

# **City of Portsmouth**

**VPDES Permit No. VA0088668**

**Annual Report**

**Fiscal Year 2018**

**July 1, 2017 – June 30, 2018**

**Submitted by:**

**James E. Wright, Jr.  
City Engineer**





# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF ENVIRONMENTAL QUALITY

### TIDEWATER REGIONAL OFFICE

Matt Strickler  
Secretary of Natural Resources

5636 Southern Boulevard, Virginia Beach, Virginia 23462  
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David K. Paylor  
Director

Craig R. Nicol  
Regional Director

### **Certification Statement and Requirements**

As required by 9VAC25-870-370 B, all reports required by state permits, and other information requested by the board shall be signed by a responsible official or by a duly authorized representative of that person. A responsible official is:

- 1. For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy-making or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for state permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;*
- 2. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or*
- 3. For a municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.*

### **Duly Authorized Representatives**

A person is a duly authorized representative only if:

- 1. The authorization is made in writing by a person described above;*
  - 2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. A duly authorized representative may thus be either a named individual or any individual occupying a named position; and*
  - 3. The written authorization is submitted to the department.*
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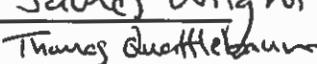
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## CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

 for James Wright  
Responsible Official Signature Date                       for James Wright

VPDES # VA 0088668 - City of Portsmouth  
Permit Number MS4 Name

In accordance with the current VPDES permit, the City of Portsmouth (the City) is submitting this annual report for the fiscal year 2018 (FY2018), which spans from July 1, 2017 through June 30, 2018. All information required by the permit has been collected and organized into the following format:

## Part I – Authorization, Effluent Limitations and Monitoring Requirements

### A.2 Permittee Responsibilities

### A.4 MS4 Program Resources

### A.6 MS4 Program Plan

### A.7 MS4 Program Review and Updates

### B.1 Planning

### B.2 MS4 Program Implementation

- a) Construction Site/Post Construction Site Runoff
- b) Retrofitting on Prior Developed Lands
- c) Roadways
- d) Pesticide, Herbicide and Fertilizer Application
- e) Illicit Discharges and Improper Disposal
- f) Spill Prevention and Response
- g) Industrial and High Risk Runoff
- h) Stormwater Infrastructure Management
- i) City Facilities
- j) Public Education/Participation
- k) Training
- l) Dry Weather Screening Program
- m) Infrastructure Coordination

### C.1 In-System/Wet Weather Monitoring

### C.2 Bacteria Monitoring

### C.3 Structural and Source Controls Compliance Monitoring and Tracking

### D.1 Chesapeake Bay TMDL Action Plan

### D.2 TMDL Action Plans other than the Chesapeake Bay TMDL

## Part I.A Discharges Authorized Under This State Permit

### Part I.A.2 Permittee Responsibilities

*“The permittee shall clearly define the roles and responsibilities of each of the permittee’s departments, divisions or subdivisions in maintaining permit compliance.”*

The MS4 program plan describes the City’s stormwater management strategy, and the multiple City departments that will implement the program plan elements. The MS4 program roles and responsibilities and applicable permit sections are described in Table 1.

Table 1  
*City of Portsmouth MS4 Program Roles and Responsibilities*

<b>Department/Division</b>	<b>Roles and Responsibilities</b>	<b>Permit Section</b>
Department of Engineering and Technical Services/Stormwater Compliance (SWC)	Evaluate non-stormwater discharges for compliance	I.A.1
	Implement and update the MS4 Program Plan; define the roles and responsibilities of City agencies; coordinate the implementation of the MS4 program; coordinate with DEQ on cases of non-compliance	I.A.2
	Review ordinances and recommend changes as necessary for permit compliance	I.A.3
	Provide MS4 program budget and funding information to DEQ	I.A.4
	Ensure permit maintenance fees are paid	I.A.5
	Maintain, implement, and enforce the MS4 Program Plan; document additions and post the MS4 Program Plan to the City website	I.A.6
	Review the MS4 Program Plan annually and update as needed	I.A.7
	Develop and submit the potential SWM project summary; post funded project information on the City website	I.B.1
	Implement erosion control and stormwater management programs in accordance with the regulations; report on more stringent requirements in City ordinances	I.B.2.a.

Develop and implement stormwater retrofit projects on prior developed land	I.B.2.b.
Develop and maintain a list of City maintained roadways treated and not treated by SWMFs	I.B.2.c.1.
Develop and implement protocols for maintenance of roads, streets, and parking lots	I.B.2.c.2.
Store deicing materials under cover	I.B.2.c.3.
Do not apply deicing materials containing urea or other forms of nitrogen or phosphorus to parking lots, roadways, sidewalks, and other paved surfaces	I.B.2.c.4.
Track acreage of lands managed under integrated pest management plans; evaluate compliance with the plans	I.B.2.d.3.
Implement a program prohibiting non-permitted discharges to the MS4; track illicit discharges and pollution releases to the MS4	I.B.2.e.
Document any non-stormwater discharges determined to be contributing significant amounts of pollutants to the MS4	I.B.2.e.1.
Develop and implement a floatables reduction program	I.B.2.e.3.
Prohibit the dumping or disposal of used motor vehicle fluids, household hazardous wastes, sanitary sewage, grass clippings, leaf litter, and animal wastes into the MS4 and implement used motor vehicle fluids and household hazardous waste material collection programs	I.B.2.e.4.
Implement a program with dry weather screening to locate and eliminate illicit discharges and improper disposal into the MS4	I.B.2.e.5. I.B.2.e.6.
Prevent, contain, and respond to non-emergency spills and provide spill response support to the Fire Department and other City Departments as requested	I.B.2.f.
Implement an industrial and high risk runoff inspection program	I.B.2.g.
Implement a stormwater infrastructure inspection and maintenance program for stormwater management (SWM) facilities and infrastructure maintained by the City	I.B.2.h.1.
Implement an inspection program for privately-maintained SWM facilities to ensure they have proper maintenance	I.B.2.h.2.
Oversee completion of the stormwater system mapping	I.B.2.h.3 I.B.2.h.4. I.B.2.h.5.
Oversee implementation of good housekeeping procedures at City facilities	I.B.2.i.1.

	Ensure City employees receive training on procedures and protocols for good housekeeping, pollution prevention, and spill prevention and response	I.B.2.i.1.d.
	Implement a stormwater inlet marking program at high-priority City municipal facilities and at City properties with greater than 2 acres of impervious surface	I.B.2.i.1.e.
	Identify all non-VPDES permitted high-priority municipal facilities that require a SWPPP, develop SWPPPs, and oversee implementation of SWPPPs at each facility	I.B.2.i.2.
	Implement a stormwater public education program	I.B.2.j.1.
	Promote, publicize, and facilitate public reporting of the presence of illicit discharges or improper disposal of materials into the MS4.	I.B.2.j.1.a.
	Continue to promote individual and group involvement in local water quality improvement initiatives, including the promotion of local restoration and clean-up projects, programs, groups, meetings, and other opportunities for public involvement.	I.B.2.j.1.b.
	Promote, publicize, and facilitate the proper management and disposal of used oil and household hazardous wastes.	I.B.2.j.1.d.
	Promote and publicize the proper disposal of pet waste and household yard waste.	I.B.2.j.1.e.
	Promote and publicize the use of the City's litter prevention program.	I.B.2.j.1.f.
	Promote and publicize methods for residential car washing that minimize water quality impacts.	I.B.2.j.1.g.
	Promote and publicize the proper use, application, and disposal of pesticides, herbicides, and fertilizers by public, commercial, and private applicators and distributors.	I.B.2.j.1.h.
	Encourage private property owners to implement voluntary SWM techniques and/or retrofits.	I.B.2.j.1.i.
	Target public education towards local groups of commercial, industrial, and institutional entities likely to have significant stormwater impacts.	I.B.2.j.1.j.
	Ensure the MS4 permit, annual reports, and MS4 Program Plan are posted on the City website	I.B.2.j.2. I.B.2.j.3. I.B.2.j.4.
	Implement a training program in illicit discharge recognition and reporting, good housekeeping, and pollution prevention; document and report on training	I.B.2.k.1. I.B.2.k.2. I.B.2.k.3. I.B.2.k.9.
	Ensure that employees and contractors who apply pesticides and herbicides are properly trained or certified per the Virginia Pesticide Control	I.B.2.k.4.

	Ensure that appropriate personnel have erosion and sediment control and stormwater management training and certifications	I.B.2.k.5. I.B.2.k.6.
	Implement dry weather screening program	I.B.2.l.
	Coordinate with VDOT annually on the MS4 program	I.B.2.m.
	Implement an in-system/wet weather monitoring program with HRPDC, HRSD, and USGS	I.C.1
	Continue to implement the Hoffler Creek bacteria monitoring program	I.C.2
	Maintain and update the database of SWM facilities	I.C.3
	Develop and implement the Chesapeake Bay TMDL Action Plan including annual submittal of data	I.D.1
	Develop and implement local TMDL Action Plans including annual submittal of data	I.D.2
	Submit the annual report to VDEQ.	I.E
City Manager	Oversee the enforcement of ordinances prohibiting the dumping or disposal of used motor vehicle fluids, household hazardous wastes, sanitary sewage, grass clippings, leaf litter, and animal wastes into the MS4	I.B.2.e.4.
Department of General Services (DGS)	Prohibit the dumping or disposal of used motor vehicle fluids, household hazardous wastes, sanitary sewage, grass clippings, leaf litter, and animal wastes into the MS4 and implement used motor vehicle fluids and household hazardous waste material collection programs	I.B.2.e.4.
	Prevent, contain, and respond to non-emergency spills and provide spill response support to the Fire Department and other City Departments as requested	I.B.2.f.
	Ensure City vehicle washing is conducted at the City's Vehicle Wash Building and commercial car washes	I.B.2.i.1.a.
	Prevent, contain, and respond to non-emergency spills and provide spill response support to the Fire Department and other City Departments as requested	I.B.2.f.
	Ensure City employees receive training on procedures and protocols for good housekeeping, pollution prevention, and spill prevention and response	I.B.2.i.1.d.
DGS/Property Management Division (PMD)	Implement a stormwater inlet marking program at high-priority City municipal facilities and at City properties with greater than 2 acres of impervious surface	I.B.2.i.1.e.
DGS/Waste Management Division (WMD)	Develop and implement a floatables reduction program	I.B.2.e.3.
	Prohibit the dumping or disposal of used motor vehicle fluids, household hazardous wastes, sanitary sewage, grass clippings, leaf litter, and animal wastes into the MS4 and implement used motor vehicle	I.B.2.e.4.

	fluids and household hazardous waste material collection programs	
	Ensure City employees do not dump collected yard waste and grass clippings into the MS4	I.B.2.i.1.c.
	Continue to promote individual and group involvement in local water quality improvement initiatives, including the promotion of local restoration and clean-up projects, programs, groups, meetings, and other opportunities for public involvement.	I.B.2.j.1.b.
Department of Parks, Recreation and Leisure Services (PRLS)	Identify lands that require turf and landscape nutrient management plans; develop and implement nutrient management plans; track implementation of plans	I.B.2.d.1.
	Evaluate and implement good housekeeping/pollution prevention measures in the application, storage, transport, and disposal of pesticides, herbicides, and fertilizers	I.B.2.d.2.
	Track acreage of lands managed under integrated pest management plans; evaluate compliance with the plans	I.B.2.d.3.
	Prohibit the dumping or disposal of used motor vehicle fluids, household hazardous wastes, sanitary sewage, grass clippings, leaf litter, and animal wastes into the MS4 and implement used motor vehicle fluids and household hazardous waste material collection programs	I.B.2.e.4.
	Implement a stormwater public education program	I.B.2.j.1.
	Continue to promote individual and group involvement in local water quality improvement initiatives, including the promotion of local restoration and clean-up projects, programs, groups, meetings, and other opportunities for public involvement.	I.B.2.j.1.b.
	Develop an outreach program for public and private golf courses located within the City that discharge to the permittee's MS4, which encourages implementation of integrated management practice plans and techniques to reduce runoff of fertilizer and pesticides.	I.B.2.j.1.c.
	Ensure that employees and contractors who apply pesticides and herbicides are properly trained or certified per the Virginia Pesticide Control	I.B.2.k.4.
	Provide training to employees in illicit discharge recognition and reporting, good housekeeping and pollution prevention practices	I.B.2.k.7.
	Department of Public Utilities (DPU)	Continue to implement a sanitary sewer inspection program
Ensure all wastewater is sent to the sanitary sewer or collected by appropriate vendors		I.B.2.i.1.b.

	Ensure City employees receive training on procedures and protocols for good housekeeping, pollution prevention, and spill prevention and response	I.B.2.i.1.d.
Department of Public Works (DPW)	Ensure that employees and contractors who apply pesticides and herbicides are properly trained or certified per the Virginia Pesticide Control	I.B.2.k.4.
DPW/Streets and Highways Division (SHD)	Develop and implement protocols for maintenance of roads, streets, and parking lots	I.B.2.c.2.
	Store deicing materials under cover	I.B.2.c.3.
	Do not apply deicing materials containing urea or other forms of nitrogen or phosphorus to parking lots, roadways, sidewalks, and other paved surfaces	I.B.2.c.4.
Portsmouth Fire Department (PFD)	Provide spill response training to appropriate emergency response employees and report on training	I.B.2.k.8.
	Prevent, contain, and respond to non-emergency spills and provide spill response support to the Fire Department and other City Departments as requested	I.B.2.f.
	Prevent, contain, and respond to non-emergency spills and provide spill response support to the Fire Department and other City Departments as requested	I.B.2.f.
	Implement an industrial and high risk runoff inspection program	I.B.2.g.
Portsmouth Police Department	Provide spill response training to appropriate emergency response employees and report on training	I.B.2.k.8.
Portsmouth Public Schools (PPS)	Ensure City employees receive training on procedures and protocols for good housekeeping, pollution prevention, and spill prevention and response	I.B.2.i.1.d.

In addition to the programs implemented by City departments, the City also maintains an agreement with the Hampton Roads Planning District Commission (HRPDC) to implement portions of the MS4 permit. These programs pertain to the outreach elements in Section I.B.2.j.1.e-f. The HRPDC also coordinates the regional in-system monitoring program in Section I.C.1.

*“In the event the permittee is unable to meet conditions of this state permit due to circumstances beyond the permittee’s control, a written explanation of the circumstances that prevented permit compliance shall be submitted to the Department in the annual report.”*

Industrial and High Risk Runoff facility inspections were not performed during FY2018 due to staff turnover within the Engineering and Technical Services Department and the engagement of a new group of engineering consultants. Industrial and high risk runoff inspections are now ongoing by Arcadis and will continue to be performed via a combination of consultant and in house staff for the remainder of the permit term.

**Part I.A.4**  
**MS4 Program Resources**

*“The permittee shall submit to the Department a copy of each fiscal year’s budget including its proposed capital and operations and maintenance expenditures necessary to accomplish the activities required by this state permit. The permittee shall describe its method of funding the stormwater program with the copy of the fiscal year budget.”*

The City funds its stormwater management program using stormwater utility fees. The rate structure is the same for all properties in the City, and is based on the amount of impervious area on each. Impervious areas are surfaces that do not permit water to penetrate into the ground such as rooftops, concrete or bituminous parking lots, concrete sidewalks, etc. It is this impervious cover that contributes to stormwater runoff. Impervious area is measured in square feet and converted into Equivalent Residential Units (ERUs). The average impervious area for residential properties in the City of Portsmouth is 1,877 square feet, which has been set equivalent to one ERU. All residential properties are billed for one ERU. Commercial properties are billed for the actual amount of impervious cover, which is converted to ERUs. The billing rate for all properties in Portsmouth in FY 2018 was \$10.50 per month per ERU. Annual stormwater revenue is dependent on land use change and the ability of the City to collect assessed fees and varies from year to year. Average annual revenues are approximately \$8.4 million dollars.

A summary of the FY2018 Stormwater budget is provided below:

***FY2018 Stormwater Budget\****

Personnel services	\$1,327,397.00
Includes labor, benefits, and equipment costs	
Contractual services	\$347,068.00
Includes HRPDC, HRSD, consultants, and small contracted projects	
Materials and supplies	\$94,680.00
Includes construction materials, tools, and uniforms	
Internal service charges	\$362,986.00
Includes indirect costs, audit, IT, risk management, and telephone	
Vector Control	\$416,695.00
Other Transfers	\$147,170.00
Capital Equipment	\$345,459.00
Capital outlay	<u>\$6,100,375.00</u>
	<b>\$9,141,830.00</b>

*\*Expenditures will be finalized when the budget audit is completed*

***FY2019 Proposed Stormwater Budget***

Personnel services	\$1,402,574.00
Includes labor, benefits, and equipment costs	
Contractual services	\$421,177.00
Includes HRPDC, HRSD, consultants, and small contracted projects	
Materials and supplies	\$143,461.00
Includes construction materials, tools, and uniforms	
Internal service charges	\$407,696.00
Includes indirect costs, audit, IT, risk management, and telephone	
Vector Control	\$416,695.00
Other Transfers	\$147,183.00
Capital Equipment	\$451,000.00
Capital outlay	<u>\$6,100,375.00</u>
	<b>\$9,490,161.00</b>

**Part I.A.6**  
**MS4 Program Plan**

*“Utilizing the last annual report prior to this state permit effective date as a baseline, the permittee’s first annual report submitted under this state permit (Initial Report) shall include the necessary updates to describe implementation of this MS4 Program Plan and meet the conditions described in this section”*

The City of Portsmouth submitted its revised Program Plan to the Department with the 2017 Annual Report.

**Part I.A.7**  
**MS4 Program Review and Updates**

*“The permittee will review the current MS4 Program Plan annually...all modifications and proposed modifications shall be reported in accordance with this section of the permit.”*

There are no modifications or proposed modifications at this time.

## **Part I. B Stormwater Management**

*“The following subparts describe the requirements for the permittee to implement in its MS4 Program Plan during this state permit term.”*

## Part I.B.1 Planning

*“No later than 12 months after the permit effective date, the permittee shall provide the stormwater management project summary sheet (submitted to the Department June 30, 2017).”*

*“Each annual report shall include an updated project summary sheet.”*

POTENTIAL STORMWATER MANAGEMENT RETROFITS FOR MS4 PERMIT COMPLIANCE								
Prioritized by Estimated Cost/lb TP								
Retrofit Project Name	Acres Treated	Impervious acreage treated by potential project	Pervious acreage treated by potential project	Condition of downstream channel	Total Phosphorus reduction (lbs)	Feasibility for implementation	Estimated cost of implementation	Estimated cost per pound of TP
Gust Lane Stream Restoration	626.55	238.09	388.46	poor	51.00	poor	\$632,998	\$12,412
Green Lake #3 level I wet pond	262.69	74.23	188.46	fair	71.09	fair	\$941,558	\$13,245
Victory Blvd. level II wet pond	46.84	32.76	14.08	fair	34.76	good	\$493,000	\$14,183
Lake Collins level II wet pond	92.64	52.60	40.04	fair	20.52	poor	\$307,413	\$14,981
Hidden Cove #3 level II wet pond	6.19	3.38	2.81	good	18.85	TBD	\$297,396	\$15,777
Beaton Dr. & Sykes Ct. wet pond	16.40	6.24	10.16	fair	8.42	good	\$157,200	\$18,670
Green Lake #2 level II wetlands	44.09	15.69	28.40	fair	12.55	fair	\$240,458	\$19,160
Beaton Dr. & Sykes Ct. wetland	16.40	4.20	12.20	fair	7.66	poor	\$166,271	\$21,706
Green Lake #3 dredging	262.69	74.23	188.46	fair	30.85	fair	\$674,441	\$21,862
Peachtree level II wet pond	91.57	36.72	54.85	fair	16.63	TBD	\$387,423	\$23,297
Green Lake #2 level II wet pond	44.09	15.69	28.40	fair	7.53	fair	\$219,084	\$29,095
Churchland wet swale	8.99	1.89	7.10	poor	4.71	good	\$147,443	\$31,304
South St. parking lot wetland	9.10	2.00	7.10	fair	3.62	fair	\$120,859	\$33,386
Long Point Lake level II wet pond	76.11	30.53	45.58	fair	13.82	fair	\$462,338	\$33,454
Lake Jean #1 level II wetlands	81.61	28.61	53.00	good	23.05	poor	\$804,665	\$34,910
Lake Jean #1 level II wet pond	81.61	28.61	53.00	good	13.83	poor	\$527,798	\$38,163
Churchland High bioretention	16.80	7.70	9.10	good	19.10	poor	\$834,229	\$43,677
Croatan Tr. constructed wetland	5.24	3.84	1.40	poor	3.06	poor	\$143,491	\$46,892
Lake Cavalier level II wet pond	325.00	156.50	168.50	good	65.27	poor	\$3,158,828	\$48,396
City Park parking bioretention	3.35	2.85	0.50	good	3.55	fair	\$178,492	\$50,279
Court St. , Green St.	5.40	5.00	0.40	good	6.48	good	\$337,410	\$52,069
Croatan Tr. Bioretention	5.24	3.84	1.40	poor	3.47	fair	\$185,826	\$53,552
Greenwood Dr. North pond	38.20	28.65	9.55	good	10.13	poor	\$650,000	\$64,166
nTelos Pond #1 level II wet pond	15.79	11.93	3.86	good	4.94	fair	\$387,410	\$78,423
Green Lake #1 level II wet pond	70.45	42.06	28.39	fair	16.10	poor	\$1,367,257	\$84,923

\*Highlighted Projects have been identified and have funds approved for the Capital Improvement Plan (CIP)

*“Each annual report shall include a current web link to the project status page.”*

The City of Portsmouth Department of Engineering website will host the project status page when projects begin.

Web link: <http://www.portsmouthva.gov/257/Engineering-Technical-Services>

*“Each annual report shall include a status update for those water quality projects for which implementation or construction occurred during the reporting year.”*

Five water quality projects have been identified for action and entered planning phase. These projects have been allocated funds through the Capital Improvement Program (CIP) and are fully described in the Chesapeake Bay TMDL Action Plan.

**Part I.B.2**

**MS4 Program Implementation:**

**Part I.B.2.a)**

**Construction site runoff and post construction runoff from areas of new development and development on prior developed lands**

*“Each annual report shall contain the number of regulated land disturbing activities approved and the total number of acres disturbed.”*

***Land Disturbance Permits – FY2018***

<b><i>Project Type</i></b>	<b><i>Number of Projects</i></b>	<b><i>Number of Permits</i></b>	<b><i>Acres of Disturbed Land</i></b>
Commercial/Industrial	17	17	18.78
Multi-Family Residential & Subdivisions	1	1	2.18
Demolitions (Commercial, Subdivisions, MFR)	3	3	2.4
Single Family Residential	147	147	14.20
Single Family Residential Demolitions	50	50	5.25
Right-of-Way	4	4	2.18
<b>TOTAL</b>	<b>222</b>	<b>222</b>	<b>54.59</b>

In FY2017, 191 Land Disturbance Permits were issued for 222 projects. These projects will disturb approximately 54.59 acres of land.

“Each annual report shall contain the number of land disturbing activity inspections conducted and the number and type of each enforcement action taken...”

***Erosion and Sediment Control Inspections – FY2018***

<b><i>Project Type</i></b>	<b><i>Number of Projects</i></b>	<b><i>Number of Inspections</i></b>
Commercial/Industrial	17	385
Multi-Family Residential	1	34
Subdivisions	0	56
Demolitions (Commercial, Subdivisions, MFR)	3	25
Right-of-Way	4	80
Single Family Residential	147	2,714
Single Family Residential Demolitions	50	422
Total	222	3,716

Enforcement actions are initiated as necessary. In FY2018, 257 Notices to Comply and 153 Stop Work Orders were issued, for a total of 410 enforcement actions taken. No exceptions to stormwater management or erosion and sediment control technical criteria were granted during FY2018.

“Each annual report shall include a list of land disturbing projects that qualify under the ‘Grandfathering’ provision of the VSMP regulations...”

<b>Name</b>	<b>Address</b>
Grove Baptist Church Additions	5910 West Norfolk Road

*“Each annual report shall include a summary of actions taken by the permittee to implement Part I.B.2.a)1) and 2) of this state permit.”*

The City has continued its program to maintain and monitor structural and nonstructural erosion and sediment control (E&SC) practices to reduce the amount of pollutants in stormwater runoff from construction sites. Site inspections are completed on all projects that disturb 2,500 square feet or more of land area, including demolition projects. Land Disturbance Permits must be obtained for all such projects and an approved *E&SC Plan* or an *Agreement-in-Lieu-of-a-Plan* must be obtained prior to any land disturbing activity.

Two full-time Erosion Control Specialist positions exist within the Department of Engineering. These staff perform routine periodic inspections at all regulated job sites to ensure proper construction methods and proper installation and maintenance of erosion and sediment controls. Inspections are generally conducted once every two weeks and following any runoff-producing storm event. Following a repeat violation, inspections are conducted weekly until compliance is achieved.

Owners, Contractors, and Responsible Land Disturbers are provided copies of inspection reports when violations occur. On-site meetings are conducted with the responsible parties when necessary, as well as pre-construction meetings before construction begins. The City of Portsmouth also conducts VSMP Inspections at all sites within the City that have land disturbance greater than an acre and that have Construction General Permit coverage.

The City developed a database to track all inspections and enforcement actions that is supported by a paper filing system. In FY2018, a total of 3,716 E&SC inspections were conducted on 222 active projects throughout the City.

