenue and 35th Street Interceptor Force Main Replacement	**Design**	$4,404,011
BH014500	Ivy Home-Shell Road Sewer Extension Division I Replacement	Design	$2,243,200
BH014600	46th Street Diversion Sewer Rehabilitation Replacement	Design	$11,470,682
BH014900	Hampton Trunk Sewer Extension Division K Gravity Improvements	Design	$4,644,400
BH015100	Bloxoms Corner Force Main Replacement	Proposed	$3,495,808
CE011300	Birchwood Trunk 24-Inch 30-Inch Force Main at Independence Boulevard Replacement Phase II	Proposed	$1,686,224
CE011600	Poplar Hall Davis Corner Trunk 24-Inch Gravity Sewer Improvements	Proposed	$2,178,815
CE012000	Poplar Hall Davis Corner Trunk 24-Inch Gravity Sewer Improvements (I-264 VDOT Betterment)	Complete	$111,320
GN010730	Horizontal Valve Replacement Phase III	Proposed	$1,189,650

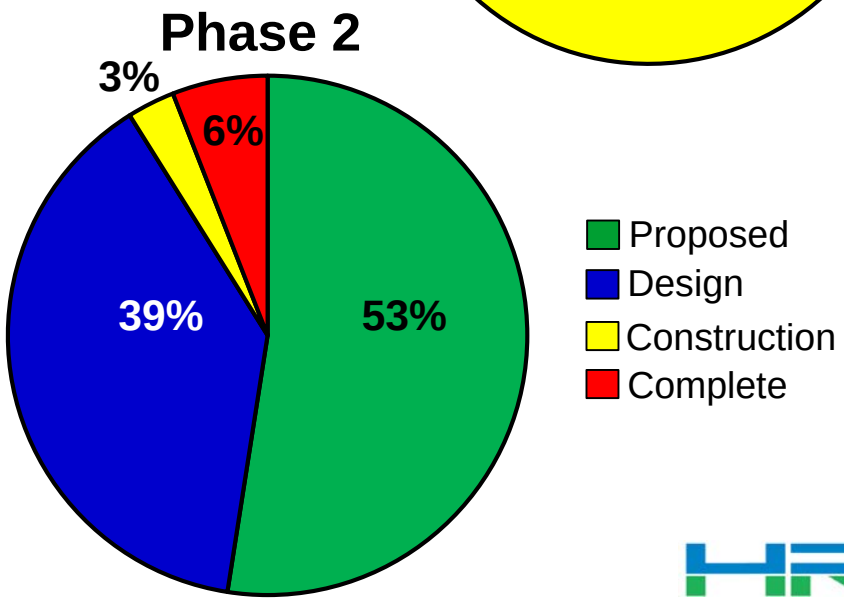
Consent Decree/Sewer Rehabilitation Plan Project Updates (Phase 2)

CIP	Project Name	Project Status	Total CIP Cost
GN014900	North Shore Gravity Sewer Improvements Phase I	Design	$5,639,906
GN015000	South Shore Gravity Sewer Improvements Phase I	Proposed	$913,381
GN015300	Interceptor System Valve Improvements Phase I	Proposed	$3,256,743
GN015400	South Shore Aerial Crossing Improvements	Proposed	$326,604
JR010600	Lucas Creek Pump Station Upgrade	Design	$2,595,000
NP010620	Suffolk Pump Station Replacement	Design	$12,049,000
NP012400	Western Branch Sewer System Gravity Improvements	Proposed	$3,404,552
NP012500	Shingle Creek and Hickman's Branch Gravity Sewer Improvements	**Construction**	$9,089,000
VP010920	Norview Estabrook Division I 18-Inch Force Main Replacement Phase II, Section 2	Proposed	$1,719,631
VP014010	**Ferebee Avenue Pump Station Replacement**	**Design**	**$5,852,747**
VP014020	Sanitary Sewer Project 1950 12 Inch Force Main and 24 and 18 Inch Gravity Replacement	Design	$7,179,000
VP014700	Ingleside Road Pump Station Replacement	**Design**	$3,810,449
VP014800	Lee Avenue-Wesley Street Horizontal Valve Replacement	Proposed	$1,109,112
VP015320	Larchmont Area Sanitary Sewer Improvements	Proposed	$16,752,950
VP015400	Lafayette Norview-Estabrook Pump Station Replacements	Design	$18,495,895
VP016500	Norview-Estabrook Division I 12-Inch Force Main Replacement	Proposed	$2,490,879
VP016700	Norview-Estabrook Division I 18-Inch Force Main Replacement Phase III	Proposed	$3,061,233
VP017100	Central Norfolk Area Gravity Sewer Improvements	Proposed	$3,094,144
VP018000	Park Avenue Pump Station Replacement	Design	$5,955,271
YR010300	Foxridge Sanitary Sewer System Sections 1, 4 & 5 Gravity and Woodland Road Fox Hill Road Gravity Sewer Rehabilitation	Proposed	$3,816,116
			$261,160,740

Consent Decree/Sewer Rehabilitation Plan Project Updates







Providence Road Offline Storage Facility

Engineers:
Kimley Horn / RK&K

Design-Build Team:
- Crowder Construction
- Hazen & Sawyer

Schedule Completion:
February 2021

Project Value: $32.0M

Funding:
HRSD Revenue Bond

Water Quality Services Building – Phase II

Architect:
Guernsey Tingle

Design-Build Team:
- Henderson, Inc.
- DJG, Inc.

Schedule Completion:
February 2021

Project Value: $20.2M

Funding:
HRSD Revenue Bond

Atlantic Treatment Plant Thermal Hydrolysis Process and FOG Receiving Station

Engineers:
HDR Engineering, Inc. / Brown & Caldwell

Construction Manager:
Crowder Construction Company

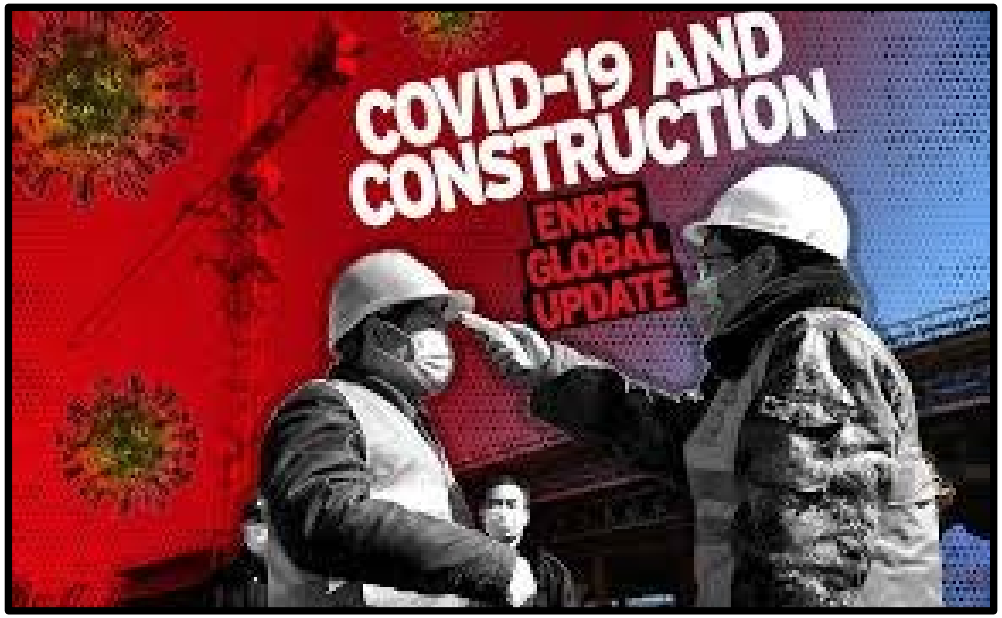
Schedule Completion:
February 2021

Project Value: $67.2M

Funding:
HRSD Revenue Bond
VRLF Loan

COVID-19 Impacts

- Staff
- Consultants
- Contractors
- Other Issues



COVID-19 Impacts (cont.)

Staff:

- Previous automation of all business processes
  - ERP (Time Sheets, E-Bidding, etc.)
  - Unifier (Project Management)
  - Infor (CMMS / Asset Management)
  - Skype/Zoom/MS Teams

- Telework, Telecommuting, Teleconferencing

COVID-19 Impacts (cont.)

Consultants:

- Remote work (collaboration very common)
- Larger firms – Limited impacts
- Smaller firms – Some impacts (SBA Loans)

HRSD

NOTICE OF ESSENTIAL WATER AND WASTEWATER UTILITY AND SUPPORTING CONTRACTOR EMPLOYEE STATUS

This Notice of Essential Water and Wastewater Utility or Supporting Contractor Employee Status

identifies the bearer of this letter, _____, accompanied by appropriate identification, as an employee performing essential job functions for continuity of the water and/or wastewater utility system including on-going design, construction and construction inspection services supporting provision of utility services necessary to protect public health. As such, it is necessary that the named employee be able to proceed to work, conduct any and all functions of his/her job in whatever setting required, and to return home after work.

This Notice is issued consistent with the U.S. Department of Homeland Security's (DHS) identification of the water and wastewater sector as one of 16 critical infrastructure areas providing a vital service to the nation as specified in DHS-Cybersecurity and Infrastructure Security Agency's Guidance on the Essential Critical Infrastructure Workforce: Ensuring Community and National Resilience in COVID-19 Response Version 2.0 (March 28, 2020). For more information, please refer to: https://www.cisa.gov/publication/guidance-essential-critical-infrastructure-workforce

This notice is issued due to the restrictions on travel and congregation issued by federal, state and local governmental authorities pertaining to the COVID-19 virus, such as "shelter-in-place," "stay-at-home" and similar other orders, declarations, advisories, and regulations.

VERIFICATION CONTACT: _____

Phone: _____

Email: _____

Authorized and approved April 2, 2020,

Ted Henifin, P.E.
General Manager

PO Box 5911, Virginia Beach, VA 23471-0911 • 757.460.7003

Commissioners: Frederick N. Elofson, CPA, Chair • Maurice P. Lynch, PhD, Vice-Chair • Vishnu K. Lakdawala, PhD
Michael E. Glenn • Stephen C. Rodriguez • Willie Levenston, Jr. • Elizabeth A. Taraski, PhD • Molly J. Ward
www.hrsd.com

Contractors:

- Adjusting to New CDC Guidelines including:

1. **No physical contact.**
2. **Maintain 6' separation unless absolutely necessary to come in closer contact.**
3. **Limit meetings of employees to 10 or less, maintaining 6' separation.**
4. **Wash your hands often, and/or use hand sanitizer, especially after being in high traffic areas.**
5. **Avoid touching your face, mouth, nose or eyes.**
6. **Cover your mouth if you sneeze or cough with a tissue (or use the inside of your elbow).**
7. **Use bottled water or water brought from home (no community coolers).**
8. **Keep work surfaces, work areas, tools and vehicle interior surfaces clean and sanitized.**
9. **Don't ride in the same vehicle with others.**
10. **Do not come to work if you are sick. Stay home, call your doctor, and let your supervisor know immediately if you believe that you have symptoms consistent with COVID-19.**

- Force Majeure letters from some contractors – Supply Chain Concerns

COVID-19 Impacts (cont.)

Other Issues:

- Contractors still aggressively bidding work
- Relaxed contractor work hours on one project
- Real Estate Acquisition becoming more challenging
- Some project delays are likely

Questions?

HRSD COMMISSION MEETING MINUTES
April 28, 2020

ATTACHMENT #4

AGENDA ITEM 17. INFORMATIONAL ITEMS

a. Management Reports
   (1) General Manager
   (2) Communications
   (3) Engineering
   (4) Finance
   (5) Information Technology
   (6) Operations
   (7) Talent Management
   (8) Water Quality
   (9) Report of Internal Audit Activities
   (10) Internal Audit – Payroll and Timekeeping

b. Strategic Planning Metrics Summary

c. Effluent Summary

d. Air Summary

e. Emergency Declaration – Little Neck Interceptor Force Main Repair

April 21, 2020

Re: General Manager's Report

Dear Commissioners:

March 2020 will always be remembered in two distinct periods, before the declaration of a National State of Emergency and after. We began the month focused on preparing for spring conferences and presentations. We were still able to celebrate length of service milestones and I was completing my series of work center meetings. We were rapidly moving toward the scheduled public hearings for expansion of the HRSD service area to include the Eastern Shore. The economy was booming, and we were concerned about the impact that was having on competitive pricing of our contracts.

By the end of the month, focus had changed significantly. Planned conferences were cancelled, along with all travel. In-person meetings were quickly replaced with virtual meetings. Teleworking, once limited to a handful of HRSD employees, became a necessity. Concerns moved from begin able to award competitive contracts to whether existing contractors would be able to continue to work. Work center visits were replaced with regular emails and a weekly Zoom meeting. We added terms like social distancing, asymptomatic and self-quarantine to our lexicon.

Significant unknowns and lack of any future certainty created widespread fear that posed a challenge to our leadership team at every level. That combination of factors would be difficult in any work environment but is amplified when leading at any level in a critical infrastructure organization largely populated by essential workers who are unable to telework. Over 600 of our people fall into this category and must travel from the safety of their homes daily to perform their jobs to protect public health and the health of our waterways.

Our leadership team and entire workforce has risen to meet this challenge and have performed incredibly. HRSD operations have not missed a beat. Permits are being met, maintenance is being done, line breaks are contained and repaired, sampling and analyses continues, contracts advertised, supplies procured, bills paid, payroll processed, construction progresses, research is moving forward, SWIFT Water is recharging the aquifer, job offers made, new employees oriented, industries monitored, safety inspections conducted, network systems maintained, desktop issues resolved, customers billed, payments received, calls answered, training provided,…if not for the masks concealing the faces, you might think nothing is out of the ordinary at HRSD.

The highlights of March's activities are detailed in the attached monthly reports.

A. **Treatment Compliance and System Operations:** All plants met permit with one mechanical failure-related line break and two contractor-related spills in the interceptor system. Other highlights for the month are included in the attached monthly reports.

B. **Internal Communications:** I participated in the following meetings/activities with HRSD personnel:

1. The CIP review meeting
2. The final two work center meetings (20 work center meetings were held between January 1 and March 12)
3. A meeting to discuss architectural review of four pump station projects in Norfolk
4. A meeting to review progress on various regional sewer system changes related to the Chesapeake-Elizabeth Treatment Plant closure
5. Two meetings related to SCADA
6. A length of service breakfast celebration
7. One new employee orientation
8. A meeting to review progress on land acquisition from Newport News related to SWIFT at James River
9. A meeting to review options for SPSA leachate disposal
10. A meeting to review ongoing reporting and monitoring of Consent Decree related-regulatory requirements over the life of the Decree
11. A review of issues related to the raw water influent pump failure at VIP
12. A meeting to review ideas customer assistance program ideas
13. A meeting of all HRSD leaders (everyone with direct reports) via Zoom to provide information and guidance on HRSD COVID-19 response

C. **External Communications:** I participated in the following meetings/activities:

1. The quarterly board and membership meeting of the Virginia Association of Municipal Wastewater Agencies (VAMWA) held virtually for the first time
2. A meeting with Hampton University (HU) regarding abandonment of the existing force main that runs in an easement through the HU campus
3. The monthly Hampton Roads Planning District Commission (HRPDC) Director of Utilities Committee meeting
4. The Virginia Beach State of the City luncheon

5. A meeting with the Newport News City Manager and senior staff related to the potential property acquisition
6. A phone conference with DEQ regarding financing options related to the Eastern Shore Force Main project and the debt associated with the Onancock Wastewater Treatment Plant
7. The quarterly meeting of Congresswoman Luria's Chesapeake Bay Advisory Board
8. A meeting with the City of Norfolk related to the cost sharing proposal for the Larchmont system improvements
9. Chaired the monthly meeting of the US Water Alliance's One Water Council via webinar
10. Revised award plans with NACWA staff for Excellence in Management due to conference rescheduling
11. Participated in a call with DEQ and VAMWA members to refine the DEQ Water Quality Improvement Fund annual needs survey
12. Attended (via telephone) the first COVID-19 regional Director's of Utilities coordination meeting

D. **Consent Decree Update:**

As a result of the economic impact of COVID-19 and the elimination of the 2021 proposed rate increase, HRSD reached out to EPA/DOJ requesting an additional two years be added to the proposed compliance dates submitted with the updated Integrated Plan.

As a result of the economic impact of COVID-19 notified EPA/DOJ of a force majeure event in accordance with the requirements of the Consent Decree. While no specific relief was requested at this time, HRSD needs to preserve the right to assert force majeure should we experience any COVID-19-related delays with our Rehab Action Plan projects or any other compliance date in the Consent Decree.

In anticipation of the General Assembly approving the Governor's proposed budget amendment that will allow for virtual meetings of public bodies in the Commonwealth during the COVID-19-related declared state of emergency, we are planning to hold the April 2020 meeting of the HRSD Commission completely virtually. While we pride ourselves on being resilient and adaptable, holding a Commission meeting entirely via Skype will be a challenge. Please be patient as we work through this first virtual meeting together.

The leadership and support you provide are the keys to our success as an organization. Thanks for your continued dedicated service to HRSD, the Hampton Roads region, the Commonwealth and the environment. **I look forward to seeing you (virtually) on Tuesday, April 28**.

Respectfully submitted,

Ted Henifin
Ted Henifin, P.E.
General Manager

TO: General Manager

FROM: Director of Communications

SUBJECT: Monthly Report for March 2020

DATE: April 6, 2020

A. Publicity and Promotion

HRSD and or/SWIFT were featured in nine news stories and editorials on topics that included:

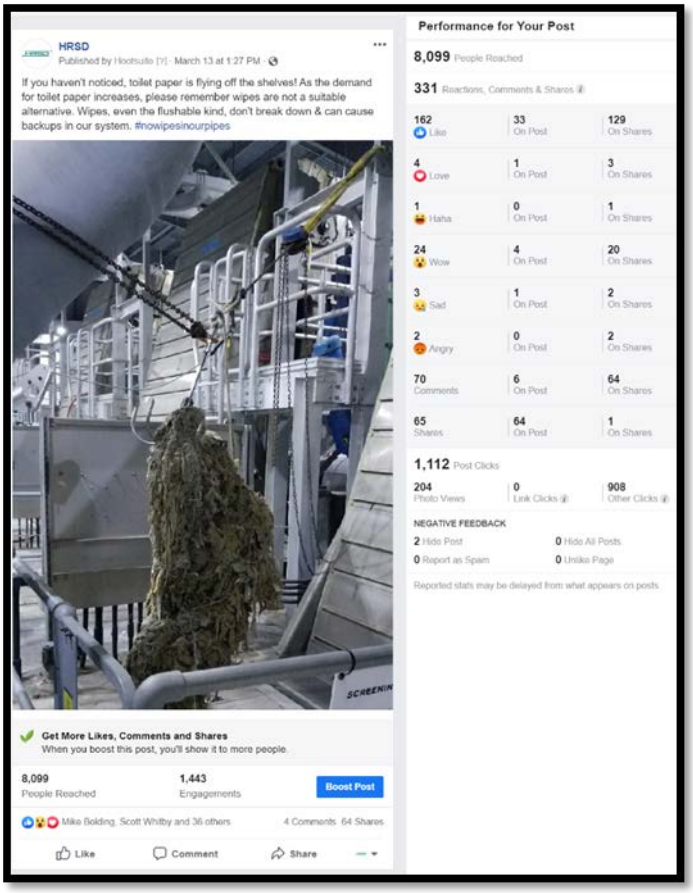
1. HRSD education on what not to flush (4 stories)
2. HRSD installation of main sewer line in Mathews
3. Integrating Planning as a better way to comply with Clean Water Act
4. SWIFT promoted as part of Suffolk Cultural Arts event

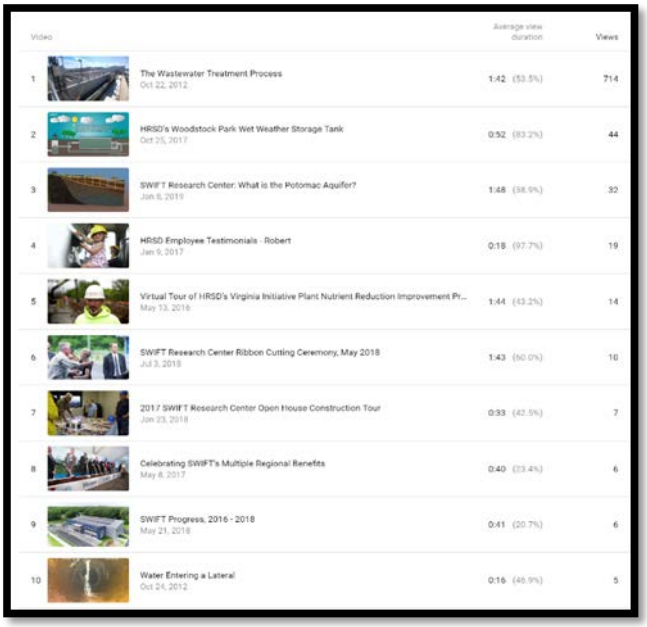
B. Social Media and Online Engagement

1. Metrics

Social Media Metrics February 2020				
METRIC	**FACEBOOK**	**LINKEDIN**	**TWITTER**	**YOUTUBE**
Number of Posts *number of published posts	236 +10	5 +2	29 +12	1:35 average view duration
Number of Followers/Likes *total number of fans	1,212 +31	4,886 +15	420 +13	176 +3
Engagement *sum of reactions comments and shares	1026 +467	34 -7	82 +37	690 unique viewers +137
Traffic *total clicks on links posted	50 +0	87 +2	5 -27	4.1% click through -.6%

2. Top posts for March on Facebook, Twitter and YouTube





3. Impressions and Visits

   a. Facebook: 39,780 page impressions, 35,839 post impressions reaching 33,189 users and Facebook engagement of 1026 (674 reactions, 220 shares and 132 comments).

   b. Twitter: 16,100 tweet impressions; 118 profile visits and 16 mentions

   c. SWIFTVA.com: 927 homepage visits

   d. LinkedIn Impressions: 2,569 page impressions and 2,028 post impressions

   e. YouTube: 904 views

   f. Next Door unique impressions: 755 post impressions

   g. Blog Posts: 0

   h. Construction Project Page Visits – 764 total visits (not including direct visits from home page, broken down as follows:

      (1) 424 visits to individual pages
      (2) 371 to the status page

B. News Releases, Advisories, Advertisements, Project Notices, Community Meetings and Project Websites

1. News Releases/Traffic Advisories/Construction Notices: one (traffic advisory)

2. Advertisements: 0

3. Project Notices: 6 (via door hanging/door knocking, mailings and Nextdoor postings reaching approximately 784 residents)

4. Project/Community Meetings: 0

5. New Project Web Pages /Videos: 2
   a. James River Treatment Plant SWIFT Improvements
   b. Elbow Road Pumping Station Improvements

C. Special Projects and Highlights

Director participated in this year's class of the Water and Wastewater Leadership Center at the University of North Carolina Kenan Flagler School of Business. While this year's program was unlike any before it given the emerging issues associated with COVID-19, it was extremely beneficial, maybe even more so given the context. The professors, as well as the other leaders participating in this year's cohort have become

an invaluable resource for best practices and innovative approaches to industry challenges.

Director participated in the Hampton Roads Planning District Commission Public Information Committee emergency planning call for COVID-19 communication.

D. Internal Communications

1. Director participated in the following internal meetings and events:

    a. CIP review meeting
    b. Planning meeting for Infrastructure Week
    c. Weekly status calls with IT for phase two web updates
    d. Ethics training module review
    e. Architectural review meeting

2. Director conducted bi-weekly communications department status meetings and one-on-one staff check in meetings.

E. Metrics

1. Educational and Outreach Activities: 4

    a. 03/03/20 – HRSD Employee SWIFT Tour (3 attendees)
    b. 03/04/20 – SWIFT Tour, Grafton High School, York County (22 attendees)
    c. 03/05/20 – SWIFT Tour, Princess Anne High School, Virginia Beach (30 attendees)
    d. 03/11/20 – SWIFT talk/presentation, Tidewater Appalachian Trail Club (40 attendees)

2. Number of Community Partners: 3

    a. York County School Division
    b. Virginia Beach Public Schools
    c. Tidewater Appalachian Trail Club

3. Additional Activities Coordinated by Communications Department: 5

    a. 03/04/20 – Nansemond Treatment Plant (NTP) tour, Grafton High School students (22 attendees)
    b. 03/06/20 – Virginia Initiative Plant (VIP) tour, Navy Warfare Group (8 attendees)
    c. 03/06/20 – STEM Expo (1,000 attendees)
    d. 03/11/20 – NTP Tour, Hampton University students (10 attendees)
    e. 03/12/20 – Chesapeake-Elizabeth Plant tour, Lake Taylor High School students (25 attendees)

4. Monthly Metrics Summary

Item #	Strategic Planning Measure	Unit	March 2020
M-1.4a	Total Training Hours per Full Time Employee (3) - Current Month	Hours / #FTE	22.33
M-1.4b	Total Training Hours per Full Time Employee (3) - Cumulative Fiscal Year-to-Date	Hours / #FTE	59.54
M-5.2	Educational and Outreach Events	Number	4
M-5.3	Number of Community Partners	Number	3

Respectfully,

Leila Rice, APR
Director of Communications

TO: General Manager

FROM: Director of Engineering

SUBJECT: Engineering Monthly Report for March 2020

DATE: April 14, 2020

A. General

1. Capital Improvement Program (CIP) spending for the eighth month of Fiscal Year (FY) 2020 was below planned spending target. Year-to-date spending is still below the targeted amount for FY 2020.

   CIP Spending ($M):

	Current Period	FYTD
Actual	15.45	92.96
Plan	19.00	124.00

2. The Engineering Department has responded to the COVID-19 pandemic with the following initiatives to keep critical functions moving forward. These efforts include:

   - Staff has moved to “work from home” locations. Administrative support is still available at both Operations Centers to address mail delivery, visitors and other issues at each location. Staff have adjusted well to this remote work model with few issues. Recent improvements to the IT system, software, and network are benefitting this change in business process. Meetings, interviews and information sharing sessions via SKYPE, Microsoft Teams and Zoom have all been used effectively.

   - Consultants working for HRSD have also been able to quickly move to work from remote locations. Pre-Bid Meetings and monthly construction Progress Meetings are being conducted remotely.

   - Construction contractors have continued to work. The construction community has a strong desire to keep employees productive and employed. The contractors are adjusting to new CDC protocols to keep employees healthy and safe. HRSD has been notified by some contractors that they expect to see delays caused by vendors, suppliers and other subcontractors impacted by supply chain issues.

If further restrictions are implemented by federal or state authorities, we could expect to see negative impacts on construction efforts.

- Real estate efforts, including the acquisition of fee simple property and easements, are being delayed in some cases due to restrictions at some local courts. Property owners are also reluctant to meet to negotiate possible sale of property or sign needed legal documents. These factors are slowing the property acquisition process on some projects.

B. Asset Management Division

1. The HRSD Hurricane Preparedness and Recovery Plan is under review to address situations such as the COVID-19 pandemic. The plan will be updated and modified to allow for a flexible and adaptive effort as we address many unique challenges in the years to come. This updated plan will address staffing, supplies and other resources needed to allow for the continuance of essential functions within HRSD.

2. On the recommendation of an SC&H audit, a Management Action Plan was recently completed to address HRSD's spare parts inventory. A new Inventory Procedures Manual was created to provide guidelines the purchasing, storing, booking and disposing of spare parts for all HRSD work centers that maintain spare parts inventories.