**Part I.B.2.b)**  
**Retrofitting on prior developed lands**

*“Each annual report shall include a status update for those projects for which implementation began during the reporting period.”*

POTENTIAL STORMWATER MANAGEMENT RETROFITS FOR MS4 PERMIT COMPLIANCE								
Prioritized by Estimated Cost/lb TP								
Retrofit Project Name	Acres Treated	Impervious acreage treated by potential project	Pervious acreage treated by potential project	Condition of downstream channel	Total Phosphorus reduction (lbs)	Feasibility for implementation	Estimated cost of implementation	Estimated cost per pound of TP
Gust Lane Stream Restoration	626.55	238.09	388.46	poor	51.00	poor	\$632,998	\$12,412
Green Lake #3 level I wet pond	262.69	74.23	188.46	fair	71.09	fair	\$941,558	\$13,245
Victory Blvd. level II wet pond	46.84	32.76	14.08	fair	34.76	good	\$493,000	\$14,183
Lake Collins level II wet pond	92.64	52.60	40.04	fair	20.52	poor	\$307,413	\$14,981
Hidden Cove #3 level II wet pond	6.19	3.38	2.81	good	18.85	TBD	\$297,396	\$15,777
Beaton Dr. & Sykes Ct. wet pond	16.40	6.24	10.16	fair	8.42	good	\$157,200	\$18,670
Green Lake #2 level II wetlands	44.09	15.69	28.40	fair	12.55	fair	\$240,458	\$19,160
Beaton Dr. & Sykes Ct. wetland	16.40	4.20	12.20	fair	7.66	poor	\$166,271	\$21,706
Green Lake #3 dredging	262.69	74.23	188.46	fair	30.85	fair	\$674,441	\$21,862
Peachtree level II wet pond	91.57	36.72	54.85	fair	16.63	TBD	\$387,423	\$23,297
Green Lake #2 level II wet pond	44.09	15.69	28.40	fair	7.53	fair	\$219,084	\$29,095
Churchland wet swale	8.99	1.89	7.10	poor	4.71	good	\$147,443	\$31,304
South St. parking lot wetland	9.10	2.00	7.10	fair	3.62	fair	\$120,859	\$33,386
Long Point Lake level II wet pond	76.11	30.53	45.58	fair	13.82	fair	\$462,338	\$33,454
Lake Jean #1 level II wetlands	81.61	28.61	53.00	good	23.05	poor	\$804,665	\$34,910
Lake Jean #1 level II wet pond	81.61	28.61	53.00	good	13.83	poor	\$527,798	\$38,163
Churchland High bioretention	16.80	7.70	9.10	good	19.10	poor	\$834,229	\$43,677
Croatan Tr. constructed wetland	5.24	3.84	1.40	poor	3.06	poor	\$143,491	\$46,892
Lake Cavalier level II wet pond	325.00	156.50	168.50	good	65.27	poor	\$3,158,828	\$48,396
City Park parking bioretention	3.35	2.85	0.50	good	3.55	fair	\$178,492	\$50,279
Court St. , Green St.	5.40	5.00	0.40	good	6.48	good	\$337,410	\$52,069
Croatan Tr. Bioretention	5.24	3.84	1.40	poor	3.47	fair	\$185,826	\$53,552
Greenwood Dr. North pond	38.20	28.65	9.55	good	10.13	poor	\$650,000	\$64,166
nTelos Pond #1 level II wet pond	15.79	11.93	3.86	good	4.94	fair	\$387,410	\$78,423
Green Lake #1 level II wet pond	70.45	42.06	28.39	fair	16.10	poor	\$1,367,257	\$84,923

\*Highlighted Projects have been identified and have funds approved for the Capital Improvement Plan (CIP)

Five water quality projects have been identified for action and entered planning and design phase, shown above. These projects have been allocated funds through the Capital Improvement Program (CIP) and are fully described in the Chesapeake Bay TMDL Action Plan.

**Part I.B.2.c)  
Roadways**

*“Streets, roads and parking lots maintained by the permittee shall continue to be operated and maintained in a manner to minimize discharge of pollutants, including those pollutants related to de-icing or sanding activities.”*

De-icing materials are covered in a salt dome that is located at the City’s Operations Center. This covered storage facility prevents runoff from the stockpile due to rain and other inclement weather conditions. The City will not use any deicing agent that contains urea or other forms of Nitrogen or Phosphorous to parking lots, roadways, and sidewalks or other paved surfaces. Immediately following a snow event, when feasible, street sweepers are used to retrieve sand/salt from primary streets. See the attached document from ch2m in regards to the City’s roadways.

*“The permittee shall include a copy of the written protocols identified in Part I.B.2.c)(2) with the next annual report that is due after development of the protocols.” (October 1, 2019)*

Protocols will be developed by the end of permit year 3 that minimize pollutant discharges from City roads, streets, and parking lot maintenance.

**Part I.B.2.d)**

**Pesticide, herbicide and fertilizer application**

*“The annual report due October 1, 2017 shall contain a list of all permittee lands and applicable acreage on which nutrients are applied to more than one contiguous acre.”*

The City of Portsmouth owns two golf courses (Bide-a-wee and The Links at City Park), where nutrients are applied by Certified Pesticide Applicators. Each of these golf courses is more than one contiguous acre.

*“Each annual report shall report on compliance with the turf and landscape nutrient management implementation schedule and include a list of the permittee’s properties for which turf and landscape nutrient management plans have been implemented during the reporting year and the cumulative total of acreage under turf and landscape nutrient management plans.”*

Bide-a-wee and The Links at City Park both recently had turf and landscape nutrient management plans drafted. The Nutrient Management Plans were reviewed by the Department and approved.. Between both golf courses, there is a cumulative total acreage of 139.75 acres that is covered under the turf and landscape nutrient management plan. This constitutes the development of landscape and nutrient management plans on 100% of the lands within the City where fertilizer is applied on lands in excess of one contiguous acre.

*“Each annual report shall include the number of acres managed under Integrated Pest Management Plans.”*

The Integrated Pest Management Plan covers 18,500 acres in the City of Portsmouth.

**Part I.B.2.e)**

**Illicit discharges and improper disposal**

*“Each annual report shall include a list of illicit discharges identified, the source, a description of follow-up activities and whether the illicit discharge has been eliminated.”*

As per the requirements of the permit, the permittee shall make a report of all discharges into the stormwater system from the sanitary sewer system. Presented here are the reported spills from the sanitary system as they infiltrated into the stormwater system. The Portsmouth Public Utilities Department previously forwarded these reports to the Department of Environmental Quality (DEQ).

In FY2018, a total of 34 reportable releases from the sanitary sewer system occurred in the City of Portsmouth. On each occasion, the Virginia Department of Environmental Quality received notice of the release and corrective actions were taken by the wastewater utility through the Sanitary Sewer Overflow Reporting System (SSORS).

*Note: The following data represents the estimated total discharge that actually entered state waters. All reports previously submitted to DEQ contain the total estimated discharge from the site in question.*

**Sanitary Sewer Overflows – FY2018**

<b>Date of Incident</b>	<b>Reported Date</b>	<b>Amount (gallons)</b>	<b>Location</b>	<b>Description of Incident</b>	<b>Corrective Action</b>
7/24/2017	7/25/2017	40	330 Thelmar Lane	Grease blockage in main sewer line caused overflow from manhole into storm drain system.	Removed blockage, clean line and deodorized area. Re-clean next day. -----July 25, 2017 08:02 AM-----
8/1/2017	8/2/2017	60	427 Mohican	Grease blockage in sewer main line caused overflow from man hole into storm drain catch basin.	Removed blockage, clean line and deodorized area. Re-clean line next day. ----- August 2, 2017 08:11 AM-----
8/9/2017	8/10/2017	10	4 Cooper Drive	Grease blockage in main sewer line caused overflow from Manhole into storm drain catch basin.	Removed blockage, clean line, and clean up area. Re-clean sewer line next day. ----- August 10, 2017 08:44 AM-----

10/28/2017	10/30/2017	10	11 Willow Breeze Ct	Malfucntion in Pump Station caused overflow from man hole into storm drain system	Fixed problem at Pump station -----October 30, 2017 08:36 AM-----
11/18/2017	11/20/2017	25	5603 F High street west	Grease blockage in sewer main line caused overflow from Manholes into storm drain system.	clean line , clean up area, re-clean next day. -----November 20, 2017 08:20 AM-----
12/9/2017	12/11/2017	25	4500 Westmoreland Terrace	Manhole overflow due to blockage in Suction well	Clean well by removing debris in well and suction main ----- December 11, 2017 07:41 AM-----
12/20/2017	12/21/2017	0	1300 Highland Avenue	Manhole overflow due to Excessive grease causing blockage.	Cleaned line by jetting it and removed grease by vacuuming it out of system at manhole ----- December 21, 2017 08:49 AM-----
12/25/2017	12/27/2017	40	5827 Woodside lane	Sewage blockage at Pump Station caused overflow from manhole near station.	Sewer Crew clean grates to remove blockage, clean up area and placed station back on line ----- December 27, 2017 09:23 AM-----
1/2/2018	1/3/2018	25	13 South Fairview Circle	Blockage in sewer main line caused overflow from manhole into storm drain system.	Sucked down manhole to stop overflow, set up by-pass system and continue to operate until repairs are made on the sewer main line. -----January 3, 2018 01:07 PM-----

1/14/2018	1/16/2018	40	26 Pollux Cir. west near pump station	Grease blockage in main sewer line caused overflow from manholes into storm drain system.	clean up overflow from manholes, clear main from grease blockage, re-clean line next day. deodorized area. ----- January 16, 2018 08:23 AM-----
1/17/2018	1/18/2018	25	#2 and #4 Tidal Ct	Grease blockage in main sewer line caused overflow from manholes into storm drain system.	suck down manholes to stop overflows, clean grease from main line, clean up area. Re-clean line next day. ----- January 18, 2018 11:43 AM-----
1/21/2018	1/22/2018	10	4013 / 4033 Breakwater Drive	Grease Blockage in main sewer line caused overflow from manholes into storm drain system.	vacuumed down manholes to stop overflows, cleaned and cleared grease from main line, clean up area. Re-checked line the next day. ----- January 22, 2018 01:27 PM-----
1/21/2018	1/22/2018	0	4005 Windymille Drive	Grease blockage in sewer main line causing manhole overflow	Jetted main sewer line unstopping grease blockage which stopped overflow onto street. Vacuumed and cleaned overflow area. ----- January 22, 2018 01:37 PM-----
1/22/2018	1/23/2018	45	900 County Street	Grease and rags cause a stoppage in the main sewer line resulting in the manhole	Jetted and cleaned main line to unstop the grease blockage which stopped the overflowing

				overflowing which entered into the storm system	manhole. Cleaned and vacuumed area. ----- January 23, 2018 12:05 PM-----
1/23/2018	1/23/2018	5	612 Oak Street	Grease, debris and rags caused a blockage in the sewer lateral which overflowed from the clean out and entering in the storm system.	Jetted out sewer lateral through serviceable clean out unblocked line stopping overflow. Vacuumed and cleaned up area. -----January 23, 2018 04:48 PM-----
1/26/2018	1/26/2018	10	413 Elmhurst Lane	Grease blockage in sewer main line which caused overflow into storm system	Jetted out sewer main line and unblocked grease stopping overflow from wash-out box. Vacuumed and cleaned up area. ----- January 26, 2018 03:49 PM-----
1/31/2018	2/1/2018	3	24 Bainbridge Ave.	Grease and Debris blockage in sewer main line caused overflow into storm system	Jetted out sewer main line and unblocked grease/debris stopping overflow from manhole. Vacuumed and cleaned up area. -----February 1, 2018 01:50 PM-----
1/31/2018	2/1/2018	4	89 Decatur Street	Grease and Debris blockage in sewer main line causing overflow into storm system	Jetted out sewer main line and unblocked grease/debris stopping overflow from manhole. Vacuumed and cleaned up area. -----February 1, 2018 01:58 PM-----

2/7/2018	2/8/2018	25	638,642,644 Douglass Ave	Grease blockage in sewer main caused over flow from clean outs into storm drain system.	Removed blockage in main sewer line, clean line, clean up area. Re-clean line next day. ----- February 8, 2018 10:27 AM-----
3/2/2018	3/2/2018	5	214 Tidel Ct	Grease blockage in sewer main line caused overflow from clean out into storm drain system.	Clean main sewer line, clean up area around clean out. Re-clean sewer main next day. --- ---March 2, 2018 03:48 PM-----
3/3/2018	3/5/2018	40	6020 Churchland Blvd.	Sewer Pump Station had no power causing system to back up and overflow.	Vacuumed system down and kept sewage from overflowing until power was restored to the pump station. Cleaned up area ----- March 5, 2018 08:12 AM-----
3/4/2018	3/5/2018	30	3829 Shannon Road	Sewer pump station was down due to a maintenance issue causing system to back up and overflow.	Vacuumed system down and kept sewage from overflowing until maintenance was completed and system was working properly. Cleaned up area. ----- March 5, 2018 08:25 AM-----
4/11/2018	4/12/2018	0	3919 Kingman Avenue	Sewer pump station was down due to a maintenance issue causing system to back up and overflow.	Vacuumed system down and kept sewage from overflowing until maintenance was completed and system was working properly. -

					----April 12, 2018 03:41 PM-----
4/23/2018	4/24/2018	20	5224 Crabtree Place	Sewer Pump Station was up due to a failure causing the main lines to back up and accumulate some blockages which caused manhole to overflow into storm system.	Used high pressure truck to unblock three separate stoppages stopping the overflow into the storm system. Vacuumed and Cleaned up area. Deoderized. Checking the area of concern on 4/24/2018 also. ---- April 24, 2018 10:32 AM-----
4/23/2018	4/24/2018	30	3308 Shoreline Drive (Pump Station)	Force Main break causing sewage to flow into storm system	Shut down force main by closing valve then repaired force main, vacuumed and cleaned up area. ----April 24, 2018 10:37 AM-----
4/23/2018	4/24/2018	7	404 Chandler Harper (pump station)	Pump Station failure causing sewer to overflow into storm system	Pump Station crew was notified and responded made corrective action inside pump station stopping the problem causing the overflow. Vacuumed and cleaned up area. Pump Station crew checking P.S. on 4/24/2018 also. ----April 24, 2018 10:43 AM-----

4/28/2018	4/30/2018	15	3908 South Street	Debris and Grease blockage in sewer main line causing manhole to overflow into storm system	Used high pressure truck to jet sewer main lines and unstop the blockage causing the overflow to stop. Cleaned up and deodorized the area. Returned and checked that the system was function properly on 4/29/2018. -----April 30, 2018 08:50 AM-----
5/3/2018	5/4/2018	30	404 Chandler Harper Dr Portsmouth Va	Pump Station failure causing 50 gallons to spill into the storm drain system.	Pump Station crew was notified responded to the spill. Took the correct action to stopping the overflow inside the pump station. The area was vacuumed and cleaned up with a vacuum truck. Pump station crew will also check pump station on 5/4/2018 to insure that the station is running properly. ----- May 4, 2018 08:38 AM-----
5/4/2018	5/7/2018	30	115 Wright Ave.	Sewer Pump Station was up due to unforeseen blockage in force main from station causing sewer to overflow out of clean out into storm system	Vacuum truck removed sewage coming from clean out as the pump station crew used a pump to force sewage through force main in order to dislodge

					blockage. Vactor crew cleaned up and deodorized area. Checked system from station was working properly on 5/5/2018 as well. -----May 7, 2018 10:27 AM-----
5/6/2018	5/7/2018	10	4408 South Hampton Arch	Debris and Grease blockage in sewer main line causing manhole to overflow into storm system	Used high pressure truck to jet main sewer lines and unstop blockage causing overflow to stop. Cleaned up and deodorized area. Returned and checked the system was flowing correctly on 5/7/2018. ---May 7, 2018 10:34 AM-----
5/6/2018	5/7/2018	15	4500 Westmoreland Terrace	Pump Station was up due to high volume of rainfall, causing overflow into the storm system.	Pump station was running at full capacity and was being assisted by the Vacon truck's vacuuming sewage out of manhole to contain and stop the overflow. Vactor's maintained the system from overflowing. Cleaned up and deodorized area. -----May 7, 2018 10:50 AM-----

5/8/2018	5/9/2018	5	4500 Westmoreland Terrace	Critical Failure and malfunction in Pump Station causing vacuum system to falter causing the sewer system to back up and overflow and flow to the storm system.	Routine check of sewer system in this area, we found the system starting to overflow checked and traced the problem to the pump station. Three vacuum trucks set up working one after the other and stopped the overflow and maintained the system as the pump station crew worked on fixing the critical malfunction of vacuum system. Pump Station is approx. .7 miles from manhole. Once system was flowing properly we vacuumed and cleaned up area. Deodorized site. Checked pump station and sewer system on 5/9/2018. -----May 9, 2018 02:41 PM-----
5/30/2018	5/30/2018	15	4500 Westmoreland Terrace	Sewer Pump Station experienced a unforeseen vacuum failure in the station causing the system to back up and overflow out of manhole into storm system.	Sewer Vactor crew constantly pumped system down and kept under control stopping the overflow into the storm system until the Pump Station Crew resolved the problem and the system was

					back operating properly. -----May 30, 2018 03:37 PM-----
6/20/2018	6/21/2018	0	Manor Ave. @ Fortune Lane	<p>HRSD Pump Station at 3519 Cedar Lane was having scheduled work being performed which caused a surcharge into their system which our system ties into at Cedar Lane manhole at Manor Ave. The surcharge caused the overflow at manhole in the intersection of Manor Avenue and Fortune Lane. Overflow was contained to the ditch lines in and around the intersection. The overflow never reached or entered into the storm system.</p>	<p>HRSD sent out their employees to clean up area, they used their vactor trucks to vacuum out ditches and clean up surrounding areas. - -----June 21, 2018 12:28 PM-----</p>

The City responds to complaints regarding illicit discharges and improper disposals. The table below lists these findings and citizen complaints.

### Illicit Discharge Records

Address	Date	Summary of Findings
4 Croatan Trail	July 5, 2017	Citizen was washing maggots out of trash can with water/vinegar mixture. Notice with informational materials was sent. Follow-up on 7/11/2017 verified spill had been resolved.
Elizabeth River	7/12/2017	Responded to a complaint of a sunken vessel leaking fuel. NRC, VMRC, EPA, DEQ, Coast Guard, and City Fire Marshall were notified. Investigation found several sunken vessels, but oil was leaking. The owner was identified and a plan was made to remove the vessels.
442 High Street	July 14, 2018	Site was found to have a grease bucket with hose attached that led to the gutter pan. Sent letter and educational materials to owners. Follow-up visit in two weeks.
313 Robin Road	July 19, 2017	Sand stock pile found in street creating runoff into storm drain. Spoke to homeowner and instructed him to remove the stockpile.
5160 Portsmouth Boulevard	July 28, 2017	City staff observed illegal dumping of tile and marble byproducts into drainage ditch. Violation letter and educational materials were sent to the owner.
3205 Brighton Street	September 29, 2017	Complaint received regarding a dumpster leaking cooking oil into the roadway. Conditions were verified by City staff and spill was cleaned by a contractor at the instruction of the City.
1345 Court Street	November 1, 2017	A mobile car wash operation was found. City staff responded to the site and operations were shut down. Violation letter and educational material sent.
3205 Brighton Street	September 29, 2017	Complaint received regarding a dumpster leaking cooking oil into the roadway. Conditions were verified by City staff and spill was cleaned by a contractor at the instruction of the City.
3529 Wright Road	February 1, 2018	City staff observed large quantities of sediment near the roadway in front of the property listed. A violation letter and educational materials were sent to the homeowner.
5624 Bingham Road	February 1, 2018	City staff observed large quantities of sediment near and in the roadway in front of the property listed. A violation letter and educational materials were sent to the homeowner. Follow up inspection scheduled for 2/8/2018.
3521 Tyre Neck Road	February 6, 2018	Complaint received regarding placement of trash and leaf litter into storm drain. Violation letter and educational materials sent to homeowner.
230 Tiger Lily	February 15, 2018	Stormwater Compliance was notified of a hydraulic spill at the location listed. Public Works, Waste Management and Stormwater Compliance staff arrived on scene and evaluated the situation. A hydraulic line from Waste Management truck # 1307 busted over top a drop inlet, leaking fluid into the inlet. Thomas Quattlebaum was notified and he contacted DEQ, while Chrisi VanLear contacted Dave with Petrochem to assist with the cleanup in the inlet. City staff spread solid-a-sorb on area around inlet that had fluid and cleaned up and properly bagged and labeled waste. Petrochem arrived and cleaned inside inlet, top of inlet and surrounding areas. Less than 1 gallon was spilled. Pictures have been attached.

Dinwiddie Street	February 20, 2018	Stormwater staff was notified of an oil spill in the gutter pan by Public Utilities at approximately 1300. Grease and water was disposed of into the gutter pan and pot holes along Dinwiddie Street. 10 bags of solid-a-sorb were used to clean up the oil. Gutter pan was cleaned and collected material was labeled and properly disposed of. Public Works patched pot holes after cleanup. Public Works, Stormwater Compliance, and the Fire Marshall's office all responded. City Staff spoke with the Bar Manager on duty at Longboards, as well as the owner.
81 Kansas Avenue	March 19, 2018	CBPA Violation. Violation letter issued for RPA.
3201 Madden Terrace	March 26, 2018	Complaint received regarding pet waste dumping in storm drain. A violation letter and educational materials were sent to the homeowner.
104 Broad Street	April 25, 2018	Citizen complaint received regarding oil being disposed of into the alley. Conditions were verified by City staff and property owner was instructed to clean spill.
1612 Spratley Street/1615 Ward Terrace	May 1, 2018	Possible CBPA/Wetlands Violations. Violation letter issued for possible wetlands and RPA violations. Inspection coordinated with DEQ. Wetlands and RPA delineation required and prepared. Final determination pending.
317 Arizona Street	May 16, 2018	Received complaint that leaves are being blown into the street. Violation letter and educational materials were sent to the homeowner.
2320 Turnpike Road	June 25, 2018	City staff discovered contaminated stormwater entering storm drain. Property owner had dumped chicken meal into a dumpster then washed excess into the parking lot and street. Property owner cleaned spill and installed measures to prevent further occurrences.

*“Each annual report shall include the amount of linear feet of sanitary sewer inspected during the reporting year.”*

The City Utilities Department inspected 8,737 linear feet or 1.7 miles of sanitary sewer and cleaned 150,252 linear feet or 28.5 miles of sanitary sewer. The Department of Public Utilities Operations Department camera truck was inoperable for much of the fiscal year. Contracting services inspected an additional 133,956.2 linear feet or 25.3 miles of sanitary sewer and cleaned 135,682.2 linear feet or 25.7 miles of sanitary sewer.

*“Each annual report after program development shall include a list of sites surveyed for floatables, a summary of observations at each site, and a determination as to the effectiveness of the floatables reduction program.”*

Due to the limited number and recent turnover of City staff, floatable quantities were not surveyed during fiscal year 2018. Implementation of the floatables monitoring program will begin in fiscal year 2019 as City staffing and consultant efforts are improved. Floatable reduction efforts have continued through recycling events, street sweeping, and public education. Results of these programs are detailed in this report.

The Department of Public Works is responsible for maintaining the City streets. Street sweeping not only improves the aesthetic qualities of the urban area; it also improves stormwater quality. Pollutants and debris are removed from the gutter, which prevents them from entering the stormwater system.

Street sweeping is done with a variety of equipment, including:

- Six street sweeper machines:
  - Mechanical Sweepers
    - one Elgin Road Wizard (currently out of service due to vehicle accident)
    - two Elgin Pelicans, (expect to replace one in FY20 with Regenerative Sweeper)
  - Regenerative Air Sweepers
    - One Tymco 500X
    - One Elgin Crosswind
    - One Tymco 435 (New Tymco 500X ordered for FY19)
- Three Tennant litter vacs, (not used very often, the two dedicated equipment operator II positions have been eliminated or reassigned)
- One roll-off truck to haul the debris collected by the sweepers, and
- One single axle dump truck

The City is divided into three sections. Each section is swept on an average of four times per year, except the downtown area, which is cleaned once each week. In FY2018, the City was able to provide a dedicated street-sweeping crew, resulting in improved service to the citizens of Portsmouth. The results are summarized below.

<b><i>STREET SWEEPING FIGURES – FY2018</i></b>	
<b>Miles Swept</b>	<b>14,217</b>
<b>Loads</b>	<b>2,002</b>
<b>Volume (cubic yards)</b>	<b>1909.9</b>
<b>Volume (tons)</b>	<b>No data</b>
<b>Bags collected (by litter vacs)</b>	<b>750</b>

*“Each Annual Report will include a summary of the semi-annual HHM recycling events.”*

Portsmouth participated in the Drive-thru-Recycling Events. Two events in 2018 recorded 772 cars participating. We collected the following: 15,00.00 lbs. of shredded paper, 4,780 lbs. of e-cycle goods and 3,570 lbs. of clothing & housewares to Goodwill, 300 lbs. of cardboard (RDS), 810 lbs. of electronics (RDS) The following was disposed of through SPSA:

<b>Material</b>	<b>Quantity</b>
Latex paint	1,033 gallons
Antifreeze	56 gallons
Used oil	173 gallons
Gasoline	65 gallons
Acid	14 gallons
Poison (liquid)	Three 55 gallon drums
Poison (solid)	1.5 gallons
Cooking Oil	93 gallons
Paint Materials	80 gallons
Aerosols	0.35 gallon drum
Alkaline batteries	35 pounds
Other batteries	10 pounds
Household Cleaners	39 gallons
Lead acid batteries	64
Propane tank	15
Helium tank	6
Fire extinguisher	11
Fluorescent bulb	29
Oxidizers	1.5 pounds
Freon tank	1

**Part I.B.2.f) Spill prevention and response**

*“Each annual report shall include a list of spills that qualify for immediate reporting as required under Part II.G and H of this state permit, the source, and a description of follow-up activities taken.”*

Date of Spill	Location of Spill	Material Spilled	Source of Material Spilled	Quantity Spilled	Did Spill Result in a Discharge?	Corrective Action Taken	Did Spill Qualify for Immediate Reporting as Required Under Part II.G and H ?	Date Reported to DEQ
7/12/2017	Elizabeth River	Possible fuel and oil	Sunken Vessels	Unknown	Unknown	Responded to a complaint of a sunken vessel leaking fuel. NRC, VMRC, EPA, DEQ, Coast Guard, and City Fire Marshall were notified. Investigation found several sunken vessels, but no oil was leaking at the time. The owner was identified and a plan was made to remove the vessels.	Yes	7/12/2017

**Part I.B.2.g)**  
**Industrial and high risk runoff**

*“The annual report due October 1, 2017 shall include a list of all known industrial and high risk dischargers including any non-VPDES regulated industrial and commercial stormwater dischargers determined by the permittee as contributing a significant pollutant load and that discharge to the MS4 system, a schedule of inspections and procedures for inspecting outfalls.”*

*“Each annual report shall report on implementation of the inspection schedule and include a list of the facilities and/or facility outfalls inspected during the reporting period.”*

A list of the identified VPDES permitted facilities and other industrial and high-risk runoff facilities was provided to the Department in the 2017 Annual Report. Industrial and high-risk runoff facility inspections were not performed during FY2018 due to staff turnover within the Engineering and Technical Services Department and the engagement of a new group of engineering consultants. Industrial and high risk runoff inspections are now ongoing by Arcadis and will continue to be performed via the combination of consultant and in house staff for the remainder of the permit term. Sixty percent of all currently identified industrial and high risk runoff facilities will be inspected in permit year 3.

*“Each annual report shall include a list of referrals to the Department.”*

City staff has notified DEQ of the following businesses that fall under the criteria for a Stormwater Industrial Permit.

1. Ocean Marine Yacht Center
2. Atlantic Metrocast Inc

**Part I.B.2.h)**  
**Stormwater infrastructure management**

*“The permittee shall submit with the annual report due October 1, 2017 the written inspection and maintenance procedures.”*

*“The annual report due October 1, 2017 shall include the permittee’s strategy to address maintenance of stormwater management controls that are designed to treat stormwater runoff solely from the individual residential lot on which they are located.”*

*“Each annual report shall provide a summary of actions taken by the permittee to address failure of privately maintained SWM facilities owners to abide by maintenance agreements.”*

During FY2017, City Staff and CH2M designed a pilot program for privately owned SWM facility inspections. This program is being implemented on a city-wide basis. Currently, the City’s IT Department is modifying the database, Tidemark, for inspectors to easily track material and inspections.

City staff inspect BMPs during construction as part of routine erosion and sediment control and VSMP compliance inspections. Furthermore, staff also inspect completed BMPs prior to City acceptance and release of performance bonds. For projects with VPDES Construction General Permit coverage, BMPs are inspected and as-builts reviewed prior to acceptance of the permit notice of termination.

*“Each annual report shall include a list of activities including inspections performed and notifications of needed maintenance and repair of stormwater facilities not operated by the permittee as required by Part I.B.2.h)2).”*

*“Each annual report shall include a summary of activities performed in support of the inspection and maintenance program...”*

During FY18, a consultant was engaged to implement the adopted inspection program for both public and private BMPs throughout the city. The work began after June 30, 2018 and is continuing. All required inspections will be completed within the end of this permit cycle. Inspection results will be provided in the FY19 and subsequent annual reports.

*“The MS4 service area map including outfalls included in Part I.B.2.h)3) shall be submitted no later than 18 months [January 1, 2018] after the effective date of this state permit.”*

*“The annual report due October 1, 2018 submitted under this state permit shall include the information included in Part I.B.2.h)4).”*

The total area of pervious and impervious area in the City of Portsmouth is reported below. The values provided include all area within the city limits. The area currently regulated under the MS4 permit will be less. The slight difference in acreages between areas separated by HUC and Chesapeake Bay Segments are due to mapping accuracy of drainage areas.

**City of Portsmouth Land Use Area (HUC)**

<b>HUC</b>	<b>Impervious Area (ac)</b>	<b>Pervious Area (ac)</b>	<b>Total Area (ac)</b>
JL55	3,689.78	4,724.51	8,414.28
JL53	2,646.46	2,463.23	5,109.69
JL50	473.32	3,366.24	3,839.56
JL56	1,759.92	2,273.03	4,032.96
<b>TOTAL</b>	<b>8,569.48</b>	<b>12,827.01</b>	<b>21,396.48</b>

**City of Portsmouth Land Use Area (Chesapeake Bay Segments)**

<b>Segment</b>	<b>Impervious Area (ac)</b>	<b>Pervious Area (ac)</b>	<b>Total Area (ac)</b>
ELIPH	1,816.79	3,774.96	5,591.75
JMSMH	413.90	1,191.10	1,605.00
JMSPH	2.22	626.71	628.92
SBEMH	2,546.71	2,436.02	4,982.73
WBEMH	3,728.26	4,735.61	8,463.87
<b>TOTAL</b>	<b>8,507.88</b>	<b>12,764.39</b>	<b>21,272.27</b>

As of 2009, stormwater management facilities treated 66.39 acres of drainage within the MS4, 44.32 acres of which were impervious and 22.07 acres of pervious. After redevelopment, a total area of 155.52 acres is currently being treated by stormwater management facilities within the City’s MS4. This includes 99.71 acres of impervious area and 55.81 acres of pervious area treated. Detailed analyses of stormwater treatment provided is within the Chesapeake Bay TMDL Action Plan attached.

*“The annual report due October 1, 2021 shall include an updated list of all information requested in Part I.B.2.h)5).”*

**Part I.B.2.i)  
City facilities**

*“The annual report due October 1, 2017 shall include a list of all high priority municipal facilities.”*

There are currently 5 high priority municipal facilities that have SWPPP’s with quarterly inspections carried out by Kimley-Horne & Associates.

1. City Operations Center
2. Public Utilities Center
3. 2717 Victory Blvd- School bus storage. Please note this is not a high priority, but SWPPP is being drafted to address low priority issues.
4. School Board Fueling Facility
5. Landfill at Craney Island

*“In PY3, the completion of each SWPPP review and update will be described.”*

*“Each annual report will provide the dates of inspection for each high priority municipal facility.”*

Quarterly SWPPP Inspection Schedule						
	2017				2018	
Facility	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2
City Operations Center	March 28, 2017		September 25, 2017	December 13, 2017	January 23, 2018	
Public Utilities Center	March 28, 2017		September 25, 2017	December 6, 2017	January 23, 2018	
2717 Victory Blvd		May 22, 2017	September 25, 2017	December 6, 2017	January 23, 2018	
School Board Fueling Facility	March 28, 2017	May 22, 2017	September 25, 2017	December 29, 2018	January 23, 2018	
Landfill at Craney Island	March 28, 2017	May 22, 2017	September 25, 2017	December 6, 2017	January 23, 2018	

**Part I.B.2.j)**  
**Public education/participation**

*“Each annual report shall include a list of permittee public outreach and education activities and the estimated number of individuals reached through the activities. An evaluation of program effectiveness, as outlined in the MS4 Program Plan with recommendations for future changes shall also be included.”*

The objective of the public education program is to inform the public about the importance of stormwater activities as they relate to individual citizens and the City as a whole. Portsmouth continues to assess various means of educating the public on the stormwater management program.

The goals of the public information program include:

- Informing the public about the Stormwater Utility and its associated fees.
- Making the public aware of the results of polluting the stormwater system.
- Involving the community in improving the quality of the area’s waters.
- Educating the public on ways to decrease the amount of pollution that is entering area waterways.

***Stormwater Educational Materials Distributed – FY2018***

<b><i>Material Name</i></b>	<b><i>Quantity Distributed</i></b>	<b><i># of Citizens</i></b>
Black Eyed Susan Seeds	100	100
Coffee Mugs	13	13
Every Drop Counts – Activity Book	150	150
HR Green Bags	103	103
HR Green pencils	325	275
It’s just dirt, City of Portsmouth	7	7
Water bottles	41	41
Stormwater Management Information	54	50
Sunflower Seeds	350	275

***Stormwater Education Events***

<b>Date</b>	<b>Location</b>	<b>Event</b>
October 29, 2017	Hoffler Creek	Fall Festival
March 10, 2018	Woodrow Wilson High School	STEM Program
March 25, 2018	Hoffler Creek	Easter Egg Hunt
March 29, 2018	Bide-A-Wee Pavilion	Waste Management Symposium
March 30, 2018	Lave View Elementary School	Career Day
April 4, 2018	Craddock Civic League	
April 5, 2018	Port Norfolk Civic League	
April 7, 2018	Virginia Beach Pavilion	Spring Plant and Flower Day
April 12, 2018	Churchland Elementary School	Career Day
April 13, 2018	Mt. Hermon Elementary School	Reading Day
April 14, 2018		Great America Clean Up
April 17, 2018	Park View Elementary School	Career Day
April 21, 2018	I.C. Norcom High School	Recycling Event
April 28, 2018	Woodrow Wilson High School	Health Fair
May 3, 2018	Mount Hermon Preschool Center	Reading Day
May 16, 2018	Churchland Library	Reading Day
May 21, 2018	Truxton Civic League	
May 25-26, 2018	Umoja Festival	

*“Each annual report shall provide a summary of voluntary retrofits completed on private property used to demonstrate pollutant reduction requirements.”*

Currently there are no known voluntary retrofits on private property known to the City. Stormwater staff is educating citizens on the benefits of completing these retrofits on their property through educational handouts.

*“Each annual report shall provide a summary of voluntary stormwater management techniques encouraged on private property.”*

Currently there are no known voluntary retrofits on private property known to the City. Stormwater staff is educating citizens on the benefits of completing these retrofits on their property through educational handouts.

*“List of local groups of commercial, industrial and institutional entities in the PY2 annual report.”*

These groups are listed in the “Industrial and high risk runoff” facilities described in Part I.B.2.g)

*“The City website address for the permit will be provided in the second annual report.”*

The City MS4 permit can be found at: <http://www.portsmouthva.gov/418/MS4-Permit>

**Part I.B.2.k)  
Training**

*“Each annual report shall include a list of training events, the date and the estimated number of individuals attending each event.”*

**Certified Pesticide Applicators**

<b>Name</b>	<b>Department</b>
Eddie Savage	Mosquito Control
Mary Seitz	Mosquito Control
George Wojcik	Mosquito Control
Jeffrey Johnson	Mosquito Control
Tiffany Gordon	Mosquito Control
Samkhan Ngeth	City Park Golf Course
Todd Spencer	Bide-a-way Golf Course
Freddie Miller	Parks and Recreation
Kevin Wallace	Parks and Recreation
Vernon Carney, Jr.	Parks and Recreation
Jarmaine Parker	Parks and Recreation
Charles Umphlete, Jr.	Public Utilities
Forrest Brown	Public Utilities
Sandra Raphael	Public Utilities

<b>Name</b>	<b>Certification</b>
James E. Wright, Jr., P.E.	Dual Combined Administrator
Thomas Quattlebaum	Dual Combined Administrator (Provisional)
Audrey Doan	Dual Inspector (Provisional)
Stephen Thun, P.E.	Kimley-Horn Plan Reviewer

Contractors are certified as Registered Land Disturbers when they apply for a Land Disturbance Permit. Their certifications are verified at that time.

*“The annual report due October 1, 2017 shall include documentation of employee emergency spill response training and/or certification.”*

Employee emergency spill response training was held on October 4, 2017 and was conducted by Sigma Consulting and Training, Inc. with Chris Pappas as the instructor. The training was a Hazardous Materials Operations/OSHA Level II course. All employees that attended are currently certified. Please see attached documentation.

Name	Department
Ed Ward	Public Works
Cornelius Harris	Public Works
April Brown	Public Works
Junius Gaines	Public Works
James M. Doyle II	Public Works
Floyd Jones	Waste Management
Kenneth Johnson	Public Works
Chris Stewart	Public Utilities
Troy Mills	Public Works
Thomas Quattlebaum	Engineering
Chris Boins	PU- Waste Management
Jeff Johnson	PW- Mosquito Control
Mary Seitz	PW- Mosquito Control
Tiffany Gordon	PW- Mosquito Control
Connie Quinones	PU – Water Quality
Beverly Snyder	PU- Water Quality
William C Hoffler	PW- Stormwater
Vincent Farrow	PW- Streets and Highway
Michael Sessoms	Public Works
Chris VanLear	Engineering
Brittany Collins	Engineering
Eddie Savage	Public Works
Joyce Wells	Public Works
DeMaris Jackson	Public Utilities
Russell Nadeau	Public Works
Jessie Craig	Public Works
Freddie Sessoms	Public Works
Fred W. Hoggard	Public Works
Markyio Staton	Public Utilities
Kevin L. Wyatt	Public Utilities
C. Howard Hamlett	Public Utilities
John Bacon	Public Works
Edward Barnes	Public Works
George Wojcik	Public Works
Forrest R. Brown	Public Utilities
Ali Neblett	PW- Stormwater
Lamarlow Vaughan	Public Works
Dorothy M. Carney	Public Works
Damier Evans	Public Works
Amos Taylor	PW- Waste Management

**Part I.B.2.I)  
Dry weather screening program**

*“Each annual report shall include the total number of outfalls included as part of the permittee’s MS4, the number of stations screened during the reporting period, a list of locations upon which the dry weather screening was conducted, the results and any follow-up actions...”*

Dry Weather Sampling at seventy-five random sites is conducted to identify potential illicit discharges. Dry Weather samples are tested for the following parameters:

<b><i>FLOW ANALYSIS PARAMETERS (Update per agreement with EPA)</i></b>	<b><i>TOLERANCE LIMIT</i></b>
pH	< 6.0 or > 9.0
Total Chlorine	> 4.0 mg/l
Hardness (to benchmark Copper)	> 3.0 mg/l
Total Phenol	> 0.026 mg/l
Detergents	> 0.5 mg/l
Ammonia	> 2.14 mg/l
Potassium	> 20 mg/l

As required for the Dry Weather Sampling aspect of our program, seventy-five sites were chosen at random, but generally selected in commercial and industrial areas with some coverage in residential areas. These sites were checked for flow and, if observed, the flow was tested for chemical concentrations outside the tolerance limits for the above listed parameters. The screening results are provided.

FY2018 Dry Weather Screening Results (75 sites)									
	Location	Stormwater Structure ID#	Master Watershed #	Land Use	Pipe Size (in)	Date(s)	Time	Type	Flow
1	4221 DARTMOUTH STREET	DI7937	70	RES.	15	4/19/2018	1106	Drop Inlet	No
2	4700 HIGH SREET	PE3667	112	RES.	12	4/19/2018	1111	Drop Inlet	No
3	4110 CAROLINE AVENUE	PE8725	70	RES.	30	4/19/2018	1102	Pipe End	No
4	2129 OREGON AVENUE	PE9436	57	COMM.	42	4/19/2018	1059	Pipe End	No
5	112 WYOMING AVENUE	PE10039	57	RES.	12	4/19/2018	1054	Pipe End	No
6	34 GRAND STREET	DI10077	59	RES.	12	4/19/2018	1045	Drop Inlet	No
7	1602 CENTRE AVENUE	DI10096	61	RES.	15	4/19/2018	1035	Drop Inlet	No

8	3717 DEEP CREEK BLVD.	DI11470	38	RES.	15	4/19/2018	1020	Drop Inlet	No
9	2012 VICTORY BLVD.	DI14134	17	COMM.	36	4/19/2018	1015	Drop Inlet	No
10	22 STEVEN PLACE	PE14429	17	RES.	36	4/19/2018	1011	Pipe End	No
11	4 VICTORY BLVD.	DI12614	40	INDUS T.	36	4/19/2018	1005	Drop Inlet	No
12	3975 VENEER ROAD	DI11496	42	INDUS T.	36	4/19/2018	950	Drop Inlet	No
13	4800 MANOR ROAD	DI2584	136	RES.	24	4/2/2018	1451	Drop Inlet	No
14	4100 WINCHESTER DRIVE	DI8224	70	RES.	24	4/20/2018	1155	Drop Inlet	No
15	4118 GREENWAY COURT W	DI8581	70	RES.	24	4/20/2018	1150	Drop Inlet	No
16	301 PARK MANOR ROAD	PE7390	76	RES.	12	4/2/2018	1348	Pipe End	No
17	5813 CHURCHLAND BLVD	PE2185	134	COMM.	24	4/2/2018	1440	Pipe End	No
18	3903 CEDAR LANE	DI1638	143	COMM.	24	4/2/2018	1500	Drop Inlet	No
19	4900 WYCLIFF ROAD	DI1690	143	RES.	24	4/2/2018	1504	Drop Inlet	No
20	4001 CEDAR LANE	PE801	143	COMM.	12	4/2/2018	1509	Pipe End	No
21	5907 CHURCHLAND BLVD	DI2199	134	COMM.	12	4/2/2018	1434	Drop Inlet	No
22	604 WINDSOR ROAD	OUT6562	75	RES.	12	4/2/2018	1350	Drop Inlet	No
23	420 WINDSOR ROAD	DI6351	75	RES.	18	4/2/2018	1352	Drop Inlet	No
24	3804 COLONY ROAD	PE1963	136	RES.	12	4/2/2018	1450	Drop Inlet	No
25	5009 HOLLY ROAD	DI1967	136	RES.	12	4/2/2018	1447	Drop Inlet	No
26	6070 CHURCHLAND BLVD	DI7390	134	COMM.	24	4/2/2018	1520	Drop Inlet	No
27	3714 CARDINAL LANE	DI2215	137	RES.	18	4/3/2018	1400	Drop Inlet	No
28	4317 TWIN PINES ROAD	PE291	162	RES.	18	4/3/2018	1345	Pipe End	No

29	3985 TWIN PINES ROAD	DI1051	150	COMM.	18	4/3/2018	1352	Drop Inlet	No
30	6400 BICKFORD LANE	DI1772	146	COMM.	36	4/3/2018	1414	Drop Inlet	No
31	5432 WEST NORFOLK ROAD	DI1990	135	RES.	15	4/3/2018	1410	Drop Inlet	No
32	3135 HANLEY AVENUE	DI3342	116	COMM.	42			Drop Inlet	Yes
33	809 VIRGINIA AVENUE	DI4281	100	INDUS T.	72	6/28/2018	1550	Manhole	Yes
34	642 VIRGINIA AVENUE	MAN4024	100	RES.	72	8/7/2018	1410	Manhole	Yes
35	4008 SWANNAN OA	DI534	158	RES.	18			Drop Inlet	Yes
36	2504 DETROIT STREET	MAN3539	108	INDUS T.	24	8/7/2018	1515	Manhole	Yes
37	6223 PORTSMOUTH BLVD.	DI9384	53	COMM.	18	6/28/2018	1055	Drop Inlet	No
38	1333 HODGES FERRY ROAD	PE10688	51	RES.	15	6/28/2018	952	Pipe End	No
39	3 SNEAD FAIRWAY	DI11625	32	RES.	18	7/20/2018	1012	Drop Inlet	Yes
40	405 YORKSHIRE ROAD	DI12203	32	RES.	30	7/20/2018	926	Drop Inlet	Yes
41	928 THOMAS CIRCLE	PE6769	83	RES.	27	6/30/2018	1155	Pipe End	No
42	706 LONDON STREET	DI4982	86	RES.	15	6/28/2018	1350	Drop Inlet	No
43	299 LINCOLN STREET	PE7655	64	COMM.	24	6/30/2018	1000	Pipe End	No
44	600 CRAWFORD LANE	DI5807	85	COMM.	15	6/28/2018	1326	Drop Inlet	No
45	120 CAMPUS DRIVE	DI12318	25	COMM.	12	6/27/2018	1717	Drop Inlet	No
46	52 ALABAMA AVENUE	DI11687	39	RES.	15	6/30/2018	1045	Drop Inlet	No
47	3601 WESTERN BRANCH BLVD.	PE6076	90	COMM.	24	6/28/2018	1107	Pipe End	No

48	3606 GATEWAY DRIVE	OUT1007	150	COMM.	24	6/28/2018	1344	Outfall	No
49	4350 PORTSMOUTH BLVD.	OUT10380	49	COMM.	24	6/28/2018	1537	Outfall	No
50	3700 BAMBOO ROAD	DI1063	148	RES.	18			Drop Inlet	Yes
51	704 CHEROKEE ROAD	DI10818	50	RES.	18	6/28/2018	1518	Drop Inlet	No
52	3100 FREDIRCK BLVD.	OUT11039	45	INDUS T.	63	6/30/2018	1105	Manhole	No
53	210 NAVAJO TRAIL	DI11121	49	RES.	36	6/28/2018	1510	Drop Inlet	No
54	3600 GEORGE WASHINGTON HWY.	OUT11593	39	INDUS T.	48	6/30/2018	1205	Outfall	No
55	205 BOBBY JONES DRIVE	OUT11889	31	RES.	18	6/28/2018	1645	Outfall	No
56	1610 HODGES FERRY ROAD	OUT11921	32	RES.	15	6/28/2018	1017	Outfall	No
57	616 CHANDLER HARPER DRIVE	DI12366	32	RES.	15	6/28/2018	1638	Drop Inlet	No
58	46 BEECHDALE ROAD	DI14552	6	INDUS T.	24	6/28/2018	1708	Drop Inlet	No
59	184 YORKSHIRE ROAD	DI13079	29	RES.	15	7/20/2018	857	Drop Inlet	Yes
60	1235 DARREN DRIVE	DI14165	13	RES.	42	7/20/2018	1123	Drop Inlet	Yes
61	2320 TURNPIKE ROAD	DI6107	81	INDUS T.	24	6/28/2018	1415	Drop Inlet	Yes
62	901 FREDERICK BLVD.	DI16432	80	COMM.	18			Drop Inlet	Yes
63	800 WILLIAMSBURG AVENUE	DI6274	81	COMM.	36	8/7/2018	1621	Drop Inlet	No
64	1503 DES MOINES AVENUE	DI7724	66	RES.	15	6/30/2018	1140	Drop Inlet	No
65	1312 JEFFERSON STREET	DI8898	61	RES.	15	6/30/2018	1028	Drop Inlet	No

66	909 LINCOLN STREET	DI8154	65	RES.	15	6/30/2018	1015	Drop Inlet	No
67	1801 DEEP CREEK BLVD.	DI8176	67	RES.	15	6/30/2018	1135	Drop Inlet	No
68	701 GUST LANE	OUT14211	15	COMM.	30	6/27/2018	1740	Outfa ll	No
69	4600 GEORGE WASHINGT ON HWY.	DI13586	15	COMM.	24	6/27/2018	1803	Drop Inlet	No
70	139 GILLIS ROAD	DI14023	15	RES.	24	6/27/2018	1825	Drop Inlet	No
71	3409 DEEP CREEK BLVD.	DI10626	45	INDUS T.	60	6/27/2018	1625	Pipe End	No
72	4020 MCLEAN STREET	PE10984	48	COMM.	36	6/27/2018	1609	Drop Inlet	No
73	3911 VICTORY BLVD.	DI12059	35	COMM.	15	6/27/2018	1609	Drop Inlet	No
74	1816 CAVALIER BLVD.	OUT14832	2	RES.	36	6/28/2018	1120	Outfa ll	No
75	3904 TURNPIKE ROAD	PE9898	58	RES.	24	8/7/2018	848	Pipe End	Yes

2018 Retest Results of 2017 Flow Sites					
Site #	32	33	34	35	36
Location	3135 HANLEY AVENUE	809 VIRGINIA AVENUE	642 VIRGINIA AVENUE	4008 SWANNANOA	2504 DETROIT STREET
Stormwater Structure ID#	DI3342	DI4281	MAN4024	DI534	MAN3539
Master Watershed #	116	100	100	158	108
Flow Rate (gal/min)	359.04		733.2		1346.4
Odor	None		None		Musty
Color	Red		Clear		Clear
Clarity	Cloudy Suspended Solids		Clear		Clear
Floatables	Suspended Solids		None		None
Salinity	<1		<1		<1
Temperature (°C)	31.61		29.56		33.44
pH	6.69		6.02		6.86
Copper (mg/L)	1.5		0		0
Ammonia (mg/L)	1.3		0.13		0.13
Phenols	0.5		0.5		0.5
Total Chlorine (mg/L)	0		0		0
Detergents (mg/L)	0.2		<0.1		<0.1
Potassium (ppm)	6		6		6

FY2018 Sites with Flow Test Results							
Site #	39	40	50	60	61	62	75
Location	3 SNEAD FAIRWAY	405 YORKSHIRE ROAD	3700 BAMBOO ROAD	1235 DARREN DRIVE	2320 TURNPIKE ROAD	901 FREDERICK BLVD.	3904 TURNPIKE ROAD
Stormwater Structure ID#	DI11625	DI12203	DI1063	DI14165	DI6107	DI16432	PE9898
Master Watershed #	32	32	148	13	81	80	58
Flow Rate (gal/min)	28.27	14.05		222.16	6.73		179.52
Odor	None	None		None	None		None
Color	Clear	Clear		Clear Red Algae	Clear Red Sediment Present		Clear Red/Orange Stained Sediment
Clarity	Clear	Clear		Clear	Clear		Clear
Floatables	Trash/Pine Needles	Oily Sheen/Grass Clippings		None	Organic Sheen/Grass Clippings		Garbage/Trash
Salinity	<1	<1		<1	<1		<1
Temperature (°C)	25.3	25.5		24.6	27.67		25.28
pH	6.54	7.22		6.88	6.85		6.35
Copper (mg/L)	0.25	0.25		0	0		0
Ammonia (mg/L)	0.13	0.13		2.6	0.25		0.13
Phenols	0	0		0.5	0.5		0.5
Total Chlorine (mg/L)	0	0		0	0		0
Detergents (mg/L)	<0.1	<0.1		<0.1	<0.1		<0.1
Potassium (ppm)	0	0		0	6		7

**Part I.B.2.m)**  
**Infrastructure coordination**

*“As part of its Annual Report, the permittee shall document coordination efforts with VDOT that occurred during the reporting year...”*

A meeting was held with VDOT on May 3, 2018 to comply with our permit. Meeting summary is provided below.