C. North Shore, South Shore and SWIFT Design & Construction Divisions

1. The Tabb Pressure Reducing Station and Offline Storage Facility professional services selection is underway. The request for proposals was advertised on March 1, 2020 and four proposals were received on March 31, 2020. Firms will be short-listed soon and interviews will be held on April 30, 2020. It is anticipated that this will be a virtual interview process to limit contact due to COVID-19.

2. The construction efforts for the Atlantic Treatment Plant Thermal Hydrolysis Process (CAMBI) continue as the work is nearing completion. Significant time is being spent to conduct final check-outs, control loop checks and equipment testing. The seeding of Digester No. 1 is planned for the near future but could be delayed due to the need to acquire the seed from DC Water. This coordination is now on hold until the COVID-19 issue is settled. Some additional work has been requested including replacement of a digester cover and the installation of screens to protect the quality of the water entering the CAMBI system. The Design-Build Team is preparing

proposals for these additional scope items. This project should be completed later this year.

3. Most SWIFT locations will include a series of recharge and monitoring wells. A few initial wells have already been installed to better understand the local groundwater conditions at each site. A consultant is needed to assist with the design, permitting and construction monitoring effort to complete the work. A request for proposals has recently been drafted and will be advertised in April. The scope of work will require a detailed understanding of both the hydrogeology of the region and the chemistry of the Potomac Aquifer. A recommendation for award of this contract will be provided at the July Commission Meeting.

D. Planning & Analysis Division

1. The consultant managing the Climate Change Study conducted a meeting with HRSD staff to discuss the final scope of work and the associated fee. Based on concerns with the anticipated cost, it was agreed that the project would begin with a pilot effort at several HRSD sites. This initial effort will allow for a better understanding of the level of effort it will take to complete the study and how costs can be controlled.

2. The Data Analysis Section has begun a new effort to inform staff of expected high-tide forecasts. Several HRSD facilities are in low-lying areas and the expected tidal elevations can be valuable to staff to plan for potential flooding. This information is also valuable for staff as they plan for various water quality sampling events and for sampling within the sewer system for infiltration and inflow. Staff is using the PI software program to alert others about upcoming high-tide events.

E. Strategic Planning Metrics Summary

1. Educational and Outreach Events: 1

   a. 03/09/2020 – Staff presented a paper entitled, “Wastewater Treatment Plant Discharge Impacts on Estuarine Water Quality: A Control Volume Modeling Study on the Urbanna Creek, Urbanna, Virginia” at the Virginia Water Conference in Richmond, Virginia sponsored by the Virginia Lakes and Watersheds Association (VLWA).

2. Number of Community Partners: 1

   a. VLWA

3. Number of Research Partners: 0

4. Metrics Summary:

Item #	Strategic Planning Measure	Unit	March 2020
M-1.4a	Total Training Hours per Full Time Employee (44) - Current Month	Hours / #FTE	2.06
M-1.4b	Total Training Hours per Full Time Employee (44) - Cumulative Fiscal Year-to-Date	Hours / #FTE	28.13
M-5.2	Educational and Outreach Events	Number	1
M-5.3	Number of Community Partners	Number	1
M-5.4	Number of Research Partners	Number	0

Bruce W. Husselbee, P.E.

Bruce W. Husselbee, P.E.

TO: General Manager

FROM: Director of Finance

SUBJECT: Monthly Report for March 2020

DATE: April 15, 2020

A. General

1. COVID-19 rocked the financial markets and is impacting HRSD in many ways. HRSD has $50 million in variable rate debt that resets weekly. With the rout in the equity markets and investors moving to cash, there was a huge supply build-up of municipal variable rate debt, meaning there were no buyers. As a result, HRSD's variable rate debt rate spiked to 4.95 percent on March 20, 2020. The market is starting to normalize as a result of Congress giving the Federal Reserve the ability to buy municipal securities, with rates resetting at 0.75 percent in early April.

2. PFM is actively managing our asset allocations in our Retiree Health Trust in these volatile market conditions. On March 2, they reduced our exposure to equities to 80 percent of policy targets. Then, on March 18, they increased it to 85 percent and on March 26 increased it again to 90 percent due to the unprecedented amount of stimulus funds being pumped into the market.

3. Staff is actively working to seek the lowest cost of capital. HRSD's WIFIA application for the James River SWIFT facility was submitted on March 24. The goal is to close in the next few months to lock in a rate for $314 million at less than 1.5 percent. In addition, we are working to close on the $100 million Virginia Clean Water Revolving Loan Fund in May or June. As a backstop and for interim financing for capital project funding only, HRSD is scheduled to close on a 12-month, $50 million Line of Credit (LOC) with Bank of America at the end of April. The rate will be 79 percent of LIBOR plus 0.35 percent per annum and a 0.15 percent fee on the unutilized balance. Depending on the WIFIA rate and the LIBOR rate, it may make more economic sense to use the LOC rather than drawing the WIFIA money.

4. The Fed announced a new program called the Municipal Liquidity Facility, lending up to $500 billion to municipal issuers for up to 24 months. It's not clear if HRSD is directly eligible, or if we must go through the Commonwealth's Treasury or the Virginia Resources Authority. This has the potential for being a low cost of capital for interim CIP financing.

5. Wastewater revenues continue to be in-line with budget as water consumption was almost flat compared to budget, but higher as a percentage of budget compared to last year. Most water consumption data reflects meter reads through mid-March, so it's too early to make a conclusion on the COVID-19 impact. Compared to Fiscal Year 2019 Actuals between February and March, there was a much larger increase month-over-month in FY 2020. Our theory is that with our large military presence and residential component, there should not be a significant impact to our revenues. I understand there are some regions in the country where industrial is a large component of their revenues and they are projecting a 15 - 20 percent revenue decline for FY 2021. Our largest impact could be lost water consumption from tourism, but this could be offset by Hampton Roads residents also not traveling. Personal services and fringe benefit expenses are generally on budget at 79 percent and 75 percent, respectively, roughly consistent with the prior year. Contractual services have been running below budget all year and are slightly higher than FY 2019. Major repairs expenses continue to be significantly lower than budget at this time, since many purchases earlier in the fiscal year related to prior year encumbrances.

6. Late Payment Fees and Accounts Receivable Aging are both trending upward and we expect this to continue as water shut-offs have been suspended and the unemployment rate climbs. HRSD has sufficient liquidity to cover any short falls. Since 2007, the largest write-off in a fiscal year (defined as an amount that could not be collected within 12-months) was $2.5 million. Note, HRSD continues to try to collect past due amounts up to 10-years old.

B. Interim Financial Report

1. Operating Budget for the Period Ended March 31, 2020

	Amended Budget	Current YTD	Current YTD as % of Budget (75% Budget to Date)	Prior YTD as % of Prior Year Budget
Operating Revenues				
Wastewater	$ 316,217,000	$ 239,643,093	76%	75%
Surcharge	1,500,000	1,236,809	82%	78%
Indirect Discharge	2,750,000	2,359,809	86%	79%
Fees	2,858,000	2,319,239	81%	77%
Municipal Assistance	725,000	452,937	62%	49%
Miscellaneous	600,000	517,710	86%	166%
Total Operating Revenue	324,650,000	246,529,597	76%	76%
Non Operating Revenues				
Facility Charge	6,160,000	4,761,475	77%	77%
Interest Income	4,000,000	5,127,144	128%	233%
Build America Bond Subsidy	2,400,000	1,121,298	47%	48%
Other	595,000	500,783	84%	43%
Total Non Operating Revenue	13,155,000	11,510,700	88%	102%
Total Revenues	337,805,000	258,040,297	76%	77%
Transfers from Reserves	10,857,750	8,143,313	75%	75%
Total Revenues and Transfers	$ 348,662,750	$ 266,183,610	76%	77%
Operating Expenses				
Personal Services	$ 57,346,225	$ 45,138,697	79%	79%
Fringe Benefits	24,232,400	18,262,785	75%	74%
Materials & Supplies	8,838,801	6,019,562	68%	71%
Transportation	1,579,921	895,136	57%	68%
Utilities	12,774,299	9,192,341	72%	75%
Chemical Purchases	10,979,218	6,449,253	59%	57%
Contractual Services	46,373,753	23,699,220	51%	49%
Major Repairs	10,847,604	4,584,269	42%	48%
Capital Assets	458,825	103,504	23%	42%
Miscellaneous Expense	3,085,523	3,370,003	109%	62%
Total Operating Expenses	176,516,569	117,714,770	67%	66%
Debt Service and Transfers				
Debt Service	63,544,841	51,965,056	82%	85%
Transfer to CIP	108,341,340	81,256,005	75%	75%
Transfer to Risk management	260,000	195,003	75%	75%
Total Debt Service and Transfers	172,146,181	133,416,064	78%	79%
Total Expenses and Transfers	$ 348,662,750	$ 251,130,834	72%	72%

2. Notes to Interim Financial Report

The Interim Financial Report summarizes the results of HRSD's operations on a basis of accounting that differs from generally accepted accounting principles. Revenues are recorded on an accrual basis, whereby they are recognized when billed; expenses are generally recorded on a cash basis. No provision is made for non-cash items such as depreciation and bad debt expense.

This interim report does not reflect financial activity for capital projects contained in HRSD's Capital Improvement Program (CIP).

Transfers represent certain budgetary policy designations as follows:

a. Transfer to CIP: represents current period's cash and investments that are designated to partially fund HRSD's capital improvement program.

b. Transfers to Reserves: represents the current period's cash and investments that have been set aside to meet HRSD's cash and investments policy objectives.

3. Reserves and Capital Resources (Cash and Investments Activity) for the Period Ended March 31, 2020

HRSD - RESERVE AND CAPITAL ACTIVITY March 31, 2020

	General Reserve				Capital	
	General	Debt Service	Risk Mgmt Reserve	Reserve	Paygo	Debt Proceeds
	Unrestricted	Restricted	Unrestricted	Unrestricted	Unrestricted	Restricted
Beginning - July 1, 2019	**$ 178,937,154**	**$ 28,553,343**	**$ 3,499,535**	**$ 15,266,324**	**$ 86,279,809**	**$ 14,334,553**
Current Year Sources of Funds						
Current Receipts	197,270,292					-
Capital Grants					-	
VRA Draws					22,121,278	
Bond Proceeds (includes interest)						36,364
Transfers In	66,355,163		195,003		81,256,005	
Sources of Funds	263,625,455	-	195,003	-	103,377,283	36,364
Total Funds Available	**$ 442,562,609**	**$ 28,553,343**	**$ 3,694,538**	**$ 15,266,324**	**$ 189,657,092**	**$ 14,370,917**
Current Year Uses of Funds						
Cash Disbursements	176,204,856				89,400,263	14,370,917
Series 2019A Refunding	-					
Transfers Out	81,451,008				66,355,163	-
Uses of Funds	257,655,864	-	-	-	155,755,426	14,370,917
End of Period - March 31, 2020	**$ 184,906,745**	**$ 28,553,343**	**$ 3,694,538**	**$ 15,266,324**	**$ 33,901,665**	**$ -**
Unrestricted Funds	**$ 237,769,272**					

4. Capital Improvements Budget and Activity Summary for Active Projects for the Period Ended March 31, 2020

Classification/ Treatment Service Area	Budget	Expenditures prior to June 30, 2019	Year to Date FY 2020 Expenditures	Total Expenditures	Outstanding Encumbrances	Available Balance
Administration	$ 74,799,313	$ 43,226,275	$ 3,636,586	$ 46,862,861	$ 15,210,291	$ 12,726,161
Army Base	158,584,000	125,110,560	451,955	125,562,515	2,458,218	30,563,267
Atlantic	132,343,059	88,977,629	14,678,395	103,656,024	6,338,964	22,348,071
Boat Harbor	143,848,412	60,512,133	11,100,465	71,612,598	14,388,122	57,847,692
Ches-Eliz	192,419,583	21,557,919	32,318,702	53,876,621	64,928,719	73,614,243
James River	288,758,687	58,557,889	3,449,473	62,007,362	7,423,594	219,327,731
Middle Peninsula	88,810,297	10,996,758	3,400,983	14,397,741	7,533,822	66,878,734
Nansemond	90,962,641	42,439,857	2,804,732	45,244,589	12,899,193	32,818,859
Surry	45,747,598	1,905,064	4,980,668	6,885,732	31,658,132	7,203,734
VIP	306,778,873	259,851,080	2,126,246	261,977,326	4,952,803	39,848,744
Williamsburg	33,002,437	12,215,243	4,004,707	16,219,950	13,148,717	3,633,770
York River	72,798,339	44,185,737	2,163,729	46,349,466	804,973	25,643,900
General	697,921,094	233,236,782	7,841,322	241,078,104	39,572,984	417,270,006
	$ 2,326,774,333	$ 1,002,772,926	$ 92,957,963	$ 1,095,730,889	$ 221,318,532	$ 1,009,724,912

5. Debt Management Overview

HRSD - Debt Outstanding ($000's) — March 31, 2020

	Principal Feb 2020	Principal Payments	Principal Draws	Trust Agreement	Principal Mar 2020	Interest Payments
Fixed Rate						
Senior	$ 215,422	$ (1,210)	$ -		$ 214,212	$ (409)
Subordinate	544,434	(2,552)	-		541,882	(1,198)
Variable Rate						
Subordinate	50,000	-	-		50,000	(42)
Line of Credit						
Total	$ 809,856	$ (3,762)	$ -	$ -	$ 806,094	$ (1,649)

HRSD- Series 2016VR Bond Analysis — April 3, 2020

	SIFMA Index	HRSD	Spread to SIFMA
Maximum	4.71%	4.95%	0.24%
Average	0.57%	0.57%	0.00%
Minimum	0.01%	0.01%	0.00%
As of 04/03/20	1.83%	1.80%	-0.03%

* Since October 20, 2011 HRSD has averaged 57 basis points on Variable Rate Debt

6. Financial Performance Metrics for the Period Ended March 31, 2020

HRSD - UNRESTRICTED CASH March 31, 2020

Can be used for any purpose since it is not earmarked for a specific use and is extremely liquid

			Days Cash on Hand	Days Cash on Hand
Total Unrestricted Cash	**$**	**237,769,272**		**492**
Risk Management Reserve	$	(3,694,538)	(8)	484
Reserve	$	(15,266,324)	(32)	452
Capital (PAYGO only)	$	(33,901,665)	(70)	382
Net Unassigned Cash	**$**	**184,906,745**		**382**

Risk Management Reserve as a % of Projected Claims Cost is 25% YTD compared to 25% Policy Minimum
Days Cash on Hand Policy Minimum is 270-365 days.