VDOT and Phase 1 Annual Infrastructure Coordination Meeting  
May 3, 2018  
HRPDC 723 Woodlake Dr. Chesapeake, VA 23320  
**Meeting Notes**

**Phase I MS4 Permittees:** City of Chesapeake, City of Hampton, City of Newport News, City of Norfolk, City of Portsmouth, City of Virginia Beach

- **Introductions**
- **VDOT Program Plan Update** Chris Swanson
- VDOT is currently working on updating the new Program Plan and will be submitting to DEQ by July 1<sup>st</sup>.
- VDOT is currently updating the LAP manual and Instructional & Informational Memorandums (IIM’s). Copies available upon request.
- Portsmouth would like assistance with identifying a new POC for ERC and they have concerns about the maintenance on some of VDOT’s SWMF’s.
  - New POC is [Timothy Berkhimer@vdot.virginia.gov](mailto:Timothy.Berkhimer@vdot.virginia.gov), 757-727-4811
- City of Norfolk would like the POC for maintenance. Concerns with VDOT’s ditches backing up and contributing to flooding problems in a certain section of roadway.
  - Christine Fuller with CON is the City representative who works directly with VDOT
  - Angela Rico with Hampton is the City representative who works directly with VDOT
- 24-hour hotline for any concerns: 1-800-FOR-ROAD
- **VDOT Projects and contractor support/laydown yards**Jenny Dail
- Reference: Section 9VAC25-880-20.C and D and VDOT’s IIM-LD-242.5, Section 4.2.4.1- Offsite support activities that are outside VDOT’s ROW. While VDOT obtains CGP coverage for the site area on these projects, it is the responsibility of the contractor to secure CGP coverage for the offsite support areas, if necessary. At times the offsite support area has yet to be identified by the contractor at the time of initial project CGP coverage; also VDOT has no authority of activities occurring outside of the ROW. This is different from the localities’ understanding, and they would like to have further clarification from DEQ. They want to ensure that neither a local MS4 nor VDOT are victimized in these kinds of projects.
- Several jurisdictions would like to engage DEQ to discuss VDOT’s offsite support facilities/activities that are associated with VDOT projects.
- **TMDL Action Planning and Interconnectivity** Chris Swanson

- The new IIM-LD- 257.1 for projects where VDOT is not the CGP permittee (e.g. LAP, LUP, etc.) was discussed. For these projects, stormwater BMP and outfall data collection inventory procedures by the LPA at project delivery are outlined.
- VDOT is open to partnering with adjacent local governments on TMDL reduction opportunities/projects. Reach out to Drew Scott for these discussions.
  - VDOT has not identified points of interconnectedness, however would be interested in obtaining that data from the Phase I City's to upload into VDOT's GIS. Future coordination meetings regarding these points of interconnectedness are predicted. City of Chesapeake identified approximately 20 possible locations of physical interconnectedness.
  - Va. Beach discussed interconnections. VB cut VDOT's ROW out of city area when developing VB service area.
  - VDOT discussed the stream cleanup events that were being promoted and noted if there are any other future events that jurisdictions will be involved in and would like VDOT to promote, please let VDOT (Jenny) know.
- **Map Updates/Status** Michelle Fults
- VDOT described mapping efforts undertaken in the past and that are currently ongoing. Recently updated the Service Area based on the 2010 CUA for CB purposes. Also completed up-to date mapping based on 2017 roads outside the Bay; will complete up-to-date mapping portion for inside the Bay shortly.
- VDOT is still updating/cleaning up the outfall and BMP data, and plans on having interns starting this summer to assist with further data verification efforts.
- If interested in obtaining VDOT Map data, please reach out to Jenny or Michelle to complete a "Locality Data Outfall Request Form."
- Va. Beach discussed mapped outfalls which can share in a geodatabase or GIS format. Have discussed interconnections.
- VDOT may be interested in obtaining data from the Phase I's.
- **CHES Bay TMDL Action Plans** Chris Swanson
- VDOT has completed the draft for the second phase 36% CHES Bay TMDL Action Plan for four river basins. The BMP "Toolbox" including stream restoration, shoreline stabilization, and others were discussed. Implementation of the AP is scheduled for June 30, 2022.
- The first 5% was met through stream restoration, nutrient credit purchases, street sweeping and other practices.
- Reference the Chesapeake Bay TMDL Update Newsletter that was handed out at the meeting.
- Many HRPDC Phase 1 jurisdictions are planning to utilize SWIFT as the main component of CB TMDL reductions up to the 100%.
- **Other Action Plan/Local TMDL Updates** Chris Swanson
- City of Chesapeake, City of Norfolk, City of VA Beach, City of Hampton have offered VDOT copies of Action Plans for review.

- VDOT has load allocations from several local sediment, PCB, and bacteria TMDL's. Updating Local AP for TMDLs approved prior to July 1, 2013 now.
- **Credit for TMDL Implementation** Chris Swanson
- Partnering
  - Norfolk recommended coordinating with HR Green/Storm for potential non-structural effort that could be applied towards TMDL credit.
  - Opportunity with City of Norfolk: Through "Keep Norfolk Beautiful" (reach out to Fleta Jackson) – to get some additional public outreach and involvement (MCM1) credit for MS4 Annual Reports.
  - On certain LAP projects, VDOT mentioned they may involve stream channel restoration and/or relocation aspects, land use modifications from developed area to open space, etc. which may be of value to both the local community and VDOT. LAP's are encouraged to communicate items to VDOT to evaluate.
- Street Sweeping
  - City of Norfolk discussed research study underway to assess 1.) Nutrient concentrations in street sweeping sediment and 2.) Mechanical vs. vacuum effectiveness. Norfolk offered to share their study with VDOT.
- WQ Monitoring
  - Va Beach discussed the water quality monitoring of BMPs and other areas that has been underway and pointed to the information available online.
- Outfall stabilization
- Re-development – When VDOT discussed the new IIM, Norfolk inquired about BMPs that will be delivered to, and maintained by, the jurisdiction for Non-VDOT projects (e.g. LAP) and how the redevelopment credit would be claimed for TMDL purposes. IIM-LD-257.1 outlines these procedures. On Non-VDOT projects, where BMPs will be maintained by VDOT or BMPs will treat VDOT lands, the TMDL credit portion (i.e. above and beyond minimum VSMP water quality compliance) will be claimed by VDOT for MS4 purposes.
  - In general, it was agreed that the entity that performs long term maintenance, would obtain the TMDL credit.
- Land cover conversion – VDOT mentioned this being investigated and pursued due to the high N reductions that can be obtained.
- VDOT to looking into other credit opportunities.
- **Illicit Discharge Detection and Elimination** Jenny Dail
- High Risk Industrial Facilities
  - If a Phase 1 is aware of an industrial facility that discharges to VDOT ROW, they will notify VDOT.
  - If Norfolk becomes aware of a high risk industrial facility in Phase 1 jurisdiction that discharges to VDOT ROW, they will notify Jennifer Dail.
- Notification to each Phase I MS4 Permittee of an IDDE
  - See handout that was distributed at meeting that included updated IDDE VDOT POC information.

- POC for IDDE-Central Office Environmental
  - Jennifer Lightfoot=jennifer.lightfoot@vdot.virginia.gov, 804-786-6678
  - Hotline Number 1-800-FOR-ROAD and email IDDEReports@VDOT.virginia.gov
  - It was indicated current IDDE POC for each jurisdiction was up to date (Jenny's list).
- **Small MS4 (Phase II) Coordination-NA**
- **Future Coordination Meetings**

## **Part I.C Monitoring Requirements**

### **Part I.C.1**

#### **In-system/wet weather monitoring**

*“The annual report due October 1, 2017 shall include the list of sites to be monitored during the term of the state permit and monitoring protocols.”*

*“Each annual report shall include a summary of the monitoring results and analyses and an interpretation of that data.”*

In FY2014, the City of Portsmouth partnered with the other Hampton Roads Phase I localities in signing a Memorandum of Agreement (see MOA at end of this section) with the Hampton Roads Planning District Commission establishing a regional water quality monitoring program. The objective of this program is to collect data at a regional scale that will accurately measure, over the next five years, the amount of nutrients and sediments delivered to waterways by the local MS4 systems.

The City of Portsmouth is currently working with the Hampton Roads Planning District Commission (HRPDC) on the Wet Weather Monitoring Stations. In FY 2016, the station at Craneybrook and the station at Carter and Daisy were installed. See the attached regional documentation for the status of this project.

**Part I.C.2**  
**Bacteria monitoring**

*“No later than twelve (12) months after the effective date of this state permit, the permittee shall submit to the Department the list of sites to be monitored, the methodology and the monitoring protocols”. (Submitted to the Department July 1, 2017)*

As part of our TMDL plan and requirements for the MS4 permit for the City, monthly testing of Hoffler Creek is conducted at four different sites. Samples are delivered to HRSD for analysis. Levels of Fecal Coliform and Enterococcus are measured, and the following reports show the levels throughout the year. The methodology and protocols are attached for review.

# 2016 – 2017 Bacteria Monitoring Program for Hoffler Creek

PREPARED FOR: City of Portsmouth James Wright, PE  
COPY TO:  
PREPARED BY: CH2M  
DATE: July 2017, Finalized September 2017

Continuation of water quality monitoring is required as part of the City of Portsmouth's Municipal Separate Storm Sewer (MS4) permit (VA0088668). Monitoring at four locations within Hoffler Creek is performed on a monthly basis to meet this requirement. This technical memorandum summarizes the monitoring performed for the period from September 2013 through March 2017. Annual updates will be submitted to the City describing the additional data collected and findings from these data.

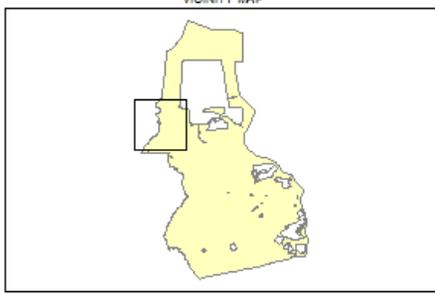
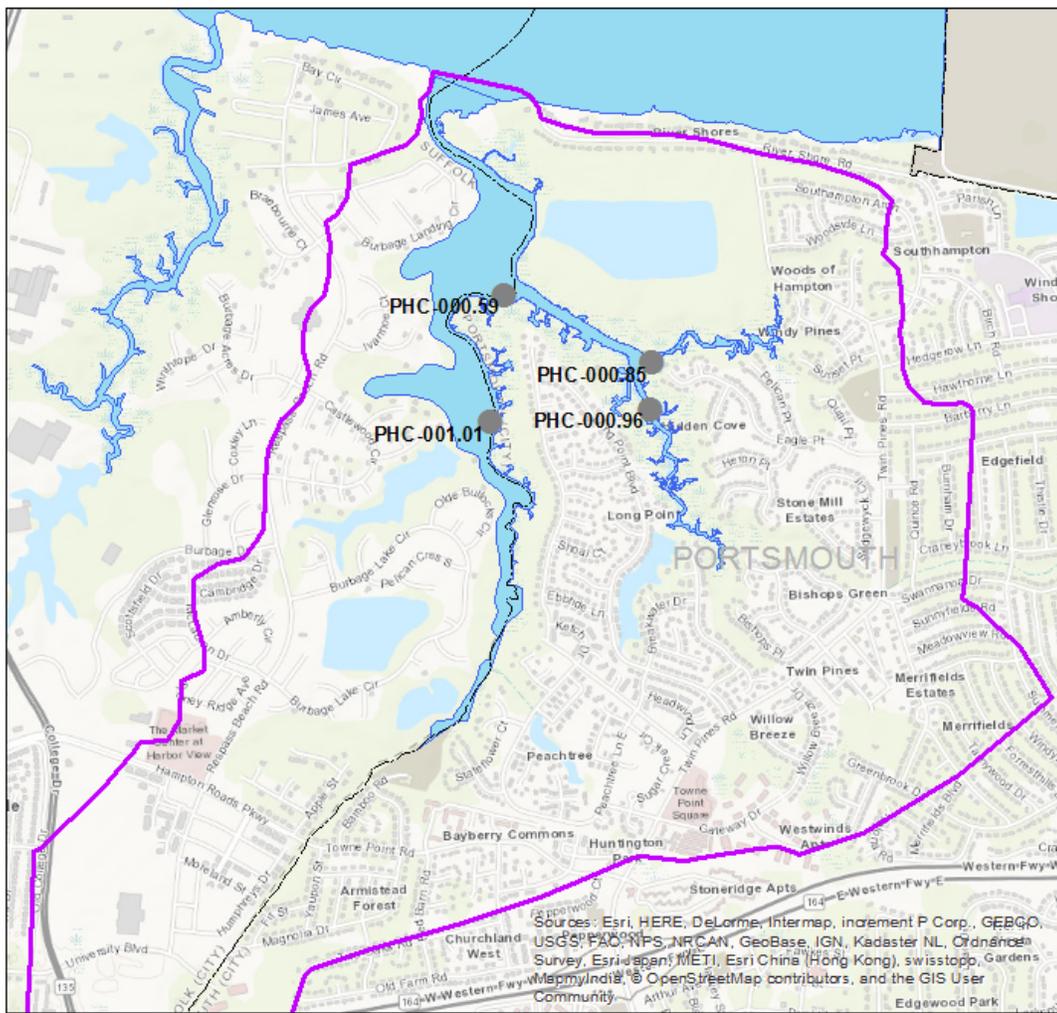
## **Monitoring Program**

The City's MS4 permit requires monthly bacteria monitoring at four locations in Hoffler Creek to assess the overall health and evaluate long-term trends in Hoffler Creek. These monitoring locations, shown on Figure 1, are sampled during ebb tide. Until July 2014, the samples were analyzed for *E. coli* and *Enterococcus* bacteria. Since that time, the samples are analyzed for fecal coliform and *Enterococcus* bacteria.

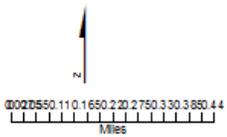
## **Monitoring Results**

Monitoring was typically performed in the middle of each month and will continue throughout the five year permit cycle. A summary of *E. coli* results for the four monitoring locations is provided in Table 1. A summary of *Enterococcus* results for the four monitoring locations is provided in Table 2. A summary of fecal coliform results for the four monitoring locations is provided in Table 3. Raw results are provided in Attachment 1. The data were analyzed to determine whether there were spatial patterns, temporal trends, or correlation with seasons, temperature, salinity, or rainfall.

A number of samples were reported as being below the reporting limit of a maximum probable number of 10 per 100 mL (MPN/100mL) for *Enterococcus* and or 10 colony forming units per 100 mL (CFU/100mL). For the calculation of the statistics, these data points were set to a value of 5 (one half detection limit) since these points fall in the range where the analysis method has limited accuracy but the sample may still contain bacteria.



**LEGEND**  
**Sampling Status**  
 ● Active  
 [Purple Outline] HofferCkDrainage  
 [Dashed Line] CityBoundary  
 [Light Blue] Waterbodies



**FIGURE**  
**Station Locations**  
 2016 - 2017 Bacteria Monitoring  
 MS4 Permitting Program

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Figure 1.  
 Hoffer Creek Monitoring Locations

Table 1. Summary of Hoffler Creek *E. coli* Observations – September 2013 – June 2014

Station	Minimum	Maximum	Mean	Std. Deviation	Samples exceeding Water Quality Standard <sup>1</sup>	Count
PHC-000.85	80	8800	1387	2677	3	9
PHC-000.96	40	270	155	115	3	9
PHC-000.59	20	7300	1281	2298	3	9
PHC-001.01	90	130	110	20	2	9

<sup>1</sup> Virginia *E. coli* Water Quality Standard – no more than 10 percent exceeding 235 MPN/100mL

Table 2. Summary of Hoffler Creek *Enterococcus* Observations – September 2013 – March 2017

Station	Minimum	Maximum	Mean	Std. Deviation	Samples exceeding Water Quality Standard <sup>1</sup>	Count
PHC-000.85	< 10	19,900	1,398	3,955	23	35
PHC-000.96	< 10	9,800	1,133	2,502	18	35
PHC-000.59	< 10	19,900	1,101	3,571	20	35
PHC-001.01	< 10	24,200	1,477	4,623	20	35

<sup>1</sup> Virginia *Enterococcus* Water Quality Standard – no more than 10 percent exceeding 104 MPN/100mL

Table 3. Summary of Hoffer Creek Fecal Coliform Observations – July 2016 – March 2017

Station	Minimum	Maximum	Mean	Std. Deviation	Samples exceeding Water Quality Standard <sup>1</sup>	Count
PHC-000.85	< 10	8,400	1,070	1,974	22	26
PHC-000.96	10	4,500	1,008	1,350	22	26
PHC-000.59	< 10	4,800	500	1,030	22	26
PHC-001.01	10	6,100	815	1,491	22	26

<sup>1</sup> Virginia Fecal coliform Water Quality Standard for Shellfish Waters – 90<sup>th</sup> percentile less than 43 cfu/100mL

## *E. Coli*

*E. coli* bacteria monitoring by the City was discontinued in June of 2014. For this reason, a detailed assessment of results or trends was not performed for this technical memorandum. *E. coli* data for the September 2013 to June 2014 period is summarized in Table 1.

## *Enterococcus*

An indeterminate pattern is seen between stations for the *Enterococcus* bacteria monitoring results. Stations PHC-000.85 and PHC-001.01 typically had higher concentrations during the monitoring period but the difference relative to PHC-000.96 and PHC-000.59 is moderate. The box and whisker plot in Figure 2 shows the range of enterococcus values measured during the September 2013 to March 2017 period.



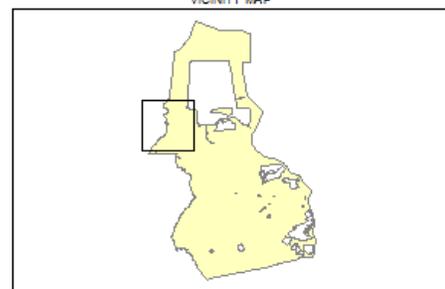
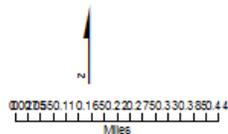
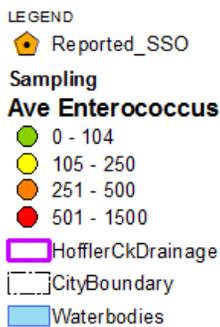
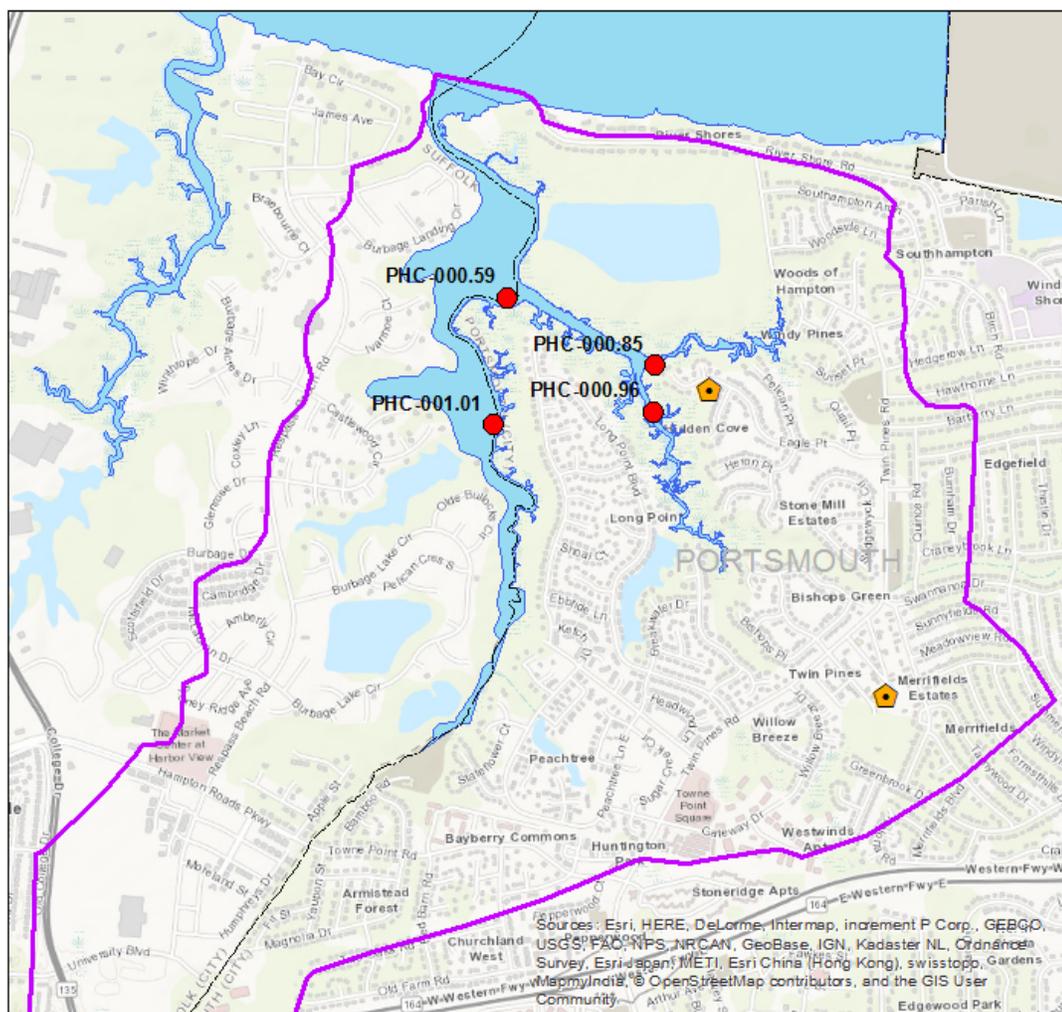
Figure 2.

*Box and Whisker Plot of Enterococcus Bacteria in Hoffler Creek in 2013 - 2017*

During the 2016-2017 period, Station PHC-001.01 tended to have the lowest concentrations but also had the single highest measurement recorded, 823 MPN/100 mL on March 15, 2017, for any station during the sampling period.

The Virginia water quality standards for *Enterococcus* are based on measurement of a geometric mean of multiple samples collected during a 30 day period. The standard does allow an alternative standard of 104 colony forming units per 100 mL if less than five samples are collected during the 30 day period. As noted in Table 2, all stations exceeded the standard more than 50 percent of the time with PHC-0.085 having the highest exceedance rate of approximately 66 percent.

Figure 3 provides a spatial representation of the mean *Enterococcus* data. The dots for stations PHC-000.59, PHC-000.85, PHC-000.96, PHC-001.01, show the relative magnitude of the mean *Enterococcus* results.



**FIGURE 3**  
Average Enterococcus Bacteria  
2016 - 2017 Bacteria Monitoring  
MS4 Permitting Program

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### Potential Sanitary Sewer Overflows

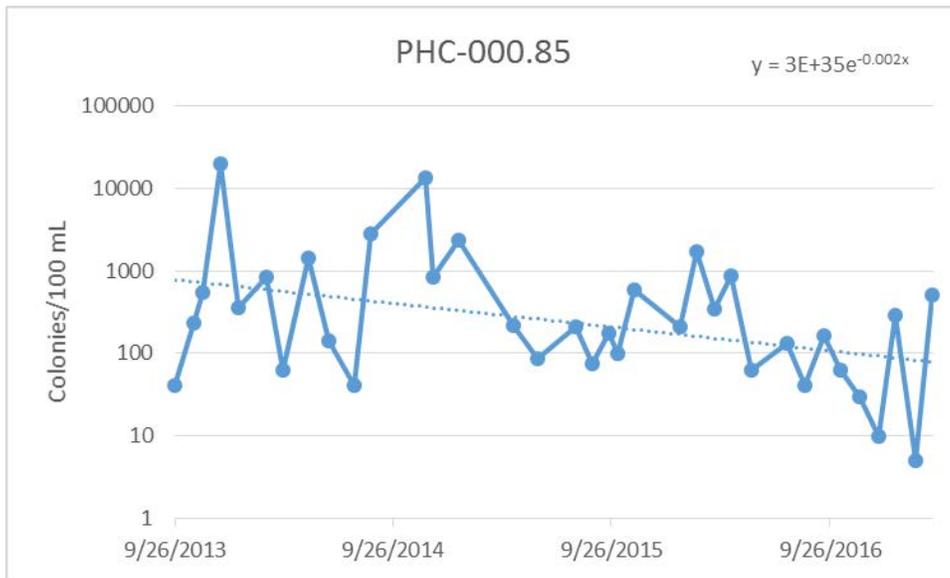
Due to the low lying nature of Portsmouth and the lack of hydraulic gradient in the sewer system, sanitary system overflows (SSOs) can occur. The City's SSORS Database - Spill Report for the period from 07/01/2016 to 03/31/2017 was analyzed to identify overflows in

the Hoffler Creek watershed. The locations, Pump Station #6 and the John Bean Pump Station, are shown on Figure 3. The overflows did not occur at the same time as the monitoring events so not direct connection between the overflows and high bacteria levels can be made but these locations should be considered potential sources.