HRSD - SOURCES OF FUNDS March 31, 2020

Primary Source	Beginning Market Value July 1, 2019	YTD Contributions	YTD Withdrawals	YTD Income Earned	Ending Market Value March 31, 2020	Allocation of Funds	Credit Quality	Current Mo Avg Yield
BAML Corp Disbursement Account	7,755,006	401,034,826	403,439,216	52,689	5,403,305	2.8%	N/A	0.55%
VIP Stable NAV Liquidity Pool	163,658,801	131,355,162	111,355,162	2,670,750	186,329,551	97.2%	AAAm	1.38%
Total Primary Source	**$ 171,413,807**	**$ 532,389,988**	**$ 514,794,378**	**$ 2,723,439**	**$ 191,732,856**	100.0%		

VIP Stable NAV Liquidity Pool out performance Va Local Government Investment Pool (the market benchmark) by 0.02% in the month of March.

Secondary Source	Beginning Market Value July 1, 2019	YTD Contributions	YTD Withdrawals	YTD Income Earned & Realized G/L	Ending Market Value March 31, 2020	Ending Cost	YTD Mkt Adj	Yield to Maturity at Market
VIP 1-3 Year High Quality Bond Fund	128,529,607	-	66,368,360	1,414,625	64,497,362	62,442,850	2,054,512	
Total Secondary Source	**$ 128,529,607**	**$ -**	**$ 66,368,360**	**$ 1,414,625**	**$ 64,497,362**	**$ 62,442,850**	**$ 2,054,512**	

VIP 1-3 Year High Quality Bond Fund out performed ICE BofA ML 1-3 yr AAA-AA Corp/Gov Index (the market benchmark) by 0.16% in the month of March.

	Total	Fund Alloc
Total Primary Source	**$ 191,732,856**	**74.8%**
Total Secondary Source	**$ 64,497,362**	**25.2%**
TOTAL SOURCES	**$ 256,230,218**	**100.0%**

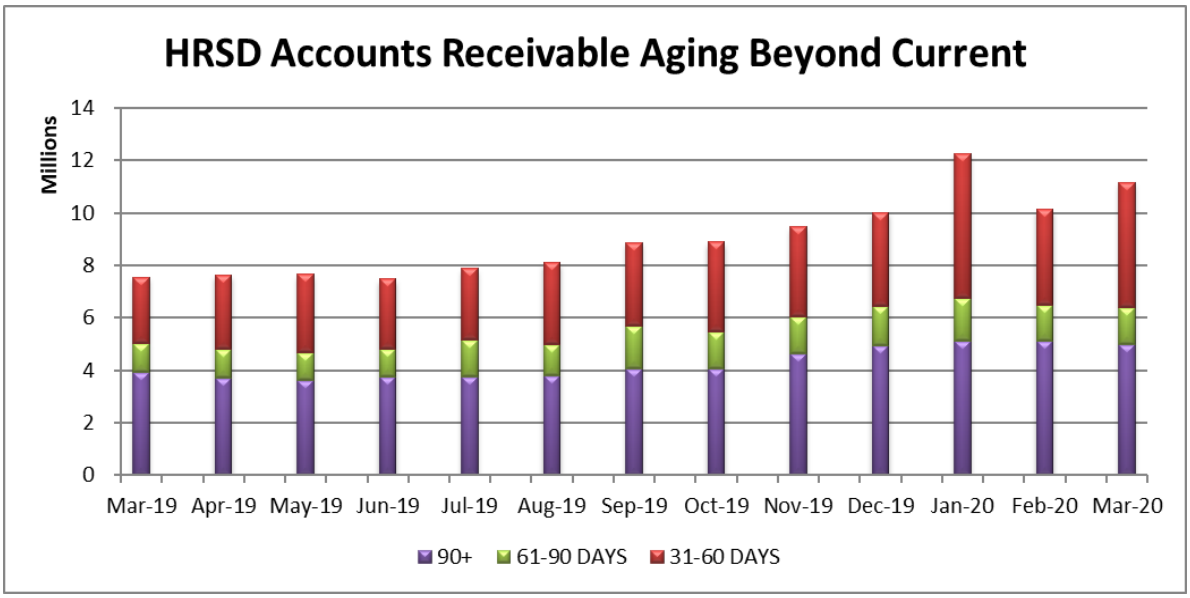
7. Summary of Billed Consumption

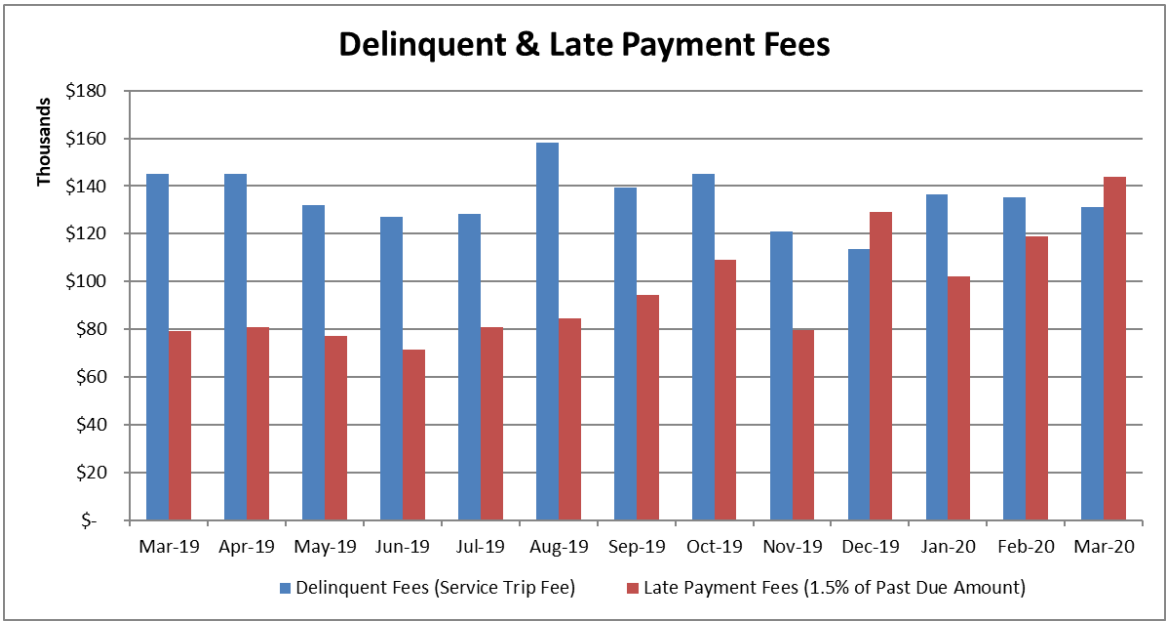
Summary of Billed Consumption (,000s ccf)

Month	*FY2020 Cumulative Budget Estimate*	*FY2020 Cumulative Actual*	*% Difference From Budget*	*Cumulative FY2019 Actual*	*% Difference From FY2019*	*Cumulative 3 Year Average*	*% Difference From 3 Year Average*
July	4,845	5,135	6.0%	5,175	-0.8%	4,940	4.0%
Aug	9,649	10,009	3.7%	10,233	-2.2%	9,815	2.0%
Sept	14,488	14,571	0.6%	14,294	1.9%	14,384	1.3%
Oct	18,842	19,169	1.7%	19,087	0.4%	19,036	0.7%
Nov	22,952	23,309	1.6%	23,249	0.3%	23,278	0.1%
Dec	27,344	27,735	1.4%	27,376	1.3%	27,532	0.7%
Jan	31,535	32,318	2.5%	32,010	1.0%	32,003	1.0%
Feb	36,079	36,222	0.4%	36,551	-0.9%	36,443	-0.6%
March	40,427	40,325	-0.3%	40,187	0.3%	40,480	-0.4%
Apr	44,149	-	N/A	44,551	N/A	44,554	N/A
May	48,421	-	N/A	48,790	N/A	48,786	N/A
June	52,985	-	N/A	53,172	N/A	53,280	N/A

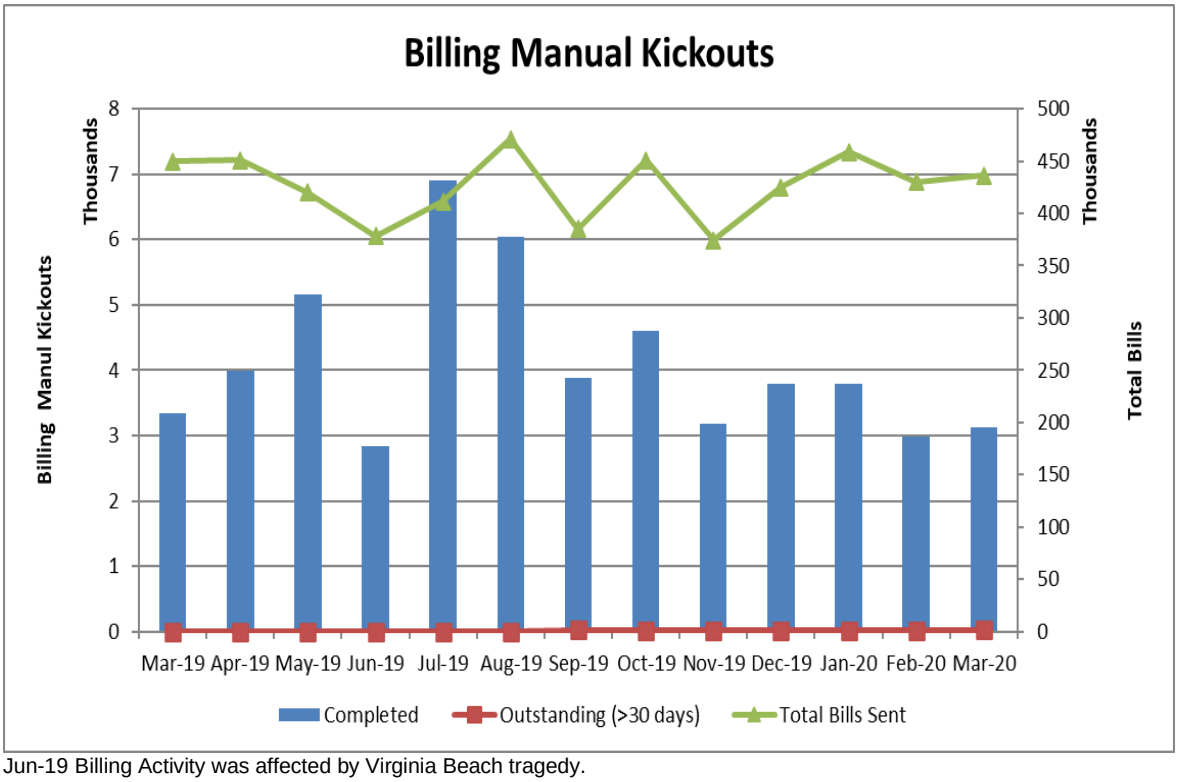
C. Customer Care Center

1. Accounts Receivable Overview

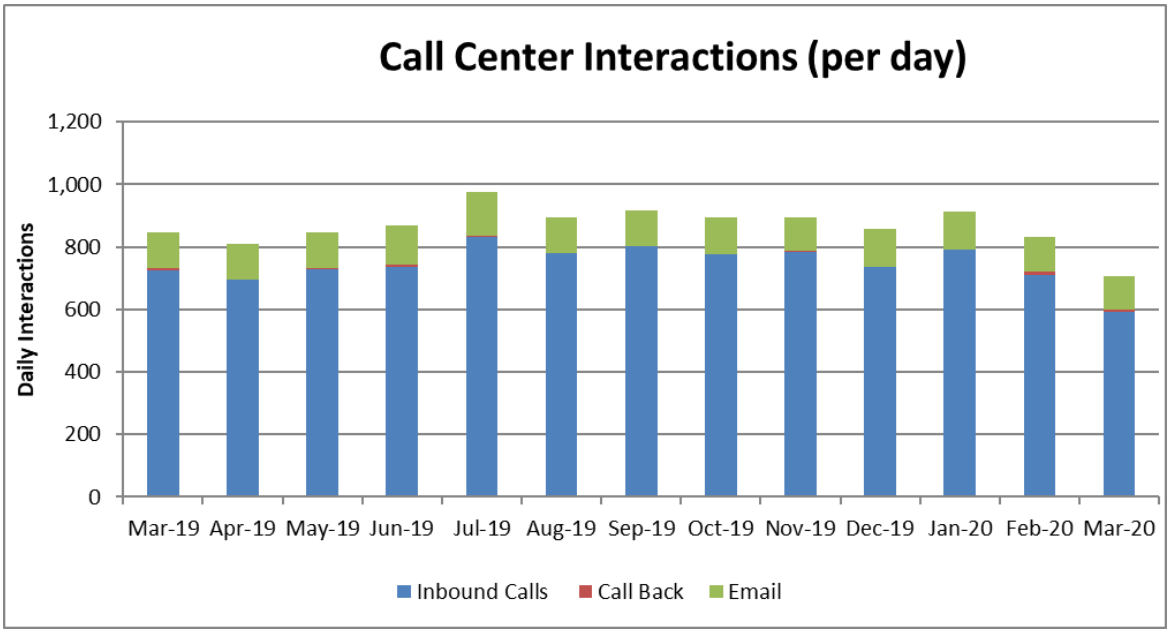




2. Customer Care Center Statistics



Jun-19 Billing Activity was affected by Virginia Beach tragedy.
Jul-19 A formatting change caused an increase in manual kickouts. We expect the levels to normalize in the next few months.