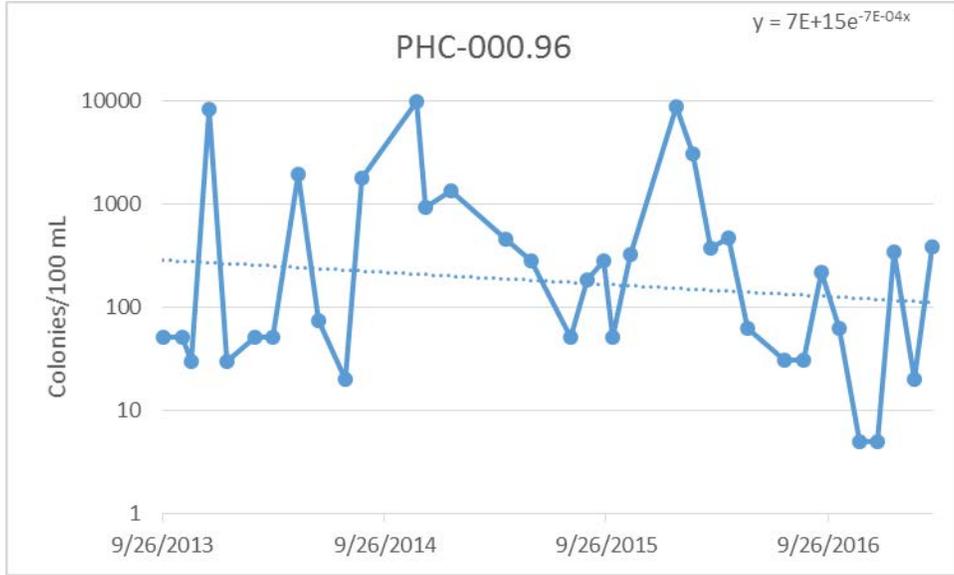
### ***Trend Analyses***

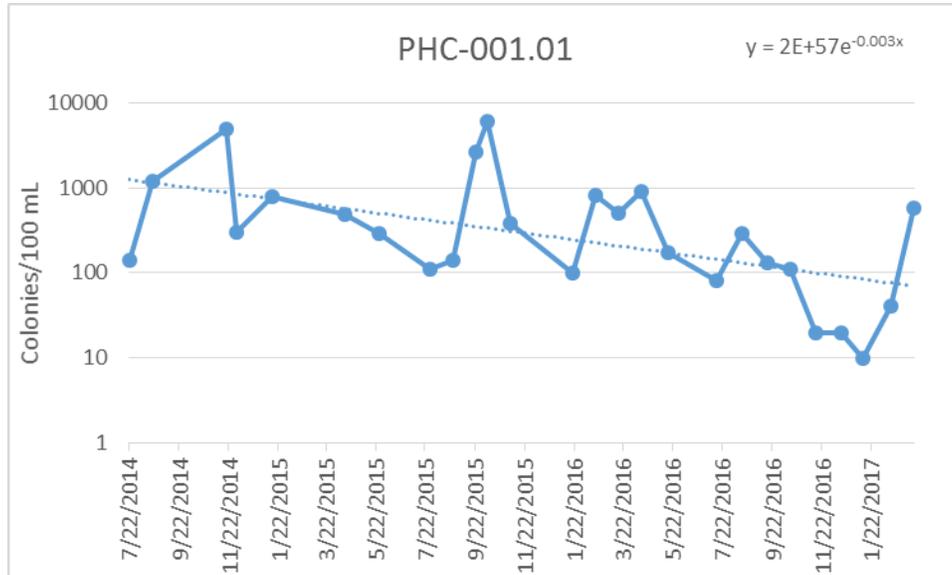
Kendall trend tests (USGS 2005) were performed on the bacteria monitoring data. The data was first analyzed with the standard Kendall trend test to determine whether a statistically significant trend existed. The data was then reanalyzed including the time of year to exclude potential seasonal influences such as temperature and sunlight. In general, the Kendall trend analyses were more significant without considering seasonality. For example, the p statistic for Station PHC-000.59 increased from 0.009 (very significant) to 0.025 (significant). This suggests that while factors such as water temperature can affect bacteria die off, other factors such as runoff loading may have a more significant and less seasonal impact.

Figures 4 through 7 demonstrate the trends for *Enterococcus* using regression analyses.



**Figure 4.**  
*Enterococcus* Bacteria in Hoffler Creek Station PHC-000.85 for 2013 - 2017



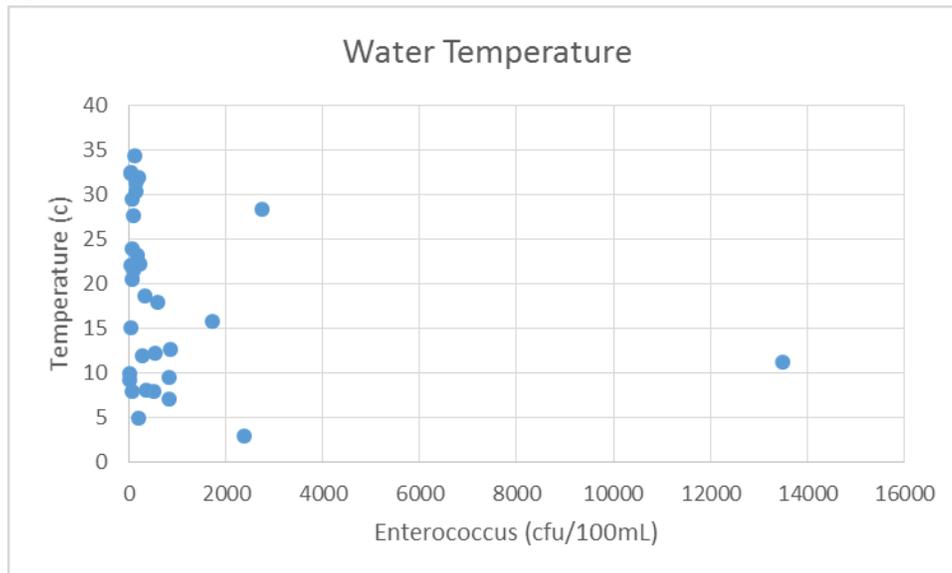


**Figure 7.**  
*Enterococcus Bacteria in Hoffler Creek Station PHC-001.01 for 2013 - 2017*

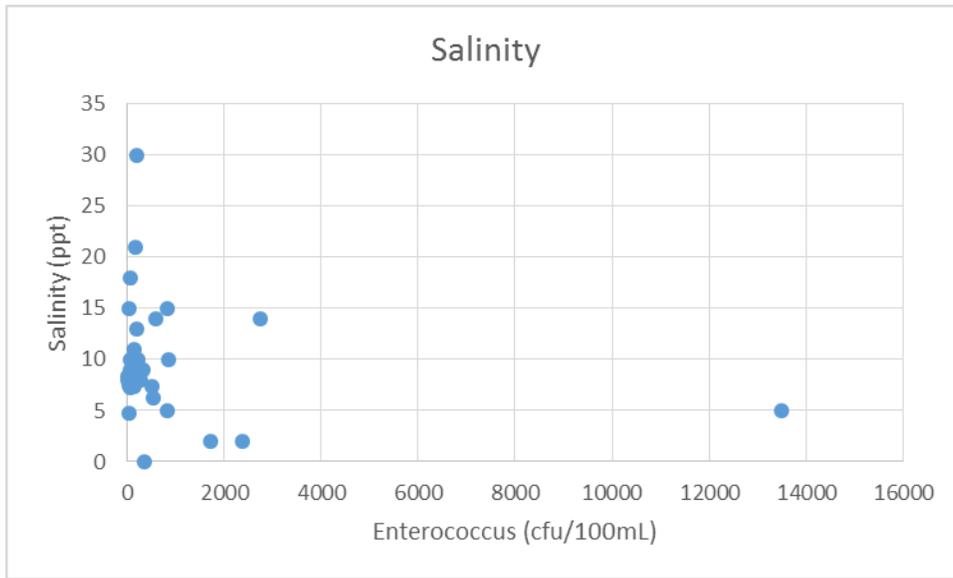
A clear downward trend is seen at all stations with PHC-0.085 have the greatest decrease and PHC-0.096 having the least decrease. High values are still seen at times but an overall decrease over time is apparent.

***Correlation with Environmental Factors***

A number of environmental factors including temperature, salinity, and precipitation may all affect bacteria levels. Correlation analyses between bacteria concentrations and these factors was performed. No significant correlation was identified between *Enterococcus* data and environmental factors. Examples of these relationships shown in Figures 8 through 10 demonstrate that some ranges of these factors tend to have higher bacteria concentrations, they cannot fully explain differences in levels. A multivariate analysis, used to determine whether a combination of factors can explain variability, also showed limited statistical significance.

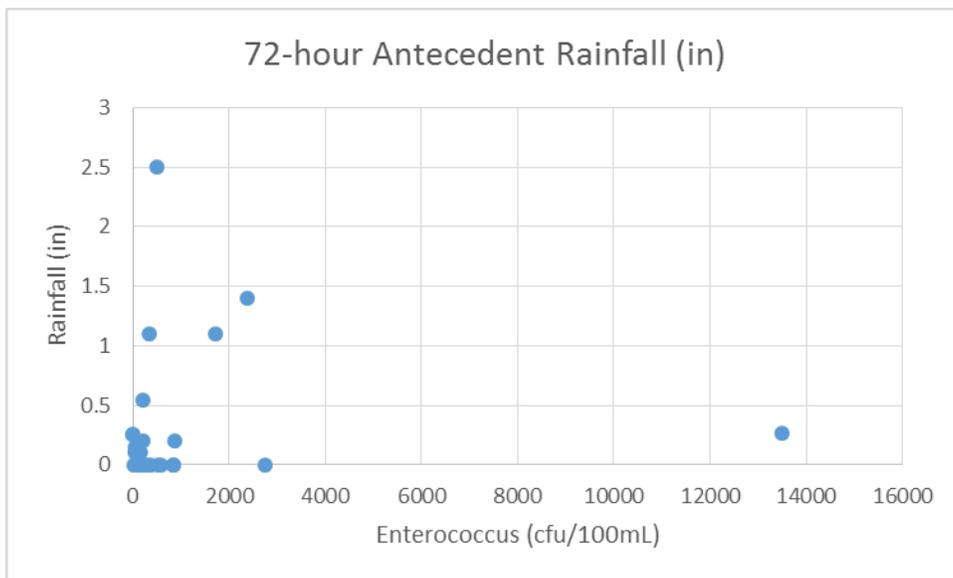


**Figure 8.**  
*Correlation of Enterococcus Bacteria and Water Temperature - Station PHC-000.85 for 2013 - 2017*



**Figure 9.**

*Correlation of Enterococcus Bacteria and Salinity - Station PHC-000.85 for 2013 - 2017*



**Figure 10.**

*Correlation of Enterococcus Bacteria and Antecedent Rainfall - Station PHC-000.85 for 2013 - 2017*

While the regression show limited explanatory power, a number of general qualitative observations can be made. Bacteria concentrations generally are highest when temperatures are in the 5 degree C to 20 degree C range... As shown in Figure 11, a large drop off of bacteria concentrations tends to occur between the October and November events when water temperature drops below 15 °C. Concentrations for Stations PHC-000.85 and PHC-000.96 on January 12<sup>th</sup>, 2017 and for all stations on March 15, 2017 are elevated despite the colder temperatures, however. This shows that bacteria levels are not completely temperature dependent.

A similar ideal salinity range for Enterococcus seems to occur when salinity is less than 15 parts per thousand. This could be due to tidal stage or to amount of runoff from the watershed.

The largest factor in *Enterococcus* concentrations during the sampling period appears to be rainfall and the subsequent source loading. The highest bacteria concentrations occur after a rainfall of more than 0.25 inches. The only significant rainfall during 2016-2017 sampling events was a large, approximately 1.98 inch rainfall event (NCDC, 2017) on March 13<sup>th</sup> and 14<sup>th</sup>, 2017 prior to the March event which had the highest bacteria concentrations in that period. No measureable rainfall occurred for 48 hours prior to the September 2016 and January 2017 sampling events however so rainfall is not the only cause for elevated bacteria counts.

A moderate relationship is seen when comparing concentrations to tide stage. Higher concentrations are seen when sampling occurs in the middle of an ebb tide versus at the beginning of an ebb tide. This could occur if concentrations in the Hoffler Creek stream network are higher than those in the adjacent river.

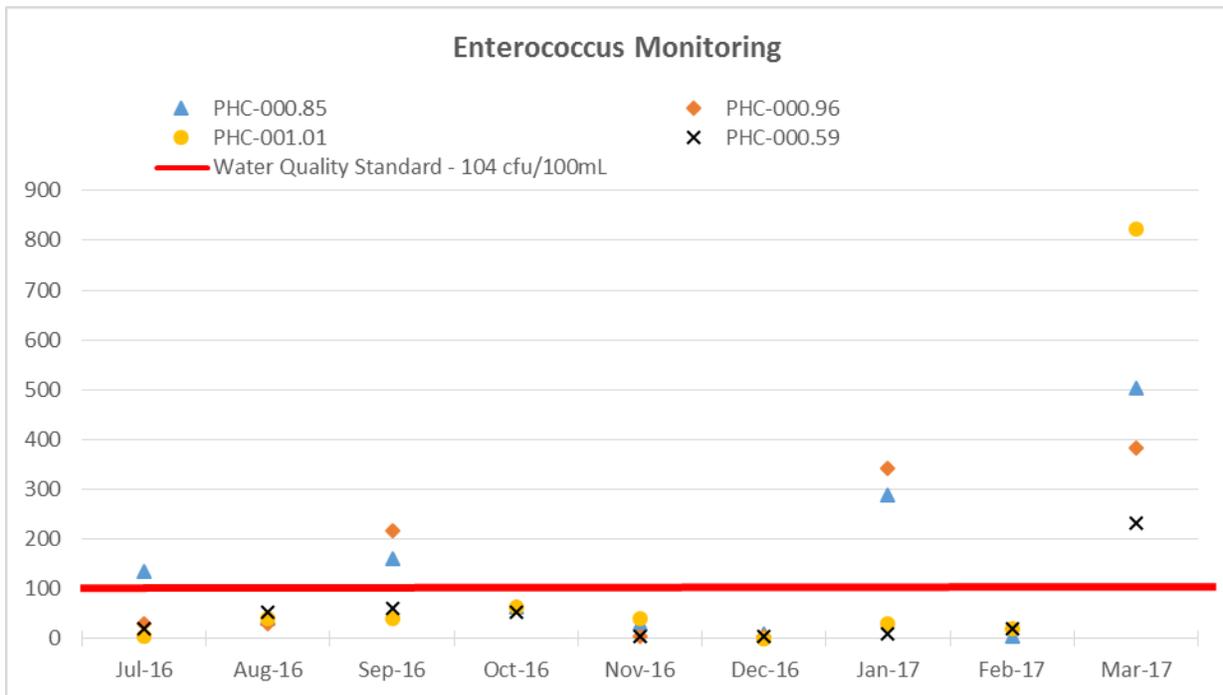
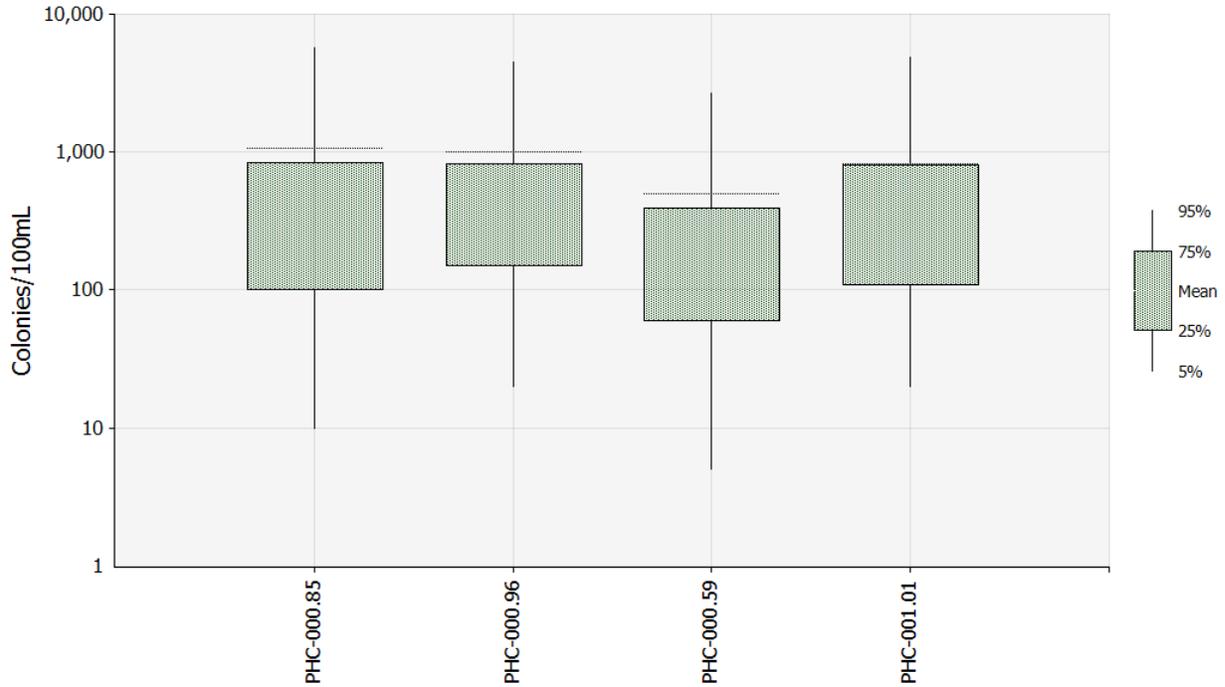


Figure 11.  
Timeseries Plot of Enterococcus Bacteria in Hoffler Creek in 2016 - 2017

### Fecal Coliform

An indeterminate pattern is seen between stations for the fecal coliform bacteria monitoring results. Stations PHC-00.085, PHC-00.096, and PHC-001.01 had similar concentrations during the 2014 to 2017 monitoring period. Station PHC-00.059 had overall lower fecal coliform concentrations. This may be due to increased die-off of fecal coliform as a result of higher salinity values seen towards the mouth of Hoffler Creek.

The box and whisker plot in Figure 12 shows the range of fecal coliform values measured from July 2014 to 2017.

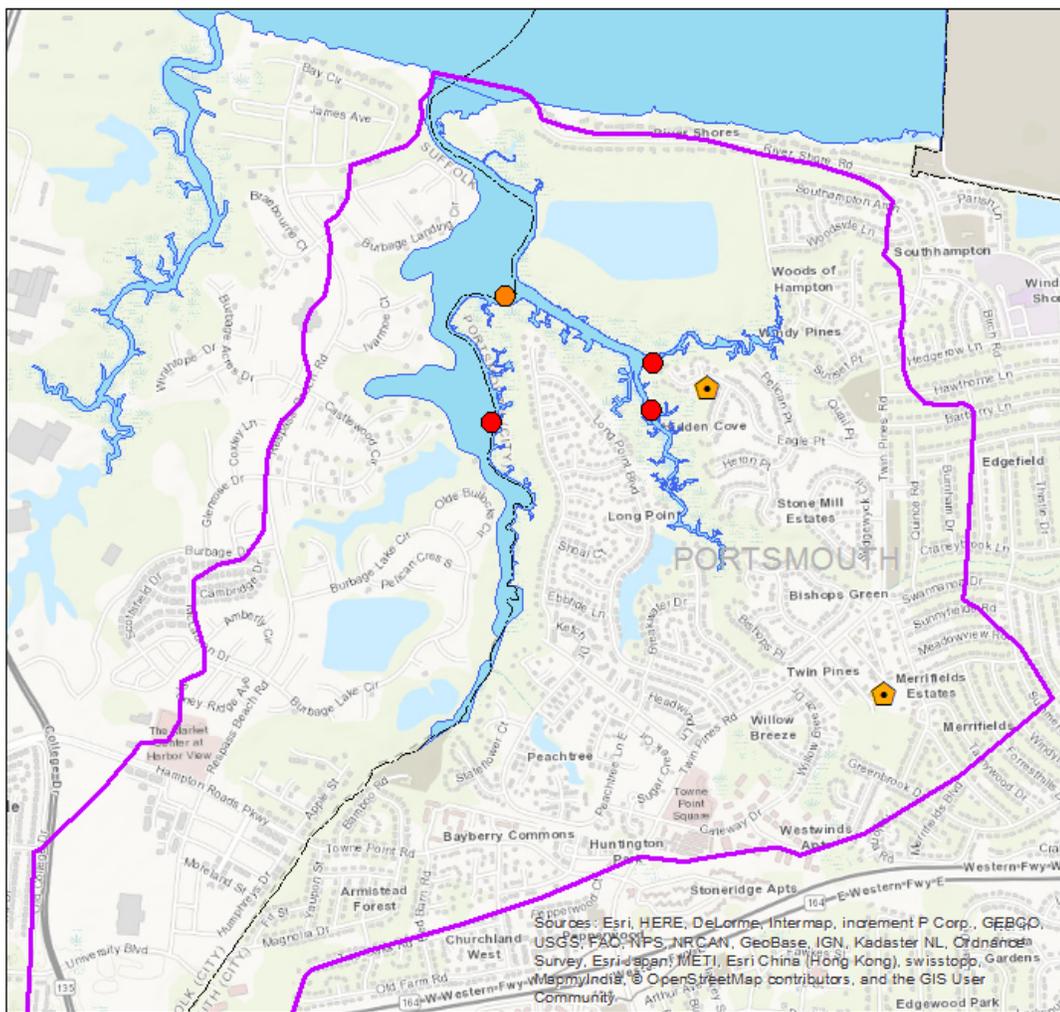


**Figure 12.**

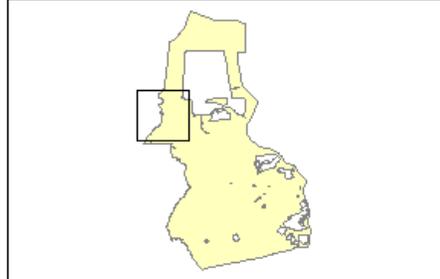
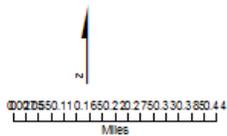
*Box and Whisker Plot of Fecal Coliform Bacteria in Hoffler Creek in 2016 - 2017*

The Virginia water quality standards for fecal coliform are based on measurement of a geometric mean of multiple samples collected during a 30 day period. The standard does allow an alternative standard of 43 colony forming units per 100 mL if less than five samples are collected during the 30 day period. As noted in Table 2, all stations exceeded the standard approximately 85 percent of the time.

Figure 13 provides a spatial representation of these data. The dots for stations PHC-000.59, PHC-000.85, PHC-000.96, PHC-001.01, show the relative magnitude of the mean fecal coliform results. No station had an average less than 43 cfu/100mL.

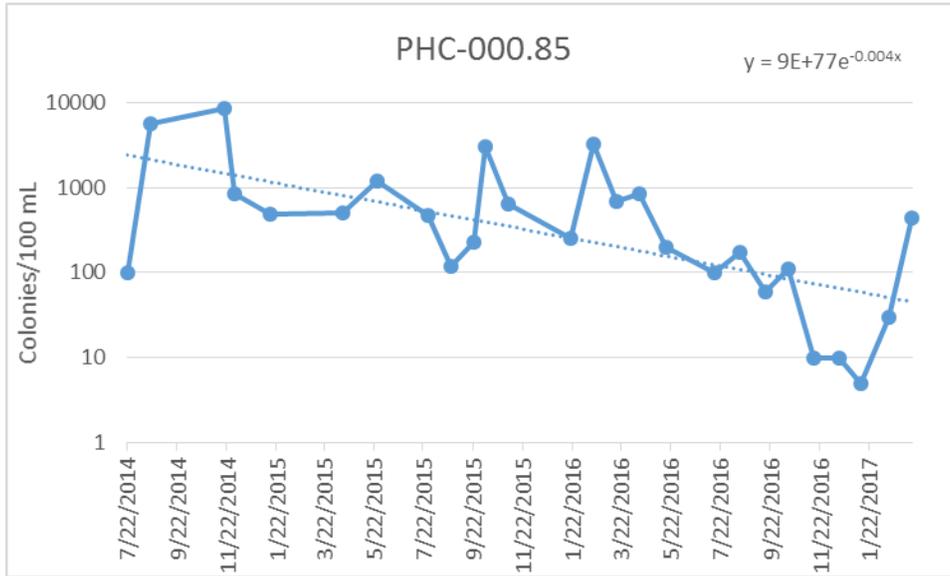


- LEGEND**
- Reported\_SSO
  - Average FC**
  - 0 - 43
  - 44 - 250
  - 251 - 500
  - 501 - 1500
  - HofferCkDrainage
  - CityBoundary
  - Waterbodies

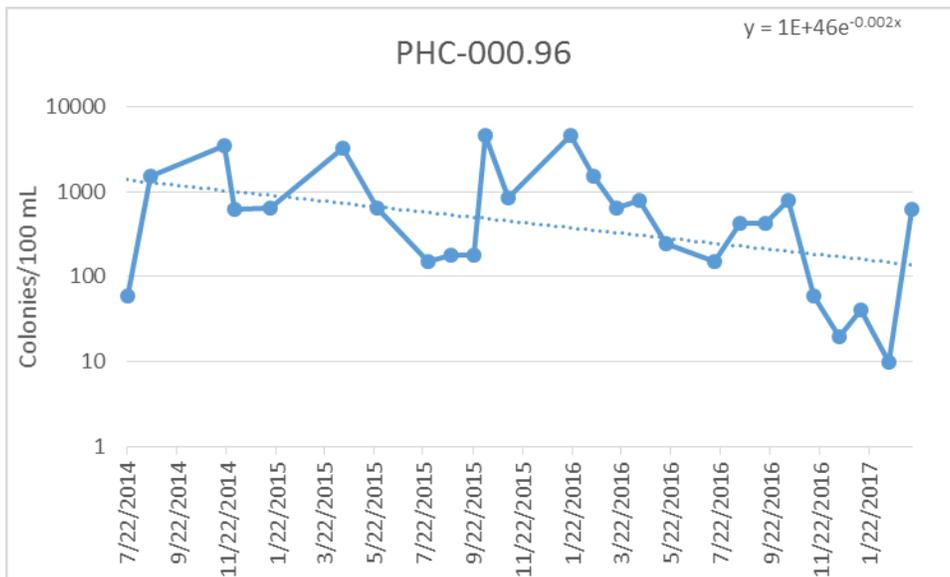


**FIGURE 13**  
**Average Fecal Coliform Bacteria**  
**2016 - 2017 Bacteria Monitoring**  
**MS4 Permitting Program**

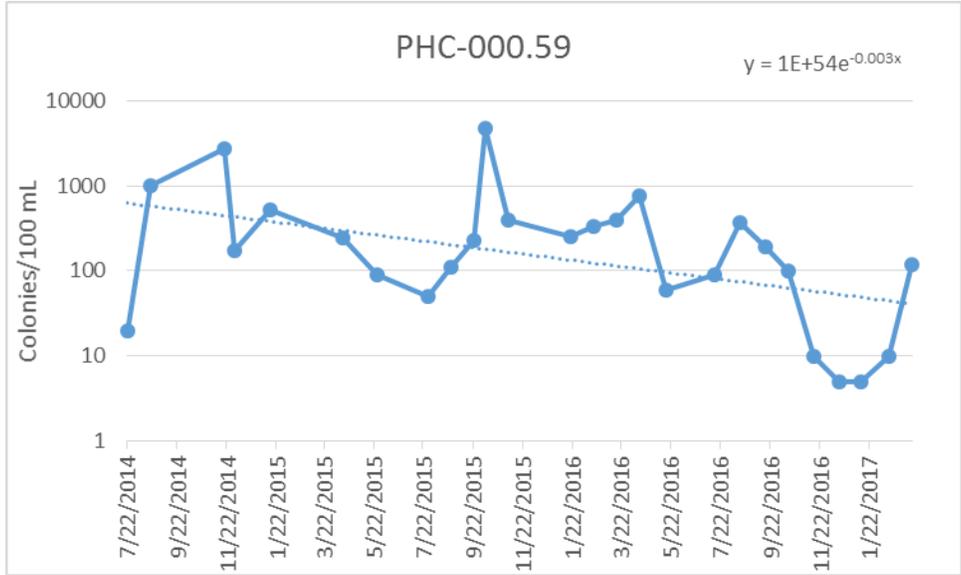
Kendall trend tests (USGS 2005) were performed on the fecal coliform bacteria monitoring data. The data was first analyzed with the standard Kendall trend test to determine whether a statistically significant trend existed. All stations show a statistically significant downward trend as shown in Figures 14 through 17.