Customer Interaction Statistics	Oct	Nov	Dec	Jan	Feb	Mar
Calls Answered within 3 minutes	86%	87%	83%	83%	86%	90%
Average Wait Time (seconds)	0:71	0:65	0:83	0:78	0:68	0:51
Calls Abandoned	7%	6%	7%	7%	6%	5%

D. Procurement Statistics

ProCard Fraud	External Fraud Transactions *	Comments
July	2	Caught by Bank Immediately
August	0	
September	0	
October	1	Caught by Bank Immediately
November	0	
December	1	Employee caught during reconciliation
January	1	Caught by Bank Immediately
February	0	
March	0	
Total	**5**	

*__External Fraud:__ Fraud from outside HRSD (i.e.: a lost or stolen card, phishing, or identity theft)

E. Strategic Planning Metrics Summary

1. Educational and Outreach Events: 0

2. Community Partners: 0

3. Monthly Metrics

Item #	Strategic Planning Measure	Unit	March 2020
M-1.4a	Training During Work Hours Per Full Time Employee (102) – Current Month	Hours / #FTE	1.78
M-1.4b	Total Training During Work Hours Per Full Time Employee (102) – Cumulative Fiscal Year-to-Date	Hours / #FTE	17.07
M-5.2	Educational and Outreach Events	Number	0
M-5.3	Number of Community Partners	Number	0
	Wastewater Revenue	Percentage of budgeted	101%
	General Reserves	Percentage of Operating Budget less Depreciation	121%
	Liquidity	Days Cash on Hand	492 Days
	Accounts Receivable (HRSD)	Dollars	$25,174,836
	Aging Accounts Receivable	Percentage of receivables greater than 90 days	20%

Respectfully,
Jay A. Bernas
Jay A. Bernas, P.E.
Director of Finance

TO: General Manager

FROM: Director of Information Technology

SUBJECT: Information Technology Department Report for March 2020

DATE: April 15, 2020

A. General

1. In response to the COVID 19 pandemic, ITD quickly developed and executed a plan of action to expand and enhance telecommuting capacity and capabilities throughout the organization. In a matter of weeks, the number of employees working remotely, grew from dozens, to hundreds. When and where possible, IT staff also work remotely, with a core support team continuing to work in the office.

2. Another pandemic-inspired IT project includes the development of an online public meetings platform for the HRSD website. In accordance with pending legislative guidance, Commission meetings and other public facing events may be accommodated virtually, via the online platform.

3. Staff continues to assist in completing user acceptance testing for the upgraded Customer Care and Billing application by various workcenters within the Finance Department.

4. As part of ITD's ongoing efforts to monitor, manage, maintain, and protect HRSD's networked assets and business data, upgraded anti-malware and network monitoring tools were installed and configured across dozens of file and database servers.

5. Representatives from HRSD and Suffolk Public Utilities attended a series of training workshops for the up and coming implementation of a new, cloud-based, mobile workforce application, Oracle Field Services Cloud. User acceptance testing will begin once appropriate measures are taken in response to the COVID 19 pandemic.

6. In conjunction with the ERP Business Analysts, the internal Sharepoint site was redisgned to include enhanced content and easier access to platform-relevant documentation.

7. The ITD Communications Team distributed a cyber security awareness assessment to all employees. The results will be used to develop an in-house cyber security training program aimed at minimizing organizational risk and liability.

B. Strategic Planning Metrics Summary

1. Educational and Outreach Events: 0

2. Number of Community Partners: 0

3. Metrics Summary:

Item #	Strategic Planning Measure	Unit	March 2020
M-1.4a	Training During Work Hours Per Full-Time Employee (50) – Current Month	Total Training Hours / # FTE	4.53
M-1.4b	Total Training During Work Hours Per Full-Time Employee (50) – Cumulative Fiscal Year-to-Date	Total Training Hours / # FTE	35.13
M-5.2	Educational and Outreach Events	Number	0
M-5.3	Number of Community Partners	Number	0

Respectfully,
Don Corrado

TO: General Manager

FROM: Director of Operations

SUBJECT: Operations Report for March 2020

DATE: April 10, 2020

A. General

Very few of the Operations Department staff can perform their jobs teleworking. Consequently, staff are responding to the COVID-19 pandemic by appropriately social distancing, practicing excellent hygiene, and limiting personal interaction contact with colleagues and contractors as much as possible. I am proud of staff's response to this crisis. As we have come to expect, staff continued to perform their critical functions without complaint and with little modification in what they do.

B. Interceptor Systems

1. North Shore (NS) Interceptor Systems

There was one Sanitary Sewer Overflow (SSO) when a contractor pressure tested the line without the test plug installed. Approximately 7,275 gallons of wastewater was released into the ground and 100 gallons were recovered.

2. South Shore (SS) Interceptor Systems

a. On March 8, the City of Virginia Beach reported a force main failure along the North Virginia Beach Interceptor Force Main near the intersection of Holly Road and Linkhorn Drive. External corrosion created a small hole on an abandoned tapping saddle. The failure created an SSO of approximately 1,200 gallons that discharged into a storm drain leading to Holly Lake. Staff removed the failed tapping saddle and installed a full circle clamp.

b. There were three interceptor complaints reported this month. Two were associated with locality assets. The third, in the City of Portsmouth (City), was a sinkhole near an HRSD manhole. Staff excavated but, upon further investigation, determined the cause was a failed City stormwater pipe. Staff repaired the pipe at the request of the City using City-provided materials.

C. Major Treatment Plant Operations

1. Army Base Treatment Plant (ABTP)

a. A 50-gallon unrecoverable spill occurred when the #3 band screen became clogged with a large piece of grease and hard plastic.

b. A contractor completed repairs and replacement of all columns in primary clarifier #4.

2. Atlantic Treatment Plant (ATP)

a. Staff shut down Odor Control Station A three times over a three-day period so that the scrubber could be tied into the new Thermal Hydrolysis Process (THP) unit.

b. Staff finished removing a significant amount of rags from inside clarifiers 5 & 6.

c. Installation of the new influent screen continued. Testing of the electrical equipment began. Completion is scheduled for late April.

3. Boat Harbor Treatment Plant (BHTP)

a. On March 15, a new operator undergoing chlorine residual training missed the 15-minute analysis time by two minutes. Since the analysis time was not met, the residual for that hour was considered invalid.

b. Staff installed the rotating assembly for centrifuge #1 and an in-line mixer to blend solids and polymer just before they reach the centrifuge. Testing of the mixer's performance will begin in April. Staff are hopeful there will be a reduction in polymer usage and an increase in the percent solids and solids recovery from the centrifuge.

4. Chesapeake-Elizabeth Treatment Plant (CETP)

a. An underground non-potable water (NPW) line ruptured on March 3, resulting in a spill of 1,000 gallons. Staff repaired the line and recovered 900 gallons.

b. Due to high influent flows, the biological phosphorus (BioP) removal efforts were ceased until later this spring.

5. James River Treatment Plant (JRTP)

a. A reportable wastewater event occurred when staff spilled about 385 gallons of diluted caustic.

b. Staff designed, manufactured and installed flow diversion plates in the Integrated Fixed Film Activated Solids (IFAS) channel at IFAS tanks #1, #2 and #3 to help equalize primary effluent flow across all nine IFAS tanks. Data showed IFAS tanks #1, #2 and #3 tended to get less flow than other tanks, resulting in a higher nutrient loading on IFAS tanks #4 through #9.

6. Nansemond Treatment Plant (NTP)

a. After testing positive again on total coliforms while using monochloramines, staff decided to use free chlorination permanently. Although, free chlorination is more effective for disinfection, it can create disinfection by-products (DBPs). At the SWIFT Research Center, however, even with free chlorination there is enough data to support that DBPs are below the maximum contaminant levels.

b. SWIFT Research Center (SWIFT RC)

1. The total volume of SWIFT recharge into the Potomac aquifer for the month of March was 14.10 MG.

2. Staff performed two pulsed backflushes per day (30 minutes total and 10 minutes each pulse) at 65 Hz to keep the recharge well injectivity stable.

3. Staff changed the flow split on granular activated carbon vessels from a ratio of 70/30 to 50/50 to keep the recharge well injectivity stable. TOC monthly average for March was 3.73 mg/L.

7. Virginia Initiative Plant (VIP)

Staff helped install two rebuilt raw influent pump motors in the Preliminary Treatment Facility. These were the pump motors that failed in February, resulting in an emergency declaration and the construction of a temporary pumping system to carry some of the plant's raw influent into an

equalization tank. Staff also adjusted the variable frequency control settings of the rebuilt motors in accordance with consultant recommendations.

8. Williamsburg Treatment Plant (WBTP)

The contractor for the WBTP Switchgear Project continued forming and pouring concrete on the new switchgear building and running electrical duct banks to various power distribution locations throughout the plant.

9. York River Treatment Plant (YRTP)

Staff prepared for higher flow levels in the headworks building that may occur from a grit tank scheduled to be out of service next month for coating. Preparations included isolating bar screen hatches with a containment wall, sealing off penetrations and protecting electrical equipment.

11. Incinerator Operations Events Summary

There were no deviations from the required minimum operating parameters and four minor (<60 minute) non-reportable bypass events.

D. Small Communities (SC)

1. Middle Peninsula Small Communities Treatment and Collections

a. Urbanna Treatment Plant (UBTP)

Staff replaced a failed secondary clarifier drive gearbox and motor on treatment train #2.

b. King William Treatment Plant (KWTP)

Approximately 1,000 linear feet and two associated manholes were cleaned in King William in a continued effort to address an odor issue emanating from this section of gravity main.

c. Matthews System

Staff discovered a vacuum leak in the collection system. Staff excavated and repaired the cracked line.

2. Small Communities – Surry Systems

a. Staff installed Telog Back Up Battery and Solar Systems at all Surry pump stations to ensure reliable operation of generator failure alarms.

b. Surry County Treatment Plant - The decanter float was struck by the mixing float and was damaged when the cable holding it failed. Staff replaced the decanter assembly by removing the existing float assembly at the Lawnes Point Treatment Plant and installing it at the Surry County Treatment Plant.

E. Support Systems

Infrastructure Assessment - Staff issued 28 work orders for 42,786 LF of gravity line inspections for North Shore and South Shore service areas to the contractor. The contractor is currently 88 percent complete with field activities for NS and SS gravity lines.

F. Water Technology and Research

In previous updates, the transition of the York River Treatment Plant (YRTP) deep-bed denitrification filters to partial denitrification anammox (PdNA) was discussed. We have learned that it is possible to provide a limited amount of supplemental carbon, for example acetic acid, glycerol, or even methanol, to partially reduce the nitrate to nitrite, allowing anammox to consume the nitrite and ammonia fed to the process. We have also learned how to control this process and how to minimize complete denitrification to nitrogen (N2) gas, which consumes a lot more supplemental carbon. In the pilot-scale moving bed biofilm reactor operating at the Chesapeake-Elizabeth pilot facility, this is a very stable and reliable process and holds a lot of promise for scale up and nitrogen polishing in light of SWIFT. From a chemical standpoint, it is a very cost-effective process as compared to full denitrification of nitrate to nitrogen gas (N_2).

The background and significance of the YR transition to PdNA will likely be explained in more detail as part of a Commission briefing in coming months. In addition, a PdNA MBBR is being considered as part of the SWIFT wastewater upgrades at James River Treatment Plant (JRTP). Questions remain regarding design load conditions and how this process should be started up to allow for the accumulation of anammox biomass on plastic biofilm carriers or sand filter media.

Over the past year, DCWater has been operating a Xylem/Leopold denitrification filter pilot system at their Blue Plains Treatment Plant to test

PdNA startup and operation on different types of sand media. This work has also demonstrated the effectiveness of PdNA. Working with Xylem and DCWater, we have decided to move this truck-mounted filter pilot to YRTP in the coming months to test in parallel with the existing full-scale denitrification filters operating in PdNA mode. Although the plan was to move the pilot in May, COVID-19 will likely delay this because of travel and access requirements by Xylem staff. This pilot will be provided free of charge to HRSD, but HRSD staff will assist Xylem with commissioning the pilot after transport and making the piping and electrical connections. The Xylem pilot will primarily be operated by an HRSD Research Intern with oversight from HRSD Treatment Process Engineers, and HRSD will be responsible for sampling and analysis.

G. MOM reporting numbers

MOM Reporting #	Measure Name	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
2.7	# of PS Annual PMs Performed (NS)	1	4	8	4	2	3	5	2	8			
2.7	# of PS Annual PMs Performed (SS)	6	5	4	5	4	5	5	4	7			
2.7	# of Backup Generator PMs Performed (Target is 4.6)	10	13	17	11	9	9	9	14	12			
2.8	# of FM Air Release Valve PMs Performed (NS)	209	77	70	127	139	111	157	168	412			
2.8	# of FM Air Release Valve PMs Performed (SS)	311	318	365	334	97	247	300	199	409			
2.9	# of Linear Feet of Gravity Clean (NS) (Target is 2,417 for HRSD)	6,248	2,681	1,426	638	2,079	3,454	7,161	4,149	4,070			
2.9	# of Linear Feet of Gravity Clean (SS) (Target is 2,417 for HRSD)	1,064	13,240	1,551	1,365	4,365	3,454	3,415	3,714	7,196			
2.9	# of Linear Feet of Gravity CCTV Inspection (HRSD Target 3,300 LF)	610	0	0	0	0	0	0	0	34,359			

H. Strategic Measurement Data

1. Education and Outreach Events:

   a. 03/9/2020 - Participation in National Water Research Institute independent panel review of reuse project and advanced treatment initiative for the Israeli water utility, Mekorot – Bott

   b. 03/12/2020 - 26 Lake Taylor High School Students toured CETP. Tour was performed by Harry Kowalski and Larry Mellor.

   c. 03/12/2020 - SS interceptor staff met with City of Portsmouth Public Utilities Operations staff to collaborate and discuss locality issues – quarterly meeting.

   d. 03/31/2020 - SS interceptor staff met with City of Virginia Beach Utilities Operations staff to collaborate and discuss locality issues – quarterly meeting.