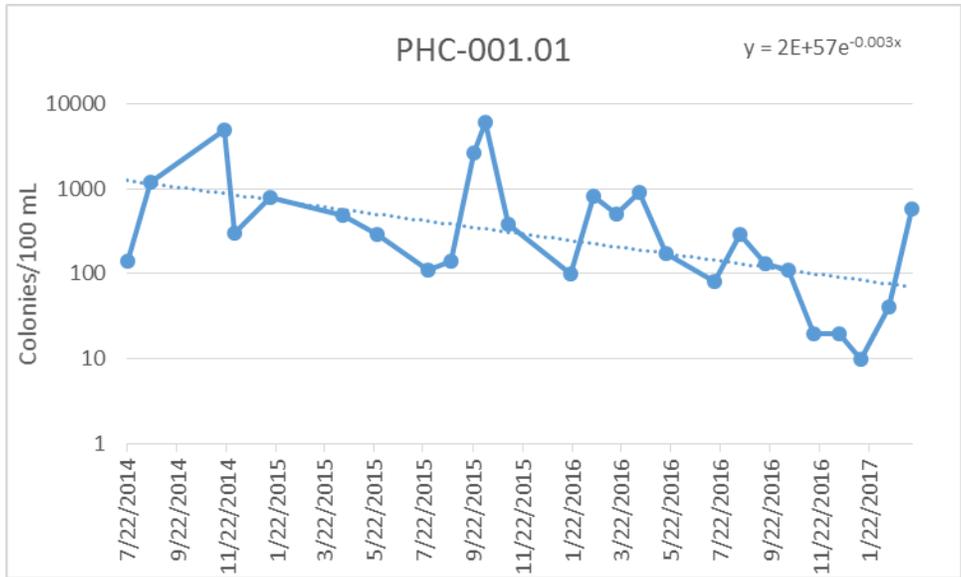
**Figure 14.**  
Fecal coliform Bacteria in Hoffler Creek Station PHC-00.085 for 2014 - 2017



**Figure 15.**  
Fecal coliform Bacteria in Hoffler Creek Station PHC-001.01 for 2014 - 2017



**Figure 16.**  
Fecal coliform Bacteria in Hoffler Creek Station PHC-001.01 for 2014 - 2017



**Figure 17.**  
Fecal coliform Bacteria in Hoffler Creek Station PHC-001.01 for 2014 - 2017

A clear downward trend is seen at all stations with PHC-0.085 have the greatest decrease and PHC-0.096 having the least decrease. High values are still seen at times but an overall decrease over time is apparent.

A timeseries of results is provided in Figure 15.

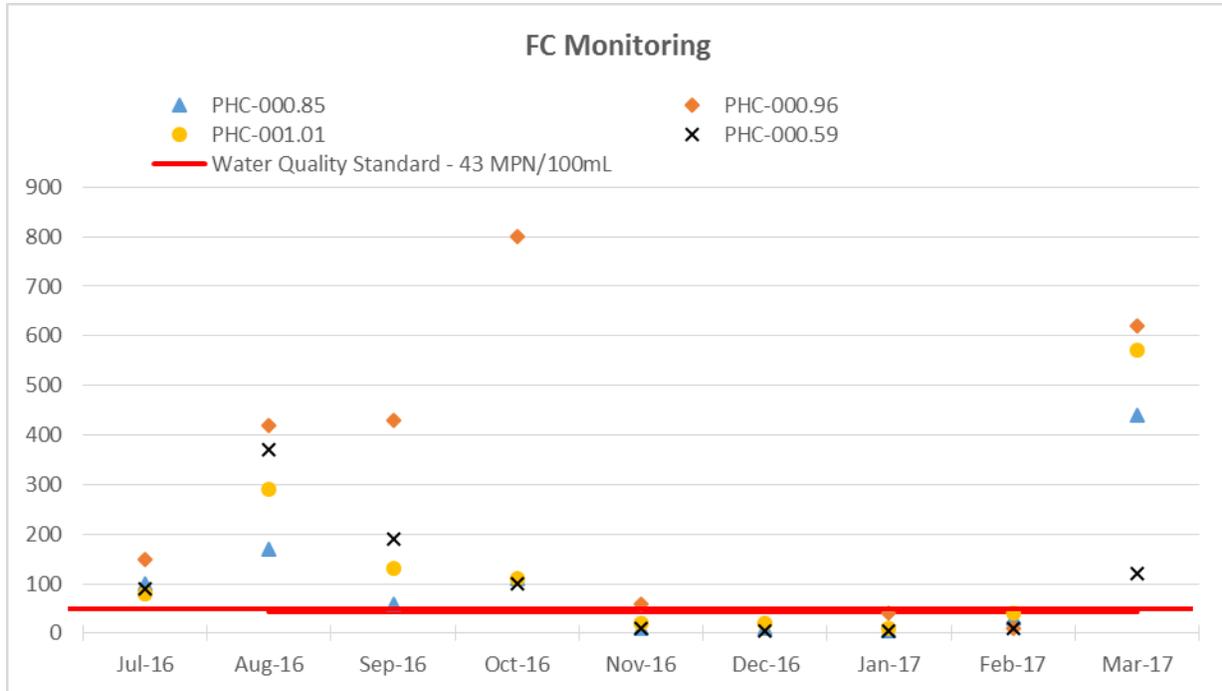


Figure 15.  
Timeseries Plot of Fecal coliform Bacteria in Hoffler Creek in 2016 - 2017

Only moderate correlation was identified between fecal coliform data and environmental factors. The largest factor in fecal coliform concentrations during the sampling period appears to be moderate temperatures and antecedent rainfall

As with *Enterococcus*, fecal coliform concentrations can be seen decrease as temperatures decrease. Concentrations for all stations on March 15, 2017 are elevated despite the colder temperatures. A spike in fecal coliform concentrations on January 12<sup>th</sup>, 2017 at Stations PHC-000.85 and PHC-000.96 is not seen as it was for *Enterococcus*. In combination, temperature and salinity may have a moderate impact on fecal coliform concentrations.

### Conclusions

A review of the Hoffler Creek bacteria monitoring data show a moderate level of bacteria at all stations. A large spatial difference is not seen between stations although PHC-000.59 had slightly lower concentrations than the three upstream stations. This may be due to the higher flushing with the Elizabeth River.

Two SSO locations, associated with pump stations, were identified in the watershed. While overflows did not occur during any sampling event, they could be considered as potential sources of bacteria.

Water quality standards for *Enterococcus* and fecal coliform were not uncommon from 2013 through 2017. The *Enterococcus* standard was exceeded at all station at least fifty percent of the time. The fecal coliform standard was exceeded approximately 85 percent of the time at all stations. Despite this, a trend analysis shows a steady and continuing decrease in bacteria demonstrating clear improvements over time.

### References

- NCDC. 2017. Draft Monthly Climate Data – Norfolk, VA Station. National Climatic Data Center, National Weather Service.
- VADEQ. 2012. TMDL Implementation Plan for Hoffler Creek. Virginia Department of Environmental Quality.

USGS. 2005. Computer Program for the Kendall Family of Trend Tests. U.S. Geological Survey. Scientific Investigations Report 2005-5275.

“Each subsequent annual report shall include a summary of the monitoring results and analyses and an interpretation of that data with respect to long-term patterns/trends.”

**Hoffler Creek Bacteria Monitoring Program Update – FY2018**

Required monthly monitoring of bacterial levels within Hoffler Creek at the four stations previously identified continued through FY2018. At each station, water samples were obtained and field observations of water temperature, salinity, and pH were recorded. Water samples were analyzed for presence of *Enterococcus* and fecal coliforms by the HRSD Central Environmental Laboratory (CEL), VA Laboratory ID 460011. The HRSD CEL remains VELAP/NELAC accredited by the Division of Consolidate Laboratory Services. The results have been summarized below.

*Enterococcus* observations within Hoffler Creek during fiscal year 2018 had an overall average of 200 MPN/100ml. As shown in Table 1, there was no significant variability between stations.

**Table 1.** Summary of *Enterococcus* Observations in Hoffler Creek, July 2017 – June 2018

<b>Station</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Count</b>
PHC-000.59	<10	1190	187	327	12
PHC-000.85	<10	909	173	254	12
PHC-000.96	<10	1330	273	448	12
PHC-001.01	<10	613	167	189	12

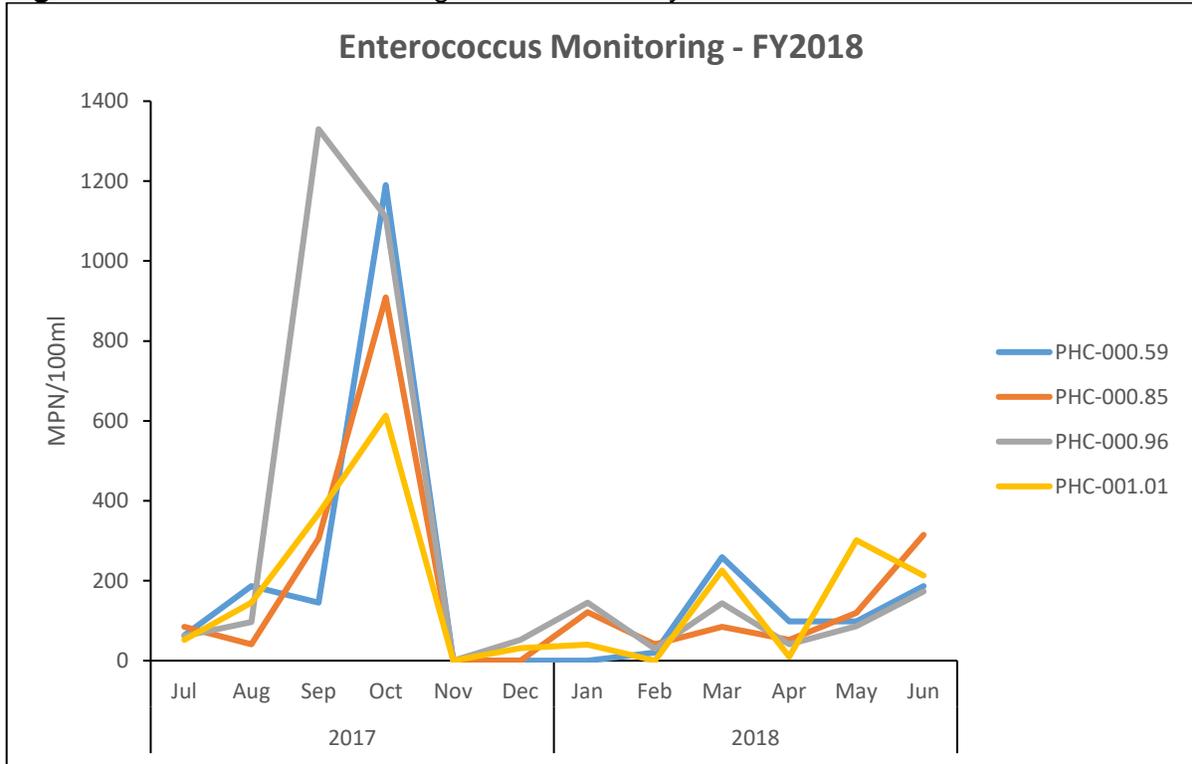
Fecal coliform observations within Hoffler Creek during fiscal year 2018 had an overall average of 173 CFU/100ml. As shown in Table 2, there was no significant variability between stations.

**Table 2.** Summary of *Fecal Coliform* Observations in Hoffler Creek, July 2017 – June 2018

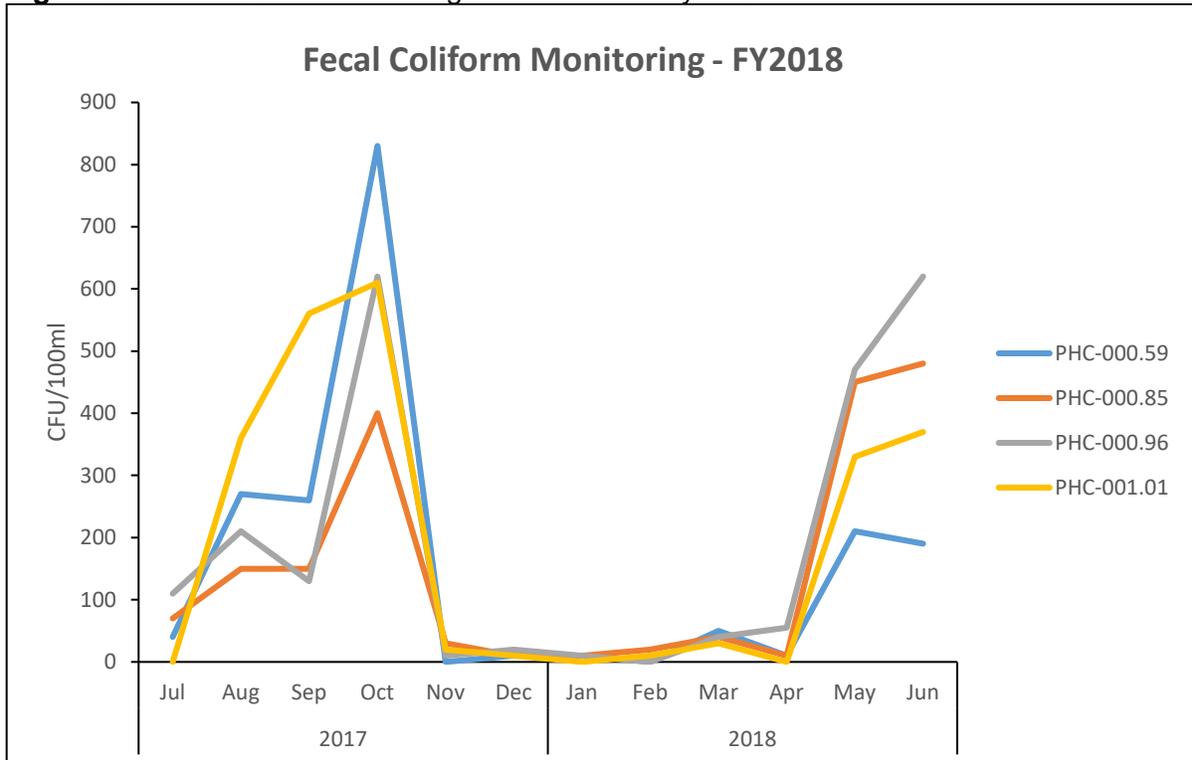
<b>Station</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Count</b>
PHC-000.59	<10	830	157	237	12
PHC-000.85	10	480	152	183	12
PHC-000.96	<10	620	191	239	12
PHC-001.01	<10	610	192	238	12

Figures 1&2 depict temporal trends at each station of *Enterococcus* and fecal coliform observations, respectively. Both bacterial populations show strong seasonal variation, reaching a minimum in winter months.

**Figure 1. Enterococcus monitoring results for fiscal year 2018**

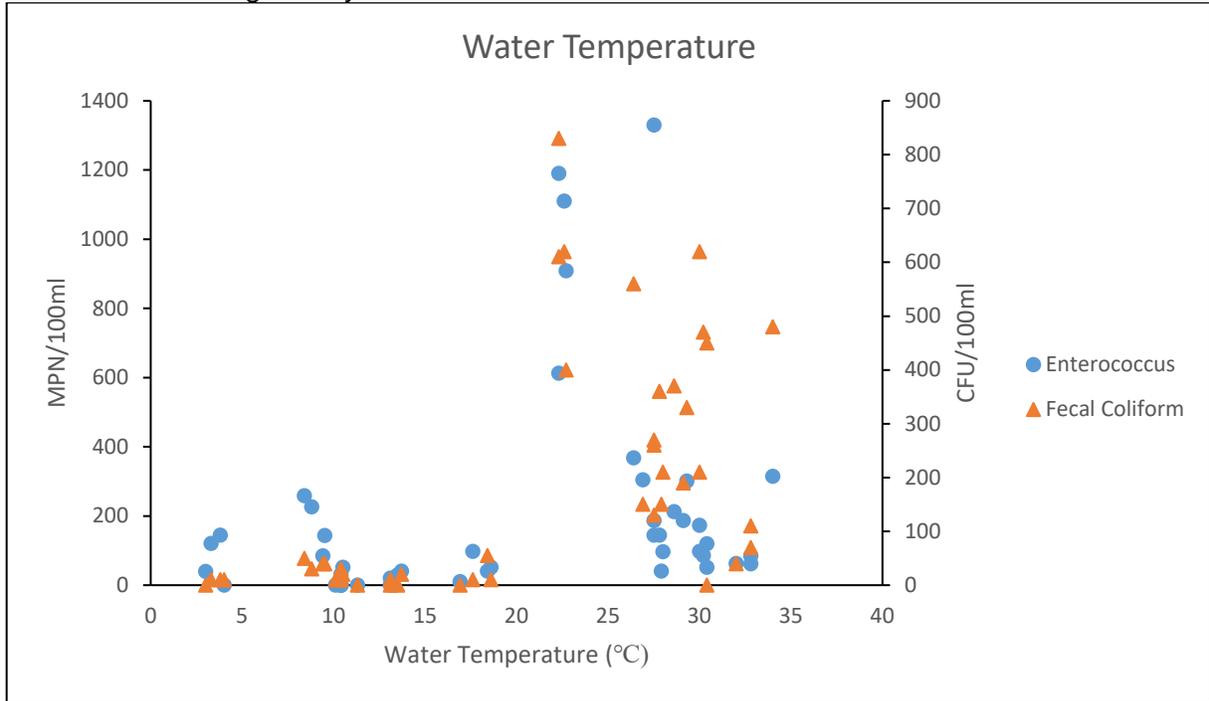


**Figure 2. Fecal coliform monitoring results for fiscal year 2018**

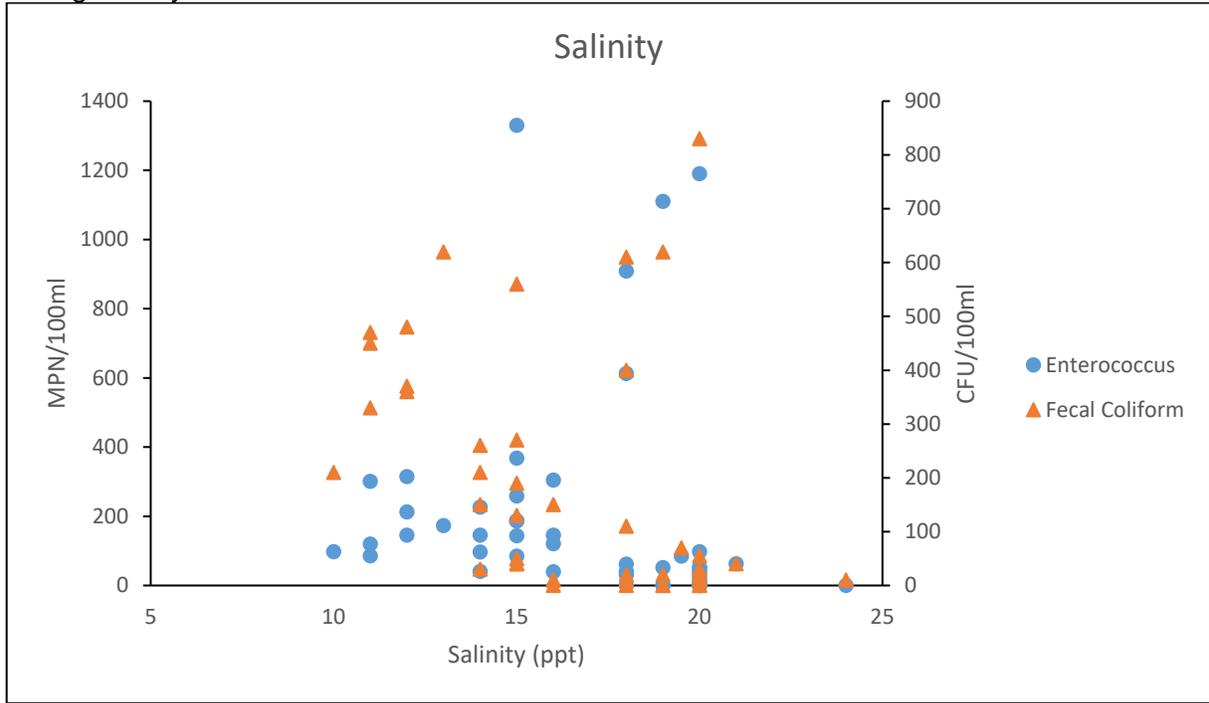


The seasonal trends are again observed when correlated to water temperature (Fig. 3). Salinity did not appear to have a strong effect on bacterial populations (Fig. 4). Figure 5 depicts the pH range for optimal growing conditions of bacteria. The optimal pH range of 7.5-8 also correlates to higher water temperatures (Fig. 6).

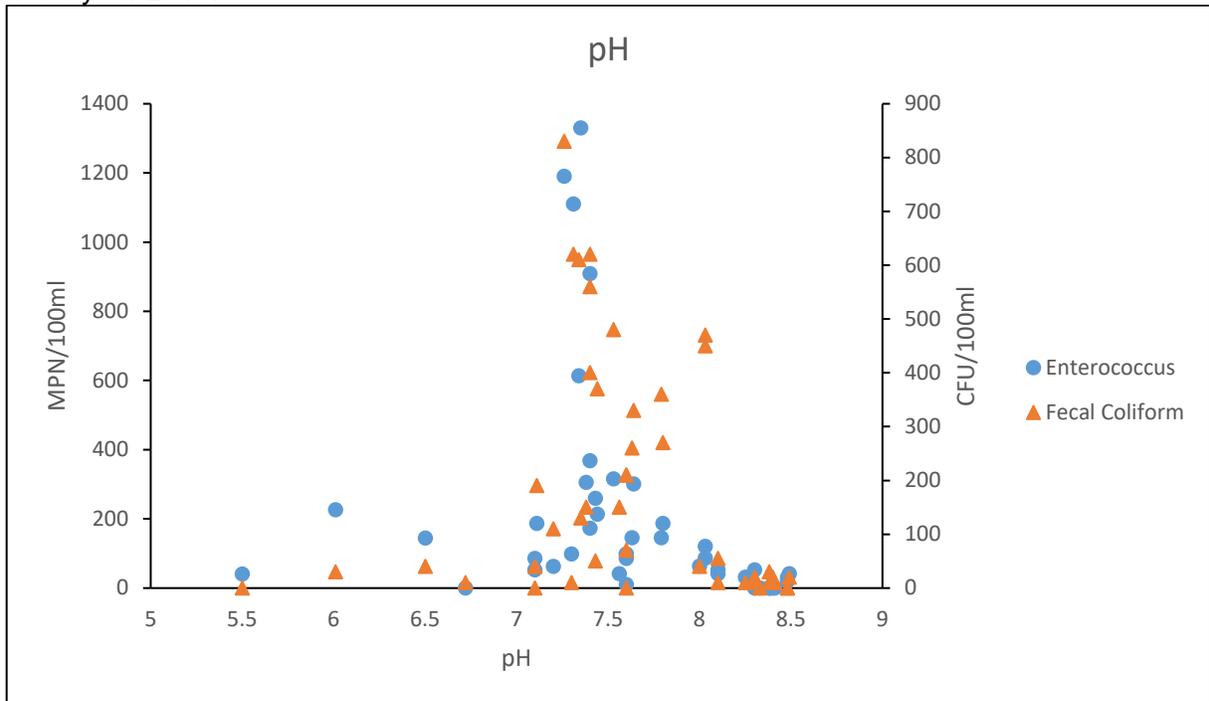
**Figure 3.** Correlation of temperature and bacteria (*Enterococcus* and fecal coliform) observations during fiscal year 2018.



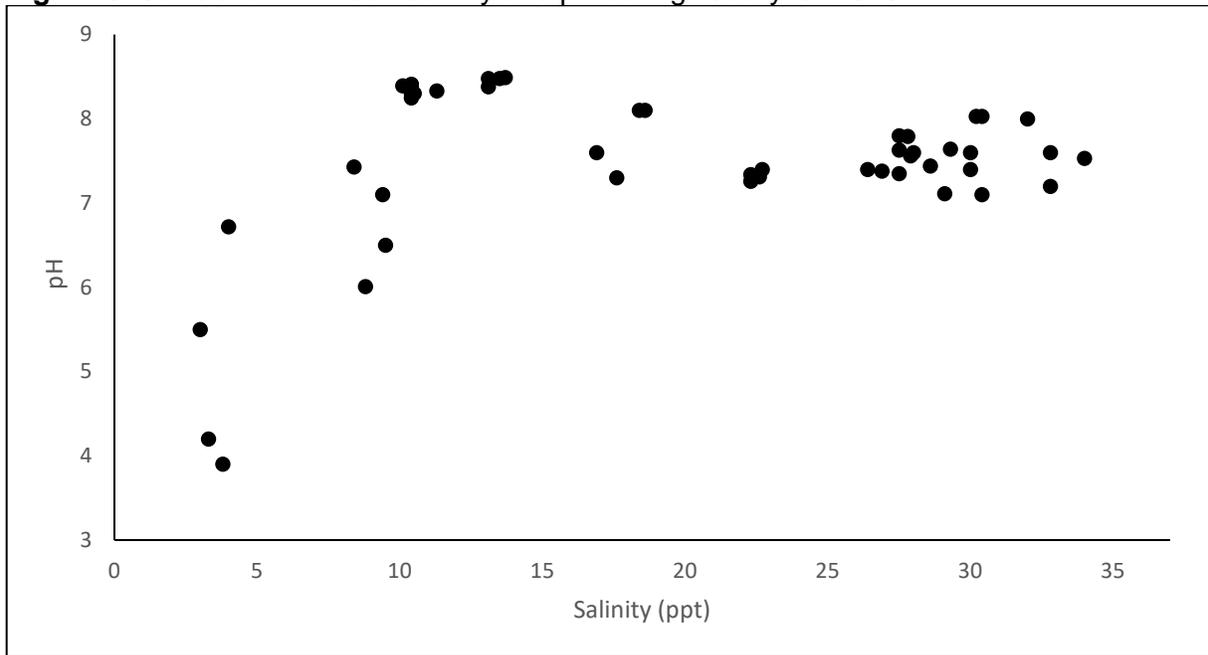
**Figure 4.** Correlation of salinity and bacteria (*Enterococcus* and fecal coliform) observations during fiscal year 2018.



**Figure 5.** Correlation of pH and bacteria (*Enterococcus* and fecal coliform) observations during fiscal year 2018.



**Figure 6.** Correlation between salinity and pH during fiscal year 2018



### Discussion and Long Term Trends

The water quality standards for *Enterococcus* (104 MPN/100ml) and fecal coliforms (43 CFU/100ml) were exceeded at all stations during the fiscal year. These instances occurred only during the warm months, as shown in the seasonal trends depicted in Figures 1&2. A large spatial variability was not observed during the July 2017 to June 2018 sampling period, consistent with previous data.

Average bacteria levels in Hoffler Creek were less than those of previous years. This continues the downward trend noted in the initial report. However, the small sample size obtained so far limits meaningful analyses. The monitoring program is expected to continue monthly sampling through the following fiscal years.

*“Final results and analyses shall be submitted with the permit application for the reissuance of this state permit due 180 days prior to this permit’s expiration date.”*

### **Part I.C.3**

#### **Structural source controls compliance monitoring and tracking**

*“Each annual report shall include a copy of the updated database in electronic format.”*

*The current stormwater management facility database is attached below.*

*“Each annual report shall include a summary of activities taken by the permittee to ensure maintenance of private stormwater management facilities.”*

Due to the limited the number and recent turnover of City staff, four private stormwater facilities were inspected during fiscal year 2018. Implementation of the stormwater management facility inspection program will begin in fiscal year 2019 as City staffing and consultant efforts are improved.

During FY18, the consultant was engaged to implement the adopted inspection program for both public and private BMPs throughout the city. The work began after June 30, 2018 and is continuing. Inspection results will be provided in the FY19 and subsequent annual reports

*“Each annual report shall include a summary of the program to ensure maintenance of stormwater management facilities maintained by the permittee.”*

Due to the limited number and recent turnover of City staff, public stormwater facilities were not inspected regularly and via a formal program during fiscal year 2018. Rather the City utilized a consultant to help maintain public stormwater ponds, e.g. repairing and replacing aerators, when problems would arise. The City is in the process of finalizing a contract with a new lake and pond consultant, Solitude Lake Management, and will move forward with a more proactive maintenance and inspection program in fiscal year 2019. Implementation of the stormwater management facility inspection program will begin in fiscal year 2019 as City staffing and consultant efforts are improved.

During FY18, the consultant was engaged to implement the adopted inspection program for both public and private BMPs throughout the city. The work began after June 30, 2018 and is continuing. Inspection results will be provided in the FY19 and subsequent annual reports.

SITE NUMBER	FILE	ADDRESS	BMP TYPE	SIT_PLAN_NAME
SIT2017-00020	C1706	835 LONDON BLVD	Underground detention	WENDY'S RESTAURANT #11773 835 LONDON BLVD.
SIT2017-00004	C1702	1098 FREDERICK BLVD	Filterra	PANDA EXPRESS
SIT2017-00003	C1701	3410 AIRLINE BLVD	Extended dry detention	O'REILLY AUTO PARTS STORE AIRLIEN BLVD. #3
SIT2016-00020	S1602	23 MOHAWK DR	Bioretention	SUBDIVISION DEVELOPMENT PLAN 23 MOHAWK DRIVE
SIT2016-00020	S1602	23 MOHAWK DR	Bioretention	SUBDIVISION DEVELOPMENT PLAN 23 MOHAWK DRIVE
SIT2016-00020	S1602	23 MOHAWK DR	Bioretention	SUBDIVISION DEVELOPMENT PLAN 23 MOHAWK DRIVE
SIT2016-00020	S1602	23 MOHAWK DR	Bioretention	SUBDIVISION DEVELOPMENT PLAN 23 MOHAWK DRIVE
SIT2016-00016	C1608	2210 PORTSMOUTH BLVD	Underground detention	DOLLAR GENERAL
SIT2016-00016	C1608	2210 PORTSMOUTH BLVD	Underground detention	DOLLAR GENERAL
SIT2016-00013	C1606	21 CAVALIER BLVD	Bioretention	TRI-COUNCIL GRAND LODGE
SIT2016-00013	C1606	21 CAVALIER BLVD	Rooftop disconnect	TRI-COUNCIL GRAND LODGE
SIT2016-00012	C1605	GEORGE WASHINGTON HWY	Dry swale	4800 BLK. GEORGE WASHINGTON HIGHWAY
SIT2016-00012	C1605	GEORGE WASHINGTON HWY	Rooftop disconnect	4800 BLK. GEORGE WASHINGTON HIGHWAY
SIT2016-00011	C1604	3214 ELLIOTT AVE	Bioretention	PORTSMOUTH CHRISTIAN SCHOOL ELEMENTARY SCHOOL EXPA
SIT2016-00011	C1604	3214 ELLIOTT AVE	Underground detention	PORTSMOUTH CHRISTIAN SCHOOL ELEMENTARY SCHOOL EXPA
SIT2015-00037	C1526	1009 VICTORY BLVD	Rainwater harvesting	FW BEAZLEY EDUCATION CENTER PARADISE CREEK
SIT2015-00037	C1526	1009 VICTORY BLVD	Bioretention	FW BEAZLEY EDUCATION CENTER PARADISE CREEK
SIT2015-00036	C1525	5910 WEST NORFOLK RD	Extended dry detention	GROVE BAPTIST CHURCH YOUTH CENTER
SIT2015-00036	C1525	5910 WEST NORFOLK RD	Extended dry detention	GROVE BAPTIST CHURCH YOUTH CENTER
SIT2015-00036	C1525	5910 WEST NORFOLK RD	Swale	GROVE BAPTIST CHURCH YOUTH CENTER
SIT2015-00036	C1525	5910 WEST NORFOLK RD	Bioretention	GROVE BAPTIST CHURCH YOUTH CENTER
SIT2015-00030	C1522	2175 ELMHURST LN	Dry swale	SITE DEVELOPMENT PLANS FOR 2175 ELMHURST LANE
SIT2015-00029	C1521	1 HIGH ST	Filterra	SEABOARD APT. RENOVATIONS PARKING LOT
SIT2015-00022	PF1504	2001 FREDERICK BLVD	Bioretention	PUBLIC WORKS STORMWATER DECANTING FACILITY
SIT2015-00021	C1517	GRAHAM ST	Filterra	LEXINGTON 1, PHASE 1
SIT2015-00021	C1517	GRAHAM ST	Filterra	LEXINGTON 1, PHASE 1
SIT2015-00018	C1516	3201 HIGH ST	FMD	GOODWILL
SIT2015-00018	C1516	3201 HIGH ST	Underground detention	GOODWILL
SIT2015-00014	C1511	3636 HIGH ST	Bioretention	E&S PLAN BOND SECOURS MARYVIEW MEDICAL CENTER MRI
SIT2015-00006	C1504	3950 BURTONS POINT RD	Permeable pavement	VANE BAROTHER'S WAREHOUSE
SIT2015-00006	C1504	3950 BURTONS POINT RD	Other	VANE BAROTHER'S WAREHOUSE
SIT2015-00004	C1502	1711 EFFINGHAM ST	Bioretention	DOLLAR GENERAL
SIT2015-00002	PF1501	1100 PORTSMOUTH BLVD	Grass channel	BRIGHTON ELEMENTARY SCHOOL ATHLETIC FIELD IMPROVE,
SIT2015-00001	C1501	1811 EFFINGHAM ST	Bioretention	7-ELEVEN
SIT2015-00001	C1501	1811 EFFINGHAM ST	Bioretention	7-ELEVEN
SIT2014-00032	C1430	5811 W HIGH ST	FMD	ALDI GROCERY STORE
SIT2014-00032	C1430	5811 W HIGH ST	Underground detention	ALDI GROCERY STORE
SIT2014-00030	C1428	3010 HIGH ST	Filterra	AUTOZONE STORE #6467
SIT2014-00030	C1428	3010 HIGH ST	Filterra	AUTOZONE STORE #6467
SIT2014-00030	C1428	3010 HIGH ST	Filterra	AUTOZONE STORE #6467
SIT2014-00028	C1426	4001 GREENWOOD DR	Swale	7-ELEVEN
SIT2014-00026	C1424	801 FLORIDA AVE	Underground detention	EPSILON WAREHOUSE
SIT2014-00025	C1423	1201 FREDERICK BLVD	Grass channel	AUTOBELL CAR WASH
SIT2014-00022	C1421	801 FLORIDA AVE	Underground detention	EPSILON SYSTEMS SOLUTIONS, PHASE II
SIT2014-00012	C1411	801 VICTORY BLVD	Extended dry detention	BEACH MARINE PROPERTIES
SIT2014-00011	C1410	417 COUNTY ST	Filterra	STERLING COURT
SIT2014-00011	C1410	417 COUNTY ST	Filterra	STERLING COURT
SIT2014-00011	C1410	417 COUNTY ST	Filterra	STERLING COURT
SIT2014-00010	C1409	600 WASHINGTON ST	Filterra	KING'S COURT
SIT2014-00009	C1408	1200 FREDERICK BLVD	Other	WAWA FREDERICK BLVD. AND SCOTT STREET
SIT2014-00006	C1405	5060 GREENWOOD DR	Filterra	AIRLINE MARKET PLACE
SIT2014-00002	C1402	4825 PORTSMOUTH BLVD	Infiltration	SMILEY'S HEATING AN COOLING
SIT2013-00030	C1325	1602 HODGES FERRY RD	Sheet flow	GREEN LAKES BAPTIST CHURCH
SIT2013-00029	C1324	3601 VICTORY BLVD	Bioretention	ROYAL FARMS #205
SIT2013-00029	C1324	3601 VICTORY BLVD	Filterra	ROYAL FARMS #205
SIT2013-00029	C1324	3601 VICTORY BLVD	Filterra	ROYAL FARMS #205
SIT2013-00028	C1323	3029 AIRLINE BLVD	Wetpond	HAPPY BOXES SELF STORAGE
SIT2013-00028	C1323	3029 AIRLINE BLVD	Bioretention	HAPPY BOXES SELF STORAGE
SIT2013-00026	C1321	3709 ELLIOTT AVE	Infiltration	FAIRWOOD AGAPE BAPTIST CHURCH
SIT2013-00025	C1320	3991 ELM AVE	Infiltration	COMMERCIAL SITE PLAN FOR PER PROPERTIES
SIT2013-00020	C1315	4211 COUNTY ST	Bioretention	ADDITION TO HOLIDAY HOUSE
SIT2013-00020	C1315	4211 COUNTY ST	Other	ADDITION TO HOLIDAY HOUSE
SIT2013-00011	C1308	2900 TURNPIKE RD	Dry Pond	KROGER
SIT2013-00009	C1306	200 CHEROKEE RD	Bioretention	OLIVE BRANCH BAPTIST CHURCH PARKING LOT
SIT2013-00007	B1301	1811 KING ST	Bioretention	BEHAVIORAL HEALTH SERVICES

SIT2013-00007	B1301	1811 KING ST	Bioretention	BEHAVIORAL HEALTH SERVICES
SIT2013-00004	C1304	1140 LONDON BLVD	Filterra	THE QUARTERS AT PARK VIEW
SIT2013-00004	C1304	1140 LONDON BLVD	Filterra	THE QUARTERS AT PARK VIEW
SIT2013-00001	C1301	5829 W HIGH ST	Filterra	CVS PHARMACY #10088
SIT2012-00019	C1216	SOUTH ST	Underground detention	THE WESTBURY SENIOR COTTAGES
SIT2012-00019	C1216	SOUTH ST	Bioretention	THE WESTBURY SENIOR COTTAGES
SIT2012-00019	C1216	SOUTH ST	Bioretention	THE WESTBURY SENIOR COTTAGES
SIT2012-00018	C1215	611 SIXTH ST	Filterra	HOPE VILLAGE APARTMENTS SITE IMPROVEMENTS
SIT2012-00018	C1215	611 SIXTH ST	Filterra	HOPE VILLAGE APARTMENTS SITE IMPROVEMENTS
SIT2012-00016	C1213	3410 AIRLINE BLVD	Constructed wetland	AIRLINE COMMERCE PARK
SIT2012-00016	C1213	3410 AIRLINE BLVD	Bioretention	AIRLINE COMMERCE PARK
SIT2012-00014	C1211	901 FREDERICK BLVD	Underground detention	CHICK-FIL-A
SIT2012-00014	C1211	901 FREDERICK BLVD	Filterra	CHICK-FIL-A
SIT2012-00011	C1208	4015 VICTORY BLVD	Wetpond	COOK OUT
SIT2012-00010	S1201	4300 GEORGE WASHINGTON HWY	Other	AFTON GREEN SUBDIVISION - PH 1 & 2
SIT2012-00010	S1201	4300 GEORGE WASHINGTON HWY	Other	AFTON GREEN SUBDIVISION - PH 1 & 2
SIT2012-00005	C1204	801 VICTORY BLVD	Extended dry detention	BEACH MARINE PROPERTIES
SIT2011-00041	C1128	4022 SEABOARD CT	Wetpond	4018 SEABOARD LLC OFFICE/STORAGE/WAREHOUSE
SIT2011-00039	SF1101	101 POPLAR LN	Bioretention	E&S FOR 101 POPLAR LANE
SIT2011-00037	B1101	3116 SOUTH ST	Filterra	PRHA ADMINISTRATIVE HEADQUARTERS
SIT2011-00033	PW1103	700 WASHINGTON ST	Infiltration	WASHINGTON STREET PUMP STATION
SIT2011-00033	PW1103	700 WASHINGTON ST	Swale	WASHINGTON STREET PUMP STATION
SIT2011-00027	C1123	5515 PORTSMOUTH BLVD	Infiltration	BB&T
SIT2011-00024	C1120	1009 VICTORY BLVD	Other	PARADISE CREEK NATURE PARK
SIT2011-00021	PF1102	5601 MICHAEL LN	Underground detention	CHURCHLAND ELM SCHOOL BLDG. ADDITION & PARKING ARE
SIT2011-00019	C1116	VICTORY BLVD	Dry Pond	O'REILLY AUTO PARTS
SIT2011-00019	C1116	VICTORY BLVD	Other	O'REILLY AUTO PARTS
SIT2011-00018	C1115	2512 BARCLAY AVE	Infiltration	PARKING LOT FOR THE FIARST CHURCH OF THE NAZARENE
SIT2011-00017	C1114	3555 AIRLINE BLVD	Other	DEVELOPMENT PLANS FOR CVS PHARMACY STORE 5501
SIT2011-00011	S1101	3715 AIRLINE BLVD	Dry Pond	BEDFORD PLACE SUBDIVISION PLAN
SIT2011-00009	SF1101	160 YORKSHIRE RD	Other	CBPA SITE PLAN FOR 160 YORKSHIRE ROAD
SIT2011-00008	C1107	103 CAVALIER BLVD	Bioretention	PARKING LOT EXPANSION GUILDING LIGHT APOSTOLIC CHU
SIT2011-00007	C1106	2044 VICTORY BLVD.	Extended dry detention	
SIT2011-00004	C1104	715 SUMMERS PL	Swale	EPICENTER CHURCH
SIT2011-00002	C1102	900 ELM AVE	Dry Pond	WESTBURY SPLASH PARK
SIT2010-00041	C1029	3406 JACKSON ST	Bioretention	LIBERTY NEW TESTAMENT CHURCH
SIT2010-00036	C1026	749 FLORIDA AVE	Extended dry detention	TIDEWATER STAFFING
SIT2010-00036	C1026	749 FLORIDA AVE	Extended dry detention	TIDEWATER STAFFING
SIT2010-00032	C1023	4022 SEABOARD CT	Wetpond	PORTSMOUTH HUMANE SOCIETY
SIT2010-00025	C1019	726 SOUTH ST	Infiltration	FOURTH BAPTIST CHURCH
SIT2010-00025	C1019	726 SOUTH ST	Underground Infiltration	FOURTH BAPTIST CHURCH
SIT2010-00021	C1016	ADAMS ST	Extended dry detention	PROPOSED OFFICE AND WAREHOUSE ADAMS ST.
SIT2010-00021	C1016	ADAMS ST	Filterra	PROPOSED OFFICE AND WAREHOUSE ADAMS ST.
SIT2010-00019	RW1002	ELM AVE	Dry Pond	SOUTH NORFOLK JORDAN BRIDGE
SIT2010-00016	C1013	1800 FREDERICK BLVD	Underground detention	CVS PHARMACY
SIT2010-00016	C1013	1800 FREDERICK BLVD	Other	CVS PHARMACY
SIT2010-00012	B1001	5700 HEDGEROW LN	Filterra	CHURCHLAND PRIMARY/INTERMEDIATE SCHOOL ADD'N/RENOV
SIT2010-00012	B1001	5700 HEDGEROW LN	Other	CHURCHLAND PRIMARY/INTERMEDIATE SCHOOL ADD'N/RENOV
SIT2010-00012	B1001	5700 HEDGEROW LN	Other	CHURCHLAND PRIMARY/INTERMEDIATE SCHOOL ADD'N/RENOV
SIT2010-00012	B1001	5700 HEDGEROW LN	Other	CHURCHLAND PRIMARY/INTERMEDIATE SCHOOL ADD'N/RENOV
SIT2010-00011	C1010	3119 RIVEREDGE DR	Other	3119 RIVEREDGE DRIVE E & S PLAN
SIT2010-00005	C1004	1 LEXINGTON DR	Other	LINCOLN PARK SITE AND LANDSCAPE IMPROVEMENTS
SIT2010-00005	C1004	1 LEXINGTON DR	Infiltration	LINCOLN PARK SITE AND LANDSCAPE IMPROVEMENTS
SIT2009-00041	C0927	3410 GEORGE WASHINGTON HWY	Dry Pond	PHASE 3 CONSTRUCTION PLANS RDS OF VIRGINIA
SIT2009-00041	C0927	3410 GEORGE WASHINGTON HWY	Dry Pond	PHASE 3 CONSTRUCTION PLANS RDS OF VIRGINIA
SIT2009-00035	SF0903	1506 LANE PL	Other	CPBA SITE PLAN FOR 1506 LANE PLACE
SIT2009-00030	C0919	800 WILLIAMSBURG	Dry Pond	OASIS SOCIAL MINISTRY BLDG.
SIT2009-00029	PF0904	512 SOUTH ST	Infiltration	SOUTH STREET PUMP STATION
SIT2009-00028	C0918	2620 ELMHURST LN	Dry Pond	CANADA COMPANY BUILDING ADDITION
SIT2009-00027	C0917	SOUTH ST	Filterra	SWANSON HOMES COMMUNITY CENTER PARKING LOT
SIT2009-00027	C0917	SOUTH ST	Underground detention	SWANSON HOMES COMMUNITY CENTER PARKING LOT
SIT2009-00026	C0916	1503 LONDON BLVD	Dry Pond	LONDON SHOPS
SIT2009-00022	PF0903	18 DAHLGREN AVE	Bioretention	JAMES HURST ELEMENTARY SCHOOL PHASE 2
SIT2009-00010	C0906	1600 SOUTH ST	Underground detention	SOUTH BAY APARTMENTS
SIT2009-00010	C0906	1600 SOUTH ST	Infiltration	SOUTH BAY APARTMENTS
SIT2009-00008	B0901	132 BYERS AVE	Bioretention	SIMONSDALE ELEMENTARY SCHOOL