2. Community Partners:

   a. Chesapeake Bay Foundation – oyster cage maintenance at BHTP for oyster gardening program
   b. United Way
   c. DOE Jefferson Lab

3. Monthly Metrics

Item #	Strategic Planning Measure	Unit	March 2020
M-1.4a	Training During Work Hours per Full Time Employee (FTE) (516) – Current Month	Hours / FTE	3.49
M-1.4b	Total Training During Work Hours per FTE (516) – Cumulative Year-to-Date	Hours / FTE	28.15
M-2.3a	Planned Maintenance Total Maintenance Hours	Total Recorded Maintenance Labor Hours	33,850

Item #	Strategic Planning Measure	Unit	March 2020
M-2.3b	Planned Maintenance – Preventive and Condition Based	% of Total Maintenance Hours	60.39%
M-2.3c	Planned Maintenance - Corrective Maintenance	% of Total Maintenance Hours	14.17%
M-2.3d	Planned Maintenance - Projects	% of Total Maintenance Hours	25.44%
M- 4.1a	Energy Use: Treatment *reported for February 2020	kWh/MG	2,257
M-4.1b	Energy Use: Pump Stations *reported for February 2020	kWh/MG	175
M-4.1c	Energy Use: Office Building *reported for February 2020	kWh/MG	74
M-5.2	Educational and Outreach Events	Number	4
M-5.3	Number of Community Partners	Number	3

Respectfully submitted,

Steve de Mik
Director of Operations

TO: General Manager

FROM: Director of Talent Management (TM)

SUBJECT: Monthly Report for March 2020

DATE: April 15, 2020

A. Talent Management Executive Summary

1. Recruitment

New Recruitment Campaigns	12
Job Offers Accepted – Internal Selections	7
Job Offers Accepted – External Selections	13
Average Days to Fill Position	73

2. The following was performed in response to the COVID-19 Pandemic:

a. Evaluated Families First Coronavirus Response Act requirements in relation to HRSD operations. Although HRSD is exempt based on Department of Labor guidance, several additions were made to Leave and Telework policies to provide relief to HRSD employees and to ensure HRSD can maintain operations. Human Resources (HR) and Accounting staff updated HR/Payroll processes based on the new leave policies.

b. Developed self-disclosure and response guidelines for employees who are suspected or known to have COVID-19 or who have been exposed through close contact (based on Virginia Department of Health guidance).

c. Updated HR New Employee Orientation, Recruitment and Open Enrollment to comply with social distancing, minimize in-person interactions and use virtual processes where applicable.

d. The medical plan provider expanded coverage to eliminate cost sharing for participants who are tested or treated for COVID-19.

e. Organizational Development & Training (OD&T) classes were postponed or revised to accommodate social distancing. Staff are developing online or virtual methods to deliver training where applicable, starting with the *Your Role in Quality* workshop. Half of the current-term Apprenticeship classes were moved onto an online environment.

f. The Safety Manager and Support Systems staff developed and distributed procedures for daily housekeeping and cleaning facilities in the event of a COVID-19 exposure, based on Centers for Disease Control (CDC) guidance.
g. Safety postponed or adapted training, testing, inspections and evaluations to ensure work activities meet social distancing requirements. A training library was established on SharePoint for monthly work center training.

3. HR staff worked with the Benefits consultant on the following:

a. Finalized medical, vision and dental plan renewals for Fiscal Year 2021
b. Evaluated and added diabetes medications to preventive coverage and an assurance plan to manage potential high cost specialty therapies
c. Preparations for virtual Open Enrollment meetings to be conducted in May
d. Projection of COVID-19 impact to current and future year claims costs

4. Wellness Program Participation

Participation Activities	Unit	March 2020	Year to Date (March 2020–February 2021)
Biometric Screenings	Number	65	65
Preventive Health Exams	Number	94	94
Preventive Health Assessments	Number	27	27
Online Health Improvement Programs	Number	16	16
Online Health Tracking	Number	99	99
Fit-Bit Promotion	Number	12	12

5. Wellness Year 7 data was evaluated and compared to previous years. Overall, participation increased five percent and there was a significant increase in participants achieving over a 15 percent weight loss.

6. The Wellness Specialist worked with Optima Health staff to identify HRSD employees meeting participation requirements, qualifying for the wellness (lower) deductible and earning incentives. Incentive level award and appeal forms were mailed to employees and spouses.

7. Additional data was provided for a Chesapeake Bay Bridge Tunnel District Pay and Classification study.

8. OD&T staff met with the Organizational Professional Services Consultant to develop training formats for the Chief's Forum, Interview Training, an Operations Leadership Retreat and Supervisor Training.

9. Facilitators conducted the Project Management 101 Workshop.

10. The Apprenticeship *Wastewater Analysis and Laboratory* lecture was moved to an online format. Staff worked with the Central Environmental Laboratory (CEL) to revise the lab portion to incorporate demonstrations and guest speakers to enhance apprentices' understanding of CEL operations.

11. Mishaps and Work-Related Injuries Status to Date (OSHA Recordable)

	2019	**2020**
Mishaps	37	7
Lost Time Mishaps	6	0
Numbers subject to change pending HR review of each case.		

12. Safety Division Monthly Activities

Safety Training Classes	33
Work Center Safety Inspections	9
Reported Accident Investigations	1
Construction Site Safety Evaluations	30
Contractor Safety Briefings	9
Hot Work Permits Issued	27
Confined Space Permits Issued/Reviewed	85
Industrial Hygiene Monitoring Events	3

B. Monthly Strategic Planning Metrics Summary

1. Education and Outreach Events: (1)

   03/05/2020 - Tidewater Community College Customer Service and Hospitality Fair

2. Community Partners: (1)

   Tidewater Community College

3. Monthly Metrics

Item #	Strategic Planning Measure	Unit	March 2020
M-1.1a	Employee Turnover Rate (Total)	Percentage	0.62%
M-1.1b	Employee Turnover - Service Retirements	Percentage	0.40%
M-1.4a	Total Training Hours Per Full Time Employee (17) – March	Total Training Hours/ FTE	4.68
M-1.4b	Total Training During Work Hours Per Full Time Employee (17) – Cumulative Fiscal Year-to-Date	Hours / FTE	41.76
M-5.2	Educational and Outreach Events	Number	1
M-5.3	Community Partners	Number	1

Respectfully submitted,
Paula A. Hogg
Director of Talent Management

TO: General Manager

FROM: Director of Water Quality (WQ)

SUBJECT: Monthly Report for March 2020

DATE: April 14, 2020

A. General

1. Pretreatment and Pollution Prevention (P3) division staff assessed no civil penalties this month.

2. The Central Environmental Laboratory (CEL) received notification that the corrective action plan submitted to the Division of Consolidated Laboratory Services in response to findings identified during the Virginia Environmental Laboratory Accreditation Program onsite assessment was accepted. Findings were minor and were focused on documentation and implementation of quality control practices for newly implemented methods. This assessment is closed and the next one will most likely be scheduled for early 2022.

B. Quality Improvement and Strategic Activities

1. The Sustainability Environment Advocacy (SEA) Group reported the following activities for the month of March:

   a. Communications: March's Sustainable Spotlight shared events employees could participate in to promote Earth Day and receive an HRSD Earth Day t-shirt.
   b. Earth Day: Held a meeting to discuss how to proceed considering COVID-19:
      - Celebration of the 50th Anniversary of Earth Day has been postponed until later in the year, possibly in late October.
      - Lacie Wever created a blog post on 50 ways to celebrate Earth Day at home, which will be shared on HRSD's blog or askHRgreen.org.
      - Christel Dyer will use the blog post as a guide to develop "50th Anniversary Earth Day Celebration in Isolation." SEA is planning to send the April Sustainable Spotlight to employees on Friday, April 10, highlighting the postponement of Earth Week events, the "50th Anniversary Earth Day Celebration in Isolation" and the blog post.

- SEA continues to work with Fort Monroe on the installation of an oyster reef. The oyster reef ribbon cutting will be included in the Earth Week celebration to be held in the fall.

c. Trash Collector Design – design plans were submitted to Christel Dyer to start the permitting process.

d. Metrics Reporting– A meeting was held to review data received from work centers regarding their recycling routines. There are some anomalies to be discussed with the work centers. Data of all items being recycled and of refuse produced while performing HRSD functions was reviewed. Recycling management will be recommended to be done on HRSD time.

2. The WQ Communication Team continues monitoring and measuring inter-divisional communication issues within the WQ Department.

C. Municipal Assistance

1. HRSD provided sampling and analytical services to Northumberland County and Westmoreland County to support monitoring required for their respective Virginia Pollution Discharge Elimination System (VPDES) permits.

2. The Municipal Assistance Billed Reimbursements per service collected between January 1 and March 31, 2020 is attached.

3. The Municipal Assistance Invoice Summary for the first quarter of the 2020 calendar year is attached.

D. Strategic Planning Metrics Summary

1. Educational and Outreach Events: 5
   a. 03/01/2020 – TSD staff supported a Chesapeake Bay Governor's School for Marine and Environmental Science high school student with planning a water quality capstone project
   b. 03/07/2020 - CEL staff volunteered at a Science, Technology, Engineering, and Math (STEM) Expo at Wilson High School in Portsmouth.
   c. 03/10/2020 – TSD staff presented on HRSD's Citizen Science collaborations to the Surfrider Foundation (Virginia Chapter) Blue Water Task Force
   d. 03/17/2020 – P3 staff participated in a Clean the Bay Day Coordination Meeting.
   e. 03/26/2020 – CEL staff met with a local Chesapeake Bay Governors School student regarding a Senior project.

2. Community Partners: 8
   a. American Red Cross
   b. City of Chesapeake
   c. City of Hampton
   d. City of Newport News
   e. City of Suffolk
   f. City of Virginia Beach
   g. Hampton Roads Planning District Commission Fats, Oils, and Grease
   h. Virginia Department of Health Division of Shellfish Sanitation

3. IWD System Issues: 1

4. Monthly Metrics

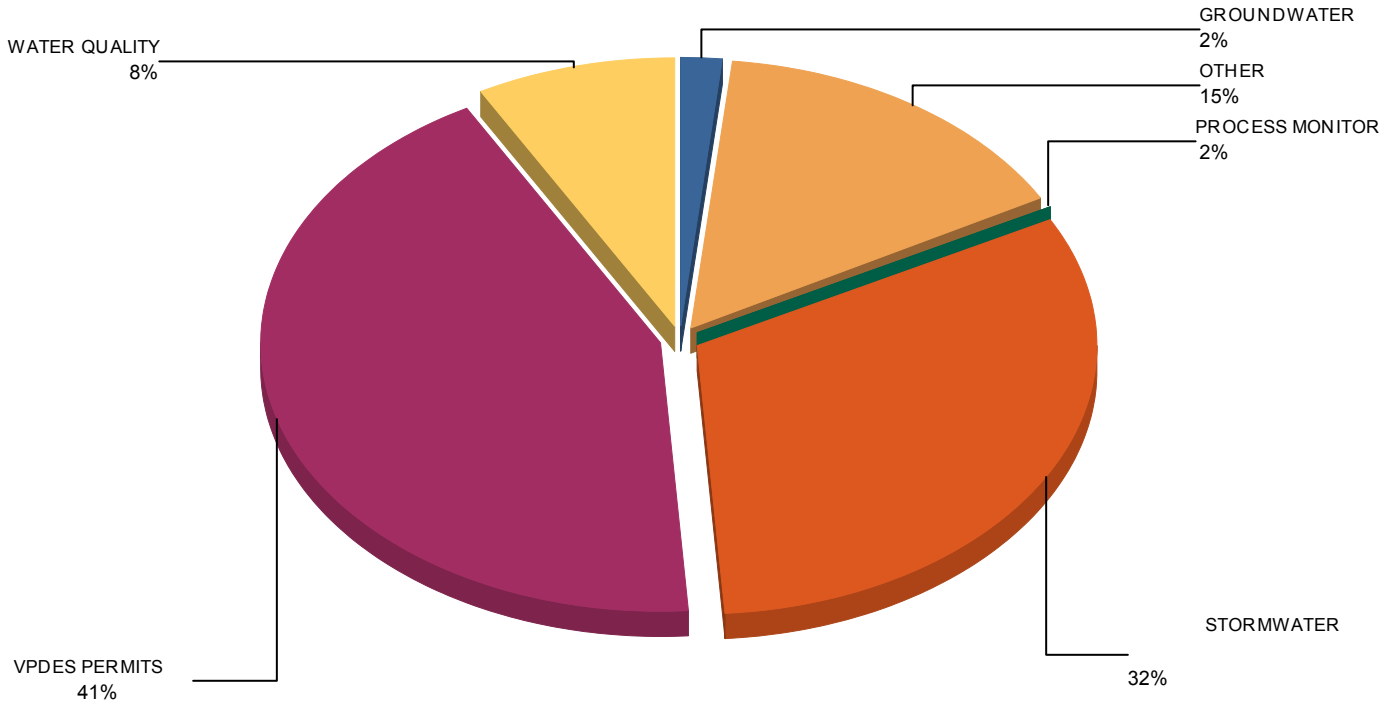
Item #	Strategic Planning Measure	Unit	March 2020
M-1.4a	Training During Work Hours Per Full Time Employee (114) (Current Month)	Total Hours / # FTE	4.95
M-1.4b	Total Training During Work Hours Per Full Time Employee (114) (Cumulative Fiscal Year-to-Date)	Total Hours / # FTE	45.06
M-2.5	North Shore/South Shore Capacity Related Overflows	# within Level of Service	0
M-3.1	Permit Compliance	# of Exceedances: # of Permitted Parameters	8:45,659
M-3.2	Odor Complaints	#	0
M-3.4	Pollutant Removal	Total Pounds Removed	139,767,440
M-3.5	Pollutant Discharge	% Pounds Discharged/ Pounds Permitted	19%
M-5.2	Educational and Outreach Events	#	5

Item #	Strategic Planning Measure	Unit	March 2020
M-5.3	Community Partners	#	8
	Average Daily Flow	Total MGD for all Treatment Plants	152.36
	Pretreatment Related System Issues	#	1

Respectfully submitted,
James Pletl, PhD
Director of Water Quality

Municipal Assistance Billed Reimbursements per Service
From 01/01/2020 to 03/31/2020

Attachment 1



Notes: Other = Equipment purchase, consultation, validation studies, boater pump-out program, etc.

Municipal Assistance Invoice Summary
From 01/01/2020 - 03/31/2020

Municipality	Reimbursements
Accomack County	$2,562.50
Buckingham County	$621.51
Chesapeake Public Works	$125.06
City of Chesapeake	$5,206.83
City of Emporia	$241.63
City of Fredericksburg	$692.82
City of Hampton	$4,675.12
City of Lynchburg	$4,365.54
City of Norfolk	$5,970.80
City of Portsmouth	$6,839.87
City of Roanoke	$2,018.63
City of Suffolk	$2,579.07
City of Virginia Beach	$6,301.41
HRPDC	$48,761.23
Hanover County	$4,767.43
Loudoun Water	$5,198.83
METRO Wastewater Reclamation Dist	$64.22
New Kent County	$13,845.14
Northampton County WWTP	$1,844.84
Northumberland Co. - Callao WWTP	$1,071.60
Spotsylvania County	$1,239.83
Stafford County	$9,607.70
Town of Cape Charles	$8,645.27
Town of Lawrenceville	$654.51
Upper Occoquan Service Authority	$7,044.14
Virginia Department of Health	$7,649.69
Westmoreland County	$722.20
Totals:	**$153,317.42**

Hampton Roads Sanitation District
Internal Audit Status
March 31, 2020

The following Internal Audit Status document has been prepared by SC&H for the HRSD Commission. Below is a summary of projects in process, upcoming audits, and the status of current management action plan (MAP) monitoring.

I. *Projects in Process*

Payroll/ Timekeeping

- **Tasks Completed (March 2020)**
  - Made minor updates to final report
  - Issued final report to Payroll Management (April 7, 2020)

Pollution Source Control

- **Tasks Completed (March 2020)**
  - Performed fieldwork testing procedures
  - Discussed preliminary results of completed planned procedures

- **Upcoming Tasks (April 2020)**
  - Complete Fieldwork Procedures
  - Complete draft of Internal Audit Report
  - Issue Draft Audit Report to Management for review

SWIFT Program

- **Tasks Completed (March 2020)**
  - Received and reviewed Program Management Contract

- **Upcoming Tasks (April 2020)**
  - Waiting to receive additional documentation (Updated Program Management Plan)
    - On-hold pending updates to documentation and process as a result of Unifier
  - Schedule follow-up meeting with Chief of SWIFT to discuss project timing

Business Continuity and Disaster Recovery (Audit Fieldwork Complete/ Management Response in Process)

- HRSD management has communicated its continued progress to develop a plan to address the recommendations included in the BC/DR report. SC&H will continue to work with HRSD process owners and management to finalize the audit report, incorporating management action plans. A specific completion date has not been identified at this time.

II. *Upcoming Projects (FY2020)*

SC&H's next audit will pertain to the Fleet Management at HRSD and is scheduled to begin in Q2 (April) of calendar year 2020.

III. *Management Action Plan (MAP) Monitoring*

SC&H is performing on-going MAP monitoring for internal audits previously conducted for HRSD. SC&H begins MAP follow-up approximately one year following the completion of each audit and will assess bi-annually.

For each recommendation noted in an audit report, SC&H gains an understanding of the steps performed to address the action plan and obtains evidence to confirm implementation, when available.

The following describes the current project monitoring status. This listing does not include audits which were determined by HRSD Management and the Commission to include confidential or sensitive information.

			Recommendations		
Audit	**Report Date**	**Next Follow-up**	**Closed**	**Open**	**Total**
D&C: CIP Project Management	5/11/2016	September 2020	11	2	13
Biosolids Recycling	10/8/2016	Pending Permit	7	1	8
HR Benefits	11/22/2016	Closed	15	0	15
Inventory	4/20/2017	In process	1	4	5
Procurement/ ProCard	8/23/2017	June 2020	8	3	11
Engineering Procurement	4/20/2018	In process	4	4	8
Corporate Governance: Ethics Function	3/21/18	June 2020	3	2	5
Treatment Plant Operations	10/15/18	In process	0	9	9
Customer Care Division*	7/26/19	August 2020	0	4	4
Safety Division*	9/12/19	September 2020	0	3	3
Permitting*	2/4/20	August 2020	0	2	2
		Totals	49	34	83

*SC&H has not yet performed formal follow-up procedures for the implementation status of these MAPs. Actual status may vary within the associated process areas and will be updated upon follow-up.

SC&H GROUP

Expertise that Works

Internal Audit

Payroll and Timekeeping

Hampton Roads Sanitation District

March 27, 2020

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I. Executive Summary

Background

SC&H conducted an internal audit (audit) of Hampton Roads Sanitation District's (HRSD) payroll and timekeeping function (collectively payroll). The payroll function includes processing timecards, calculating wages, withholding taxes and deductions (voluntary and involuntary), preparing direct deposit by automated clearing house (ACH), and processing employee federal and state tax payments.

HRSD currently employs approximately 847 employees. Employee categories include salary and hourly. These categories are further defined as full-time, temporary, part-time, and intern. Payroll, a section of the Accounting Division within the Finance Department, currently consists of three staff; an Accounting Manager, Payroll Specialist, and Business Analyst. Bi-weekly, the Payroll staff complete the payroll process which includes reconciliations, review procedures, and direct deposit and physical check disbursements for HRSD employees. In addition to standard payroll processing procedures, several special calculations may be required. These include retroactive pay changes, severance calculations, and fair labor standards act (FLSA) calculations.

The following provides an excerpt of the payroll function, from employee onboarding through processing, and additional payroll related activities.

Onboarding

At the time of hire, Human Resources (HR), a division within the Talent Management Department, creates an employee profile in HRSD's Oracle ERP System (Oracle) and employees are granted access to the Time Entry module (Time Entry) within Oracle. An employee profile includes grade, position, location, assignment category, exemption status, and Supervisor. HR reviews the new employee profile to verify the accuracy of the entered information, then notifies Payroll via e-mail of the new employee. Payroll performs a reasonableness review based on the position hired to verify all required fields are complete and appear appropriate.

Time Entry and Approvals

On a daily basis, employees enter their time and expenses into Time Entry. Timecards are recommended for daily completion, however this is not a systematic requirement. Entry fields vary depending upon the type of employee set-up. Weekly, employees submit their time activity for review and approval. Once all time has been entered, Supervisors, as designated and assigned in Time Entry, review and approve employee timecards so they may be processed by Payroll. In general, approvers are direct Supervisors.

Payroll Processing

Following the time entry and approval process, the payroll process function commences. This occurs on Mondays between 12pm and 1pm. During this period, timecards are locked by the Business Analyst to prevent changes by employees or Supervisors.

Timecards not submitted and approved timely are auto paid. As a result, the employee is paid for their standard work week. The Payroll Specialist generates an Auto Pay Report from Oracle that indicates each employee due to receive an automatic payment. This report is shared with HR, who reviews and confirms that the employees are still employed by HRSD. The Payroll Specialist stops payment from being processed for any employees who are no longer active. Further, the Accounting Manager meets with the employee and their Supervisor to discuss and avoid future late time entry and approval occurrences. When the late timecard is eventually approved in the following pay period, the auto pay is reversed from the employee's paycheck. A retroactive payment is then calculated within Oracle and paid based on the employee's actual approved time activity.

Objectives

The following audit objectives were established based on the internal audit planning procedures:

A. Verify new employee payroll information and employee status/data changes, including terminations, transfers, and merit changes are accurately reflected in Oracle.
B. Ensure employee timecard preparation and review is effective and accurate.
C. Verify non-paycheck related payments, including third party vouchers and tax payments are appropriately reviewed, approved, and supported.
D. Ensure employee payroll payments, including overtime and auto pay, are appropriate and accurately calculated.

Scope

The internal audit was initiated in August 2019. Fieldwork procedures began in October 2019 and were completed in February 2020. The internal audit focused on the policies, procedures, and controls in place at the time of the internal audit. Documentation sample selections were examined for the period of October 1, 2018 through September 30, 2019.

Methodology and Approach

SC&H performed the following procedures:

Process Walkthrough and Flowchart Creation

SC&H obtained and reviewed current payroll function policy and procedural documentation. SC&H then met with members of Payroll to conduct detailed process understanding discussions of related procedures. These discussions focused on process flow, required approval, inputs/outputs, and risk and control points. Based on discussions and review of the procedural documentation, SC&H created flowchart and narrative summaries to document each process. The processes identified and documented include:

- Onboarding
- Time Entry
- Payroll Process (Days 1-3)

Risk Ranking and Audit Program Creation

Following the documentation of process steps, SC&H developed a Payroll risk and control matrix (RCM). The RCM aligns risks with controls to analyze the control environment and ranks the risks on perceived likelihood and severity. Based on the understanding of the processes, risks, and related controls, SC&H developed an audit program to achieve the objectives described above. This program includes detailed steps to address each objective with the goal of verifying the existence of internal controls and identifying opportunities for improvement.

Audit Program Execution

SC&H executed the audit program by completing the following tasks:

- Examined a sample of new hire employees and assessed whether the payroll information was appropriately set up based upon the job posting and employee position
- Examined a sample of personnel changes, including promotions/demotions, merit changes, market adjustments, training appraisals, and terminations to confirm updates were made appropriately and timely in Oracle
- Recalculated leave payouts for separated employees
- Reviewed and analyzed the appropriateness of user access rights to Payroll modules in Oracle and documented user access maintenance procedures
- Examined a sample of employee timecards to assess reasonableness of function codes, activity codes, and work order usage and ensured that employee time is not approved by lateral or subordinate positions
- Reviewed a sample of payroll vouchers and a tax payment to ensure appropriate review is performed and support is documented and maintained
- Recalculated a sample of pay slips containing overtime hours to confirm that overtime is accurately calculated and paid
- Examined a sample of timecard adjustments to confirm appropriateness, timing, and review
- Reviewed the Auto Pay communication and confirmation process to ensure that terminated employees are not inappropriately paid
- Performed inquiry and observation procedures over the manual check payment process to analyze control design

Summary of Work

SC&H concludes that the HRSD Payroll and Timekeeping processes appear to incorporate appropriate and effective controls to ensure accurate and timely reporting and payment.

SC&H identified one observation with regards to merit and training appraisals not consistently occurring in a timely fashion, resulting in delayed pay rate increases.

We appreciate the assistance and cooperation of the management and staff involved in HRSD's payroll function. Please contact us if you have any questions or comments regarding any of the information contained in the internal audit report.

SC&H Group, Inc.

Matthew Simons, CPA, CIA, CGAP
Principal

II. Detailed Observations and Recommendations

Observation 1

Merit and training appraisals do not consistently occur in a timely fashion, resulting in delayed pay rate increases.

Observation Detail

Employees receive a merit appraisal on an annual basis, beginning a year after their start of service. The employee's approver should provide the employee an evaluation and approve a merit increase in Oracle prior to their appraisal date or the processing of the first payroll after the appraisal date in order to ensure that rate increases occur timely. HR receives notification of the approval in Oracle and updates the employee pay rate accordingly, which should be reflected in the paycheck following the appraisal date.

HR and approvers must maintain an ongoing awareness of multiple different appraisal dates throughout the year. These appraisal dates may differ by employee and may change for individuals as the result of a promotion. Further, there is not presently a function within Oracle to notify HR or approvers when employees are due for appraisals.

SC&H reviewed a sample of payroll changes that included 11 merit and training pay rate increases. In four of the 11 instances, the appraisal was not performed or approved timely by the employees' approver, which resulted in a delay in the pay change entry by HR. The employee continued to receive pay at a lower rate until the updated rate was entered into Oracle. Oracle then automatically calculated the retroactive pay owed to catch up for the pay increase.

Risk

Employee appraisals may not be administered or approved timely which can result in pay rate changes occurring subsequent to the expected appraisal date. This results in employees receiving paychecks at a lower rate for a period of time before receiving a paycheck that catches the employee up for back pay related to the pay rate increase.

While employees do ultimately receive the pay that they are owed, the delay may cause an employee morale risk, as individuals rely upon pay increases at expected intervals. Further, the delayed processing can be an administrative burden, resulting in an inefficient use of resources.

Recommendation 1.1

HRSD should reinforce the necessity to perform and approve appraisals in a timely fashion, ensuring employees receive increased pay with the first paycheck following their appraisal dates. Methods to accomplish this may include:

1. Tracking approvers who consistently submit late appraisals and meeting with them to identify solutions to ensure timeliness
2. Exploring the ability of Oracle to provide automated notifications and reminders as appraisals are due

Management's Action Plan

1. HR receives notifications regarding the merit review and appraisals status. Payroll does not receive this notification in Oracle currently.
2. Currently, reminder notifications are sent by Oracle to supervisors and managers at 90, 60 and 30 day intervals.

Implementation Date

Ongoing review with HR staff to create more timely submittals of merit reviews and appraisals.

Recommendation 1.2

HRSD should explore the pros/cons and costs/benefits of performing all appraisal reviews during the same time period each year. A transition to a new timing process may help ensure employees and approvers maintain an awareness of appraisal deadlines and assist in timely performance.

Management's Action Plan

This recommendation would need to be vetted by HR and Senior Management at HRSD.

Implementation Date

Senior Management decision

Recommendation 1.3

HRSD should explore the ability, pros/cons, and costs/benefits of uploading pay rate changes resulting from appraisal as batches, reducing the manual effort of HR in entering each individual pay rate increase.

Management's Action Plan

Payroll will explore with HR and Business Intelligence team to pursue the availability of pay rate changes being uploaded as batches.

Implementation Date

Complete third quarter 2020

Annual Metrics

Item	Strategic Planning Measure	Unit	Target	FY-10	FY-11	FY-12	FY-13	FY-14	FY-15	FY-16	FY-17	FY-18	FY-19
M-1.1a	Employee Turnover Rate (Total)	Percentage	< 8%	5.63%	4.09%	6.64%	7.62%	8.22%	9.97%	6.75%	6.66%	9.99%	6.63%
M-1.1b	Employee Turnover Rate within Probationary Period		0%		2.22%	8.16%	14.58%	9.68%	0.66%	0.13%	0.90%	1.01%	2.10%
M-1.2	Internal Employee Promotion Eligible	Percentage	100%		59%	80%	69.57%	71.43%	64.00%	69.00%	68.00%	85.00%	85.00%
M-1.3	Average Time to Fill a Position	Calendar Days	< 30		70	60	52	43.76	51	56	67	67	66
M-1.4	Training Hours per Employee - cumulative fiscal year-to-date	Hours	> 40		30.0	43.8	37.5	35.9	42.8	49.0	48.4	41.1	40.9
M-1.5a	Safety OSHA 300 Incidence Rate Total Cases	# per 100 Employees	< 3.5	6.57	6.15	5.8	11.2	5.07	3.87	7	5.5	5.7	4.1
M-1.5b	Safety OSHA 300 Incidence Rate Cases with Days Away	# per 100 Employees	< 1.1	0.74	1.13	1.33	0.96	1.4	0.82	1.9	1	1.1	0.8
M-1.5c	Safety OSHA 300 Incidence Rate Cases with Restriction, etc.	# per 100 Employees	< 0.8	3.72	4.27	2.55	4.5	2	1.76	3.6	2.8	2.8	1.8
M-2.1	CIP Delivery - Budget	Percentage			113%	96%	124%	149%	160%	151%	156%	160%	170%
M-2.2	CIP Delivery - Schedule	Percentage			169%	169%	161%	150%	190%	172%	173%	167%	159%
M-2.3a	Total Maintenance Hours	Total Available Mtc Labor Hours Monthly Avg			16,495	22,347	27,615	30,863	35,431	34,168	28,786	28,372	31,887
M-2.3b	Planned Maintenance	Percentage of Total Mtc Hours Monthly Avg			20%	27%	70%	73%	48%	41%	43%	44%	59%
M-2.3c	Corrective Maintenance	Percentage of Total Mtc Hours Monthly Avg			63%	51%	12%	10%	18%	25%	25%	24%	18%
M-2.3d	Projects	Percentage of Total Mtc Hours Monthly Avg			18%	22%	20%	18%	32%	34%	32%	32%	27%
M-2.4	Infrastructure Investment	Percentage of Total Cost of Infrastructure	2%		8.18%	6%	6%	4%	7%	7%	5%	5%	4
M-3.3	Carbon Footprint	Tons per MG Annual Total			1.61	1.57	1.47	1.46	1.44	1.45	1.58	1.66	1.58
M-3.6	Alternate Energy (Incl. Green Energy as of FY19)	Total KWH			0	0	0	5,911,289	6,123,399	6,555,096	6,052,142	5,862,256	47,375,940
M-4.1a	Energy Use: Treatment	kWh/MG Monthly Avg			2,473	2,571	2,229	2,189	2,176	2,205	2,294	2,395	2,277
M-4.1b	Energy Use: Pump Stations	kWh/MG Monthly Avg			197	173	152	159	168	163	173	170	181
M-4.1c	Energy Use: Office Buildings	kWh/MG Monthly Avg			84	77	102	96	104	97	104	104	95
M-4.2	R&D Budget	Percentage of Total Revenue	> 0.5%		1.0%	1.4%	1.0%	1.3%	1.0%	0.8%	1.3%	1.4%	1.8%
M-4.3	Total Labor Cost/MGD	Personal Services + Fringe Benefits/365/5-Year Average Daily Flow		$1,028	$1,095	$1,174	$1,232	$1,249	$1,279	$1,246	$1,285	$1,423	$1,348
M-4.4	Affordability	8 CCF Monthly Charge/ Median Household Income	< 0.5%		0.48%	0.48%	0.41%	0.43%	0.53%	0.55%	0.59%	0.60%	0.64%
M-4.5	Total Operating Cost/MGD	Total Operating Expense/ 365/5-Year Average Daily Flow		$2,741	$2,970	$3,262	$3,316	$3,305	$3,526	$3,434	$3,592	$3,959	$3,823
M-5.1	Name Recognition	Percentage (Survey Result)	100%	67%	71%	N/A	62%	N/A	60%	N/A	N/A	53%	N/A
M-5.4	Value of Research	Percentage - Total Value/HRSD Investment			129%	235%	177%	149%	181%	178%	143%	114%	117%
M-5.5	Number of Research Partners	Annual Total Number			42	36	31	33	28	35	15	20	26
	Rolling 5 Year Average Daily Flow	MGD		157.8	155.3	152	154.36	155.2	151.51	153.09	154.24	152.8	152.23
	Rainfall	Annual Total Inches		66.9	44.21	56.21	46.65	46.52	51.95	54.14	66.66	49.24	53.1
	Billed Flow	Annual Percentage of Total Treated		71.9%	82.6%	78%	71%	73%	74%	72%	73%	76%	72%
	Senior Debt Coverage	Net Revenue/Senior Annual Debt Service	> 1.5	2.51%	2.30%	2.07%	1.88%	1.72%	1.90%	2.56%	3.10%	3.59%	4.84%
	Total Debt Coverage	Net Revenue/Total Annual Debt	>1.4	1.67%	1.67%	1.46%	1.45%	1.32%	1.46%	1.77%	1.93%	2.03%	2.62%

Monthly Updated Metrics

Item	Strategic Planning Measure	Unit	Target	FY-10	FY-11	FY-12	FY-13	FY-14	FY-15	FY-16	FY-17	FY-18	FY-19	FY-20 Feb-20	FY-20 Mar-20
	Average Daily Flow	MGD at the Plants	< 249		136	146.5	158.7	156.3	153.5	155.8	153.5	145.8	152.7	173.2	152.4
	Industrial Waste Related System Issues	Number	0		3	6	6	6	2	4	7	4	7	0	0
	Wastewater Revenue	Percentage of budgeted	100%		97%	96%	98%	107%	102%	104%	103%	103%	104%	101%	101%
	General Reserves	Percentage of Operating and Improvement Budget	75% - 100%		72%	82%	84%	92%	94%	95%	104%	112%	117%	118%	121%
	Accounts Receivable (HRSD)	Dollars (Monthly Avg)			$17,013,784	$17,359,488	$18,795,475	$20,524,316	$20,758,439	$22,444,273	$22,572,788	$22,243,447	$23,900,803	$28,362,129	$25,174,836
	Aging Accounts Receivable	Percentage of receivables greater than 90 days			21%	20%	18%	19%	21%	20%	18%	18%	17%	18%	20%
M-2.5	Capacity Related Overflows	Number within Level of Service	0		25	1	30	5	11	16	6	10	5	1	0
M-3.1	Permit Compliance	# of Exceedances to # of Permitted Parameters	0		12:55,045	1:51995	2:52491	1:52491	2:52491	2:52,491	9:53236	9:58338	2:60879	8:40586	8:45659
M-3.2	Odor Complaints	Number	0		6	2	7	11	5	9	7	6	9	2	0
M-3.4	Pollutant Removal (total)	Total Pounds Removed			178,163,629	171,247,526	176,102,248	185,677,185	180,168,546	193,247,790	189,765,922	190,536,910	187,612,572	125,655,254	139,767,440
M-3.5	Pollutant Discharge (% of permitted)	Pounds Discharged/Pounds Removed	< 40%		25%	22%	25%	22%	22%	20%	22%	17%	17%	19%	19%
M-5.2	Educational and Outreach Events	Number			302	184	238	322	334	443	502	432	367	23	15
M-5.3	Number of Community Partners	Number			280	289	286	297	321	354	345	381	293	22	16

EFFLUENT SUMMARY FOR MARCH 2020

PLANT	FLOW mgd	% of Design	BOD mg/l	TSS mg/l	FC #/UBI	ENTERO #/UBI	TP mg/l	TP CY Avg	TN mg/l	TN CY Avg	TKN mg/l	NH3 mg/l	CONTACT TANK EX
ARMY BASE	11.17	62%	3	3.4	1	2	0.58	0.71	4.2	4.6	NA	NA	10
ATLANTIC	24.35	45%	14	7.9	3	1	NA	NA	NA	NA	NA	NA	12
BOAT HARBOR	16.00	64%	7	7.4	2	1	0.44	0.52	21	19	NA	NA	7
CENT. MIDDLESEX	0.011	43%	<2	2.1	1	1	NA	NA	NA	NA	NA	NA	NA
CHES-ELIZ	19.62	82%	22	24	34	12	1.4	1.4	33	33	NA	NA	13
JAMES RIVER	13.68	68%	5	4.1	2	1	0.26	0.50	11	9.9	NA	NA	1
KING WILLIAM	0.051	51%	<2	<1.0	NA	1	0.025	0.029	2.3	2.3	2.3	NA	NA
NANSEMOND	16.74	56%	4	4.8	3	1	0.76	0.64	3.7	4.1	NA	NA	3
SURRY, COUNTY	0.066	101%	4	<1.0	NA	NA	NA	NA	NA	NA	<0.50	NA	0
SURRY, TOWN	0.065	109%	8	10	NA	11	NA	NA	NA	NA	1.7	0.20	NA
URBANNA	0.039	39%	3	5.5	4	2	3.3	3.4	8.4	10	NA	0.11	NA
VIP	28.16	70%	9	16	5	2	0.59	0.37	3.6	3.2	NA	NA	3
WEST POINT	0.475	79%	22	24	2	4	2.5	2.3	17	16	NA	NA	0
WILLIAMSBURG	7.28	32%	3	2.3	1	1	0.30	0.43	2.8	3.7	NA	NA	1
YORK RIVER	14.66	98%	1	0.13	1	1	0.27	0.31	4.7	4.8	NA	NA	0
	152.36												

	% of Capacity
North Shore	63%
South Shore	60%
Small Communities	71%

Tributary Summary

	Annual Total Nitrogen			Annual Total Phosphorus		
	Discharged YTD	Operational Projection CY20		Discharged YTD	Operational Projection CY20	
Tributaries	%	Lbs	%	%	Lbs	%
James River	23%	4,115,945	90%	19%	269,151	85%
York River	21%	257,169	89%	23%	16,553	86%
Rappahannock	21%	NA	NA	101%	NA	NA

Permit Exceedances:Total Possible Exceedances, FY20 to Date: 8:45,659

Pounds of Pollutants Removed in FY20 to Date: 139,767,440

Pollutant Lbs Discharged/Permitted Discharge FY20 to Date: 19%

Rainfall (inch)

	North Shore (PHF)	South Shore (ORF)	Small Communities (FYJ)
Month	3.71"	5.19"	3.20"
Normal for Month	3.80"	3.34"	3.43"
Year to Date Total	12.20"	13.25"	10.65"
Normal for YTD	10.05"	9.21"	9.54"

AIR EMISSIONS SUMMARY FOR MARCH 2020

	No. of Permit Deviations below 129 SSI Rule Minimum Operating Parameters								Part 503e Limits		
MHI PLANT	Temp 12 hr ave (F)	Venturi(s) PD 12 hr ave (in. WC)	Precooler Flow 12 hr ave (GPM)	Spray Flow 12 hr ave (GPM)	Venturi Flow 12 hr ave (GPM)	Tray/PBs Flow 12 hr ave (GPM)	Scrubber pH 3 hr ave	Any Bypass Stack Use	THC Mo. Ave (PPM)	THC DC (%)	BZ Temp Daily Ave Days >Max
ARMY BASE	0	0	0	0	0	0	0	3	38	91	0
BOAT HARBOR	0	0	0	n/a	0	0	0	1	21	100	0
CHES-ELIZ	0	0	0	0	0	0	0	0	27	97	0
VIP	0	0	0	n/a	0	0	0	0	79	99	0
WILLIAMSBURG	0	0	0	n/a	0	0	0	0	16	95	0

ALL OPERATIONS

DEQ Reportable Air Incidents:	0
DEQ Request for Corrective Action:	0
DEQ Warning Letter:	0
DEQ Notice of Violation:	0
Other Air Permit Deviations:	0
Odor Complaints Received:	0
HRSD Odor Scrubber H2S Exceptions:	3

AGENDA ITEM 17.e. – April 28, 2020

Subject: Little Neck Interceptor Force Main Repair
Emergency Declaration

CIP Project: AT014700

Recommended Action: No action is required. Information Only

Brief: On April 4, 2020, the City of Virginia Beach reported a force main break on Little Neck Road near the intersection of N. Lynnhaven Road and Little Neck Road. The hardware holding a full circle clamp together on the 18-inch asbestos cement pipeline had corroded causing the failure. The failure leaked approximately 80,000 gallons into Buchanan Creek which is a tributary of the Western Branch of the Lynnhaven River.

Within several hours, HRSD staff and the City of Virginia Beach Public Utilities staff were able to isolate the break operating two mainline valves thus ceasing the overflow. HRSD staff was also able to hydroexcavate to the full circle clamp after which, the contractor, Tidewater Utility Construction, Inc. (TUCI), installed a new clamp and coated the hardware with a corrosion inhibitor.

An emergency declaration was authorized on April 7, 2020.

This emergency was declared to utilize the Prompt Repair On-Call Services contract with TUCI to establish traffic control, complete repairs on the force main, and make roadway repairs. The On-Call General Engineering contract with Hazen and Sawyer will be used to provide construction administration and inspection.

The estimated cost of this work is $500,000.