SIT2009-00008	B0901	132 BYERS AVE	HMD	SIMONSDALE ELEMENTARY SCHOOL
SIT2009-00008	B0901	132 BYERS AVE	Vegetated roof	SIMONSDALE ELEMENTARY SCHOOL
SIT2009-00008	B0901	132 BYERS AVE	Permeable pavement	SIMONSDALE ELEMENTARY SCHOOL
SIT2009-00007	C0905	3500 TOWNE POINT RD	Wetpond	ROYAL FARMS CONVENIENCE
SIT2009-00003	C0901	3340 WEST NORFOLK RD	Bioretention	E & S PLAN -BASF CORPORATION INC
SIT2008-00057	C0836	4211 COUNTY ST	Infiltration	ADDITION TO COTTAGES AT HOLIDAY HOUSE
SIT2008-00056	C0835	2901 TURNPIKE RD	Wetpond	SEABOARD SQUARE (FORMERLY CLARKE MANOR)
SIT2008-00056	C0835	2901 TURNPIKE RD	Bioretention	SEABOARD SQUARE (FORMERLY CLARKE MANOR)
SIT2008-00054	C0833	3801 KING ST	Bioretention	ADVANCE FUNERAL FUNDING
SIT2008-00051	RW0804	FAWKES ST	Wetpond	EBONY HEIGHTS NEIGHBORHOOD PHASE I IMPROVEMENTS
SIT2008-00051	RW0804	FAWKES ST	Wetpond	EBONY HEIGHTS NEIGHBORHOOD PHASE I IMPROVEMENTS
SIT2008-00051	RW0804	FAWKES ST	Swale	EBONY HEIGHTS NEIGHBORHOOD PHASE I IMPROVEMENTS
SIT2008-00045	C0826	445 CHESTNUT ST	Dry Pond	PROPOSED PARKING LOT QUEEN AND CHESTNUT ST
SIT2008-00044	C0825	2602 AIRLINE BLVD	Permeable pavement	CINGULAR WIRELESS
SIT2008-00043	M0801	3401 TURNPIKE RD	Wetpond	
SIT2008-00042	M0605	3993 TWIN PINES RD	Bioretention	TWIN PINES CONDOMINIUMS
SIT2008-00042	M0605	3993 TWIN PINES RD	Bioretention	TWIN PINES CONDOMINIUMS
SIT2008-00038	C0821	3950 BURTONS POINT RD	Permeable pavement	VANE BROTHERS PARADISE CREEK WATEFRONT REHABILITAT
SIT2008-00037	S0802	GODWIN ST	Wetpond	WESTBURY-JEFFRY WILSON PHASE 2
SIT2008-00027	PF0803	1401 CRAWFORD PKWY	Extended dry detention	PARK VIEW ELEM. PARKING ADDITION
SIT2008-00023	C0813	1445 CENTRE AVE	FMD	FIRST BAPTIST CHURCH ADDITION
SIT2008-00022	C0627	SEVENTH ST	Wetpond	PARKING LOT MASSIMO ZANETTI
SIT2008-00021	C0812	3340 WEST NORFOLK RD	Grass channel	AGGREGATE CAP INSTALLATION (FORMER EIMCO AREA) BAS
SIT2008-00021	C0812	3340 WEST NORFOLK RD	Other	AGGREGATE CAP INSTALLATION (FORMER EIMCO AREA) BAS
SIT2008-00020	C0811	4916 WEST NORFOLK RD	Dry Pond	CHURCHLAND HOUSE
SIT2008-00020	C0811	4916 WEST NORFOLK RD	Dry Pond	CHURCHLAND HOUSE
SIT2008-00016	C0810	1401 MASCOTT ST	Underground detention	CHRISTIAN ANTIOCK COMMUNITY OUTREACH CHURCH
SIT2008-00015	C0809	403 RAPIDAN ST	Dry Pond	NEW TESTAMENT BAPTIST CHURCH
SIT2008-00014	C0731	3245 PORTSMOUTH BLVD	Infiltration	KEBCO CONSTRUCTION ENTERPRISES
SIT2008-00014	C0731	3245 PORTSMOUTH BLVD	Other	KEBCO CONSTRUCTION ENTERPRISES
SIT2008-00014	C0731	3245 PORTSMOUTH BLVD	Other	KEBCO CONSTRUCTION ENTERPRISES
SIT2008-00014	C0731	3245 PORTSMOUTH BLVD	Other	KEBCO CONSTRUCTION ENTERPRISES
SIT2008-00013	C0808	2900 TANBARK LN	Bioretention	2900 TANBARK LANE CBPA SITE PLAN
SIT2008-00013	C0808	2900 TANBARK LN	Dry swale	2900 TANBARK LANE CBPA SITE PLAN
SIT2008-00013	C0808	2900 TANBARK LN	Infiltration	2900 TANBARK LANE CBPA SITE PLAN
SIT2008-00009	C0805	16 CRAWFORD CIR	Bioretention	VIRGINIA RAILROAD MUSEUM
SIT2008-00008	S0801	1501 KING ST	Dry Pond	WESTBURY, JEFFRY WILSON PH 1 & 2
SIT2008-00005	C0802	2206 VICTORY BLVD	Filtterra	AAAA SELF STORAGE
SIT2008-00005	C0802	2206 VICTORY BLVD	Filtterra	AAAA SELF STORAGE
SIT2008-00003	M0604	HOWARD ST	Wetpond	CRESCENT PLACE APARTMENTS - HOWARD AND HICKORY ST.
SIT2008-00001	C0748	4025 SEABOARD CT	Wetpond	WAREHOUSE FACILITY-GREENWOOD INDUSTRIAL PARK
SIT2008-00001	C0748	4025 SEABOARD CT	Filtterra	WAREHOUSE FACILITY-GREENWOOD INDUSTRIAL PARK
SIT2008-00001	C0748	4025 SEABOARD CT	Swale	WAREHOUSE FACILITY-GREENWOOD INDUSTRIAL PARK
SIT2007-00060	C0746	3525 TOWNE POINT RD	Extended dry detention	TOWNE POINT SHOPPES
SIT2007-00059	C0745	620 LINCOLN ST	Extended dry detention	BCR PROPERTIES PORTCENTRE COMMERCE PARK
SIT2007-00058	C0743	3400 WESTERN BRANCH BLVD	Filtterra	FIRST TEAM TOYOTA
SIT2007-00058	C0743	3400 WESTERN BRANCH BLVD	Swale	FIRST TEAM TOYOTA
SIT2007-00055	M0704	542 CHEROKEE RD	Bioretention	BELLE HALL APARTMENTS
SIT2007-00055	M0704	542 CHEROKEE RD	Bioretention	BELLE HALL APARTMENTS
SIT2007-00055	M0704	542 CHEROKEE RD	Bioretention	BELLE HALL APARTMENTS
SIT2007-00055	M0704	542 CHEROKEE RD	Dry Pond	BELLE HALL APARTMENTS
SIT2007-00051	C0739	2716 AIRLINE BLVD	Filtterra	MCDONALDS
SIT2007-00049	C0738	3029 AIRLINE BLVD	Wetpond	HAPPY BOXES SELF STORAGE CO
SIT2007-00048	C0737	PORTCENTER PKWY	Other	HOLIDAY INN AT PORT CENTRE AND CRAWFORD CONNECTOR
SIT2007-00048	C0737	PORTCENTER PKWY	Other	HOLIDAY INN AT PORT CENTRE AND CRAWFORD CONNECTOR
SIT2007-00048	C0737	PORTCENTER PKWY	Bioretention	HOLIDAY INN AT PORT CENTRE AND CRAWFORD CONNECTOR
SIT2007-00047	C0736	715 WASHINGTON ST	Bioretention	715,719,723 WASHINGTON ST. RESIDENTIAL SITE PLAN
SIT2007-00047	C0736	715 WASHINGTON ST	Infiltration	715,719,723 WASHINGTON ST. RESIDENTIAL SITE PLAN
SIT2007-00046	C0735	3959 GARWOOD AVE	Extended dry detention	GREENWOOD DRIVE SELF STORAGE
SIT2007-00045	S0701	ALABAMA AVE	Wetpond	NEW GOSPORT M&N
SIT2007-00045	S0701	ALABAMA AVE	Wetpond	NEW GOSPORT M&N
SIT2007-00045	S0701	ALABAMA AVE	Wetpond	NEW GOSPORT M&N
SIT2007-00045	S0701	ALABAMA AVE	Wetpond	NEW GOSPORT M&N
SIT2007-00044	C0734	3300 ELMHURST LN	Dry Pond	KALMAR SHOP BLDG. ADDITION
SIT2007-00043	C0733	2 HARPER AVE	Bioretention	LID RETROFIT - EARL INDUSTRIES
SIT2007-00043	C0733	2 HARPER AVE	Bioretention	LID RETROFIT - EARL INDUSTRIES
SIT2007-00043	C0733	2 HARPER AVE	Constructed wetland	LID RETROFIT - EARL INDUSTRIES

SIT2007-00043	C0733	2 HARPER AVE	Wet swale	LID RETROFIT - EARL INDUSTRIES
SIT2007-00042	S0601	GREENWOOD DR	Wetpond	NEWPORT PHASE 1B, SECTION 2
SIT2007-00041	C0712	5100 DEEP CREEK BLVD	Other	PROPOSED RESIDENTIAL SUBDIVISION
SIT2007-00040	S0702	RIVER POINTE PKWY	Wetpond	FIRST WATCH AT RIVER POINTE
SIT2007-00038	C0732	2306 AIRLINE BLVD	Extended dry detention	SALVATION ARMY
SIT2007-00037	B0705	459 PERRY ST	Other	DEMO & E&S PLAN FOR 459 PERRY ST.
SIT2007-00037	B0705	459 PERRY ST	Other	DEMO & E&S PLAN FOR 459 PERRY ST.
SIT2007-00034	S0703	5315 W HIGH ST	Swale	SUBDIVISION OF HONEYSUCKLE COVE
SIT2007-00033	C0727	900 PORTSMOUTH BLVD	Dry Pond	MT. SINAI CHURCH ADDITION
SIT2007-00032	C0725	1116 COUNTY ST	Underground detention	PHOEBUS SQUARE APARTMENTS
SIT2007-00032	C0725	1116 COUNTY ST	Other	PHOEBUS SQUARE APARTMENTS
SIT2007-00030	B0703	4934 W HIGH ST	Wetpond	CHURCHLAND LIBRARY
SIT2007-00027	C0723	361 EFFINGHAM ST	Bioretention	SB - 361 EFFINGHAM STREET
SIT2007-00018	C0717	4813 PORTSMOUTH BLVD	Swale	PROPOSED OFFICE/SHOP
SIT2007-00014	C0710	1125 VICTORY BLVD	Wetpond	COMMERCIAL READY MIX PRODUCTS
SIT2007-00014	C0710	1125 VICTORY BLVD	Swale	COMMERCIAL READY MIX PRODUCTS
SIT2007-00012	S0602	3711 TURNPIKE RD	Underground Infiltration	E&S PLAN VAUGHN (FORMERLY EMPIRE ESTATES)
SIT2007-00011	C0709	3120 TYRE NECK RD	Bioretention	COMMUNICATIONS TOWER FOR VERIZON WIRELESS
SIT2007-00010	C0708	3927 VICTORY BLVD	Dry Pond	BOJANGLES
SIT2007-00008	C0707	700 PORTCENTRE PKWY	Infiltration	OFFICE/WAREHOUSE 700 PORTCENTRE PARKWAY
SIT2007-00008	C0707	700 PORTCENTRE PKWY	Swale	OFFICE/WAREHOUSE 700 PORTCENTRE PARKWAY
SIT2007-00007	C0706	500 LINCOLN ST	Dry Pond	
SIT2007-00006	M0701	304 HATTON ST	Bioretention	HATTON STREET TRIPLEX TOWNHOMES
SIT2006-00039	C0647	2401 TURNPIKE RD	Extended dry detention	WOODFIN OIL WATCHCARD SITE
SIT2006-00037	M0606	3820 KING ST	Filterra	
SIT2006-00037	M0606	3820 KING ST	Filterra	
SIT2006-00037	M0606	3820 KING ST	Underground detention	
SIT2006-00036	C0645	3325 FREDERICK BLVD	Extended dry detention	BUILDING ADD. FOR RDS OF VIRGINIA
SIT2006-00035	B0601	260 ELM AVE	Extended dry detention	PARK VIEW ELEMENTARY SCHOOL
SIT2006-00034	C0644	3614 RACE ST	Shallow Marsh	HOLLIS MEDICAL OFFICE BUILDING
SIT2006-00033	C0643	3300 AIRLINE BLVD	Wetpond	SYKES' TRUCKING CENTER
SIT2006-00029	C0638	3505 TYRE NECK RD	Bioretention	3505 TYRE NECK ROAD
SIT2006-00029	C0638	3505 TYRE NECK RD	Bioretention	3505 TYRE NECK ROAD
SIT2006-00027	C0636	3708 ADAMS ST	Underground Infiltration	PROPOSED WAREHOUSE PHASE 2
SIT2006-00027	C0636	3708 ADAMS ST	Swale	PROPOSED WAREHOUSE PHASE 2
SIT2006-00027	C0636	3708 ADAMS ST	Swale	PROPOSED WAREHOUSE PHASE 2
SIT2006-00020	C0624	4024 COAST GUARD BLVD	Extended dry detention	APM TERMINALS SERVICE YARD
SIT2006-00020	C0624	4024 COAST GUARD BLVD	Extended dry detention	APM TERMINALS SERVICE YARD
SIT2006-00020	C0624	4024 COAST GUARD BLVD	Extended dry detention	APM TERMINALS SERVICE YARD
SIT2006-00017	C0620	2917 QUEEN ST	Dry Pond	PARKING LOT EXPANSION MT. HERMAN BAPTIST CHURCH
SIT2006-00011	C0611	4005 VICTORY BLVD	Wetpond	WAWA FOOD MARKET
SIT2006-00009	C0610	16 HARPER AVE	Swale	MODULAR BUILDING ADDITION FOR CROFTON DIVING CORP
SIT2006-00005	C0606	3600 BAMBOO RD	Infiltration	PARKING LOT ADDITION FOR NEW BEREAN BAPTIST CHURCH
SIT2006-00003	C0604	TALLWOOD DR	Wetpond	E&S VMASC, TRI-CITIES, & MAST
SIT2005-00046	C0545	3504 SHIPWRIGHT ST	Swale	E & S PLAN WESTERN BRANCH DIESEL
SIT2005-00045	C0535	3600 ELM AVE	Extended dry detention	CARGO LOGISTICS
SIT2005-00043	C0540	900 PORTCENTRE PKWY	Dry Pond	
SIT2005-00043	C0540	900 PORTCENTRE PKWY	Dry Pond	
SIT2005-00042	C0539	4900 W HIGH ST	Extended dry detention	YMCA OF PORTSMOITH
SIT2005-00042	C0539	4900 W HIGH ST	Extended dry detention	YMCA OF PORTSMOITH
SIT2005-00035	C0536	3208 TYRE NECK RD	Extended dry detention	CLEANARAMA
SIT2005-00030	C0533	1000 APM TERMINALS BLVD	Extended dry detention	MAERSK TEMPORARY CONCRETE PLANT
SIT2005-00027	C0530	3615 VICTORY BLVD	Dry Pond	UNITED HOUSE OF PRAYER FOR ALL PEOPLE
SIT2005-00027	C0530	3615 VICTORY BLVD	Dry Pond	UNITED HOUSE OF PRAYER FOR ALL PEOPLE
SIT2005-00021	C0525	4246 PORTSMOUTH BLVD	Dry Pond	PROPOSED TIRE CENTER.535
SIT2005-00019	C0523	3310 DEEP CREEK BLVD	Dry Pond	PARKING LOT ADDITION MT. CARMEL BAPTIST CHURCH
SIT2005-00019	C0523	3310 DEEP CREEK BLVD	Dry Pond	PARKING LOT ADDITION MT. CARMEL BAPTIST CHURCH
SIT2005-00018	C0522	926 CHEROKEE RD	Extended dry detention	WEST PARK CHURCH OF CHRIST BUILDING ADDITION
SIT2005-00016	C0518	800 PORTCENTRE PKWY	Underground detention	800 PORTCENTRE PARKWAY
SIT2005-00016	C0518	800 PORTCENTRE PKWY	Underground detention	800 PORTCENTRE PARKWAY
SIT2005-00013	C0515	4025 SEABOARD CT	Underground detention	WAREHOUSE FACILITY GREENWOOD INDUSTRIAL PARK
SIT2005-00009	C0510	4007 SEABOARD CT	Dry Pond	LOT 11 GREENWOOD INDUSTRIAL PARK, PHASE 2 4007 SEA
SIT2005-00007	C0507	1000 APM TERMINALS BLVD	Wetpond	MAERSK TERMINAL YARD SITE PLAN
SIT2005-00007	C0507	1000 APM TERMINALS BLVD	Wetpond	MAERSK TERMINAL YARD SITE PLAN
SIT2005-00004	C0505	801 VICTORY BLVD	Extended dry detention	BEACH MARINE SERVICES
SIT2005-00001	C0501	115 CAVALIER BLVD	Bioretention	GUIDING LIGHT APOSTOLIC CHURCH OF CHRIST

SIT2005-00001	C0501	115 CAVALIER BLVD	Bioretention	GUIDING LIGHT APOSTOLIC CHURCH OF CHRIST
SIT2004-00059	C0435	3325 FREDERICK BLVD	Extended dry detention	3325 FREDERICK BLVD
SIT2004-00057	C0434	3728 CENTENARY RD	Swale	CHURCHLAND NORTH BAPTIST CHURCH
SIT2004-00056	C0432	2503 WOODROW ST	Bioretention	WOODROW STREET OFFICE/WAREHOUSE
SIT2004-00054	C0433	100 NOBLE ST	Dry Pond	BLDG. ADDITION FOR NOBLE STREET BAPTIST CHURCH
SIT2004-00050	C0426	ADAMS ST	Infiltration	OFFICE TRAILERS & GRAVEL STORAGE LOT
SIT2004-00045	C0411	2219 FREDERICK BLVD	Wetpond	BAYSIDE HARLEY-DAVIDSON
SIT2004-00042	C0409	1201 LONDON BLVD	Other	SURPRISING PIZZA (DOMINOS)
SIT2004-00038	M401	303 EFFINGHAM ST	Other	
SIT2004-00032	0317	3100 FREDERICK BL	Extended dry detention	BUILDING EXPANSION FOR SUPERIOR MARBLE AND STONE,
SIT2004-00032	0317	3100 FREDERICK BL	Infiltration	BUILDING EXPANSION FOR SUPERIOR MARBLE AND STONE,
SIT2004-00029	C0313	1703 SEVENTH ST	Extended dry detention	PREMIER COPPER & BRASS
SIT2004-00025		5601 MICHAEL LA	Underground Infiltration	CHURCHLAND ELE. SCHOOL ADDITION
SIT2004-00024	C0312	5914 HIGH ST	Wetpond	ECKERD
SIT2004-00022	C0214	30 CLAREMONT DR	Extended dry detention	MIRACLE OF FAITH BAPTIST CHURCH
SIT2004-00016	C0405	2906 ELMHURST LN	Other	EAST COAST AUTO TRANSPORT
SIT2004-00014	C0404	4916 WEST NORFOLK RD	Dry Pond	CHURCHLAND HOUSE ADDITION
SIT2004-00014	C0404	4916 WEST NORFOLK RD	Dry Pond	CHURCHLAND HOUSE ADDITION
SIT2004-00013	C0402	5755 PORTSMOUTH BL	Dry Pond	SONIC DRIVE-IN
SIT2004-00012	C0403	4408 WEST NORFOLK RD	Extended dry detention	K-2MART
SIT2004-00012	C0403	4408 WEST NORFOLK RD	Extended dry detention	K-2MART
SIT2004-00008	C0327	910 SEVENTH ST	Swale	PORTSMOUTH CHRISTIAN OUTREACH CENTER
SIT2004-00008	C0327	910 SEVENTH ST	Swale	PORTSMOUTH CHRISTIAN OUTREACH CENTER
SIT2004-00005	S0304	3110 AIRLINE BL	Dry Pond	KINGS GATE CROSSING
SIT2003-00008	B03001	313 CHOATE ST	Dry Pond	FREDERICK BLVD BOOSTER PUMP FACILITY
SIT2003-00007	M0303	3400 GLASGOW ST	Wetpond	WHISPERING OAKS
SIT2003-00006	C0322	3400 WESTERN BRANCH BL	Extended dry detention	WAWA
SIT2003-00003	C0318	2001 LAIGH RD	Extended dry detention	AMERICAN FUNERAL SUPPLIES
SIT2001-00001		3671 GATEWAY DR 23703	Extended dry detention	AMERICAN CLASSIC SELF STORAGE
SIT1999-C0023		2906 ELMHURST LN	Wetpond	EAST COAST AUTO TRANSPORT (2906 ELMHURST LANE)
SIT1999-C0017		CAVALIER BL	Extended dry detention	TEDDY BEAR LEARNING CENTER (1218 CAVALIER BLVD.)
SIT1999-C0014		UNKNOWN	Extended dry detention	CSXI-PINNERS POINT RAIL LOADING IMP.- 1 HARPERS AV
SIT1999-C0013		UNKNOWN	Infiltration	PORTSMOUTH METAL STAMPING, INC.
SIT1999-C0007		UNKNOWN	Swale	FRATERNAL ORDER OF POLICE PARKING
SIT1998-C0029		UNKNOWN	Shallow Marsh	CAROLINA FIRE CONTROL
SIT1998-C0023		926 CHEROKEE RD	Extended dry detention	WEST PARK CHURCH OF CHRIST, PARKING LOT
SIT1998-C0023		926 CHEROKEE RD	Swale	WEST PARK CHURCH OF CHRIST, PARKING LOT
SIT1998-C0013		UNKNOWN	Extended dry detention	MID-ATLANTIC BELLCOM
SIT1998-C0013		UNKNOWN	Swale	MID-ATLANTIC BELLCOM
SIT1998-C0012		UNKNOWN	Wetpond	SOCIAL SERVICES FACILITY
SIT1998-C0010		2710 COLUMBUS AV	Wetpond	ST. MARK'S MISSIONARY BAPTIST CHURCH
SIT1998-C0010		2710 COLUMBUS AV	Wetpond	ST. MARK'S MISSIONARY BAPTIST CHURCH
SIT1998-C0009		UNKNOWN	Extended dry detention	GROVE PARK BAPTIST CHURCH, RODMAN AVE
SIT1997-C0034		2430 GRAHAM ST 237046232	Infiltration	TRINITY TEMPLE CHURCH , GRAHAM ST
SIT1997-C0028		UNKNOWN	Extended dry detention	MOUNT SINAI CHURCH
SIT1997-C0028		UNKNOWN	Extended dry detention	MOUNT SINAI CHURCH
SIT1997-C0018		UNKNOWN	Swale	FOSTER FUNERAL HOME PARKING EXPANSION
SIT1997-C0016		UNKNOWN	Swale	MONUMENTAL UNITED METHODIST CHURCH QUEEN ST.
SIT1997-C0006		UNKNOWN	Swale	WESTERN BRANCH METALS, WESLEY ST.
SIT1997-C0006		UNKNOWN	Extended dry detention	WESTERN BRANCH METALS, WESLEY ST.
SIT1995-C0019		UNKNOWN	Infiltration	IMAGE CONTRACTING- BEECHDALE COMM. PARK
SIT1995-C0016		UNKNOWN	Swale	SAINT ANDREWS UNITED METHODIST CHURCH
SIT1995-C0014		UNKNOWN	Infiltration	B & R CONSTRUCTION WAREHOUSE
SIT1994-C0018		UNKNOWN	Infiltration	EFFINGHAM COMFORT INN

## **Part I.D TMDL Action Plan and Implementation**

### **Part I.D.1.b)**

#### **Chesapeake Bay Watershed TMDL Planning**

*“No later than 24 months after the effective date of this state permit (July 1, 2018), the permittee shall develop and submit to the Department for its review and approval a phased Chesapeake Bay TMDL Action Plan...”*

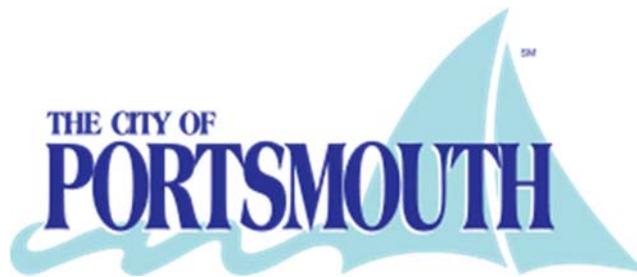
The Chesapeake Bay TMDL Action Plan has been developed and is attached below.

### **Part I.D.1.c)**

#### **Chesapeake Bay Action Plan Implementation**

*“The permittee shall implement the TMDL action plan required in Part I.D.1.b)1) of this state permit according to the schedule therein.”*

# CHESAPEAKE BAY TMDL ACTION PLAN



City of Portsmouth, VA  
Permit No. VA0088668

June 19, 2018

Prepared by Arcadis

# CONTENTS

1	Introduction .....	4
2	Legal Authority for TMDL Implementation .....	5
2.1	Current Program and Existing Legal Authority .....	5
2.2	New or Modified Legal Authority .....	6
2.3	Means and Methods to Address Discharges from New Sources.....	6
3	Pollutant loads and required reductions .....	7
3.1	Definition of the MS4 Service Area .....	7
3.1.1	Summary of MS4 Outfall Delineation Methodology .....	8
3.1.2	Summary of Current MS4 Boundary.....	8
3.2	Baseline Annual Pollutant Loads.....	9
3.2.1	Land Cover within the MS4 Service Area .....	10
3.2.2	Baseline Pollutant Load Calculations.....	11
3.3	Pollutant of Concern Required Reductions .....	11
3.4	Additional Source Loads and Required Reductions.....	12
4	Means and Methods to meet required reductions .....	13
4.1	Historical BMPs .....	14
4.2	Redevelopment BMPs.....	15
4.3	Capital Improvement Projects (1 <sup>st</sup> Permit Cycle) .....	16
4.3.1	Victory Boulevard Level II Wet Pond Retrofit.....	17
4.3.2	Churchland Wet Swale .....	19
4.3.3	Beaton Drive Level I Wet Pond .....	21
4.3.4	Court Street Green Streets .....	23
4.3.5	Green Lake #3 Wet Pond .....	25
4.3.6	Current CIP Budget and Schedule.....	28
4.4	Implementation Schedule and Estimated Costs .....	28
5	Public Comment Process .....	29
6	Conclusions .....	29
7	Limitations.....	29

## TABLES

Table 1. Breakdown of 2009 Land Use in City MS4 Service Area .....	10
Table 2. Existing Source Loads from City MS4 Service Area.....	11
Table 3. First Permit Cycle Pollutant Reduction Requirements.....	12
Table 4. First Permit Cycle Pollutant Reduction Requirements with additional 15% reduction.....	13
Table 5. Summary of Planned Projects and Historic BMPs for 1 <sup>st</sup> Permit Cycle .....	14
Table 6. Summary of Load Reduction Credits from Historic BMPs .....	15
Table 7. Summary Load Reduction Credits from Redevelopment BMPs.....	16
Table 8. Summary of Load Reduction Credits for Victory Boulevard Level II Wet Pond Project .....	18
Table 9. Summary of Load Reduction Credits for Churchland Wet Swale Retrofit .....	20
Table 10. Summary of Load Reduction Credits for Beaton Drive Wet Pond.....	22
Table 11. Summary of Load Reduction Credits for Court Street Green Streets.....	24
Table 12. Summary of Load Reduction Credits for Green Lake.....	26
Table 13. Summary of Annual Budgets for Storm Water Fund .....	28
Table 14. Estimated Costs for Design and Construction of Projects Included .....	28

## FIGURES

Figure 1. City of Portsmouth .....	4
Figure 2. City of Portsmouth MS4 Service Area .....	9
Figure 3. Locations of 1st Permit Cycle CIP Projects .....	17
Figure 4. Victory Boulevard Level II Wet Pond Retrofit Drainage Area .....	18
Figure 5. Churchland Wet Swale Retrofit Drainage Area .....	20
Figure 6. Beaton Drive Level I Wet Pond Drainage Area .....	22
Figure 7. Court Street Green Streets Rendering .....	24
Figure 8. Green Lake #3 Wet Pond Drainage Area .....	26

## APPENDICES

- A City of Portsmouth MS4 Program: Task 2.4 Outfall Service Area Delineation
- B City of Portsmouth MS4 Program: Task 4.2 Setting the Baseline
- C City of Portsmouth MS4 Program: Pollutant Reductions from Historical and Redevelopment Stormwater Best Management Practices

# 1 INTRODUCTION

The City of Portsmouth (City) has developed this Chesapeake Bay Total Maximum Daily Load (TMDL) Action Plan (Plan) for the Chesapeake Bay nutrients and sediment TMDL, as required by the Virginia Stormwater Management Program (VSMP) Individual Municipal Separate Storm Sewer System (MS4) Permit (Permit No. VA0088668), which was effective on July 1, 2016 and expires on June 30, 2021. This Plan was developed to comply with the Chesapeake Bay TMDL Special Condition (Part 1.D of the Permit) and is required to be submitted to the Virginia Department of Environmental Quality (DEQ) no later than 24 months after the effective date of the Permit (by July 1, 2018). The DEQ Chesapeake Bay TMDL Action Plan Guidance Memo (DEQ Guidance Memo)<sup>1</sup> was used to prepare this Plan, which is the first of three permit terms of Chesapeake Bay TMDL Action Plans to be developed by the City to document the planned reductions of total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) in order to achieve compliance with permit-required load reduction goals.

The City is located within the James River Basin in coastal Virginia and has a total land area of 33 square miles, as shown in Figure 1. The City is bordered on the west by the City of Suffolk, on the south and west by the City of Chesapeake, on the north by the James River, and on the east by the City of Norfolk.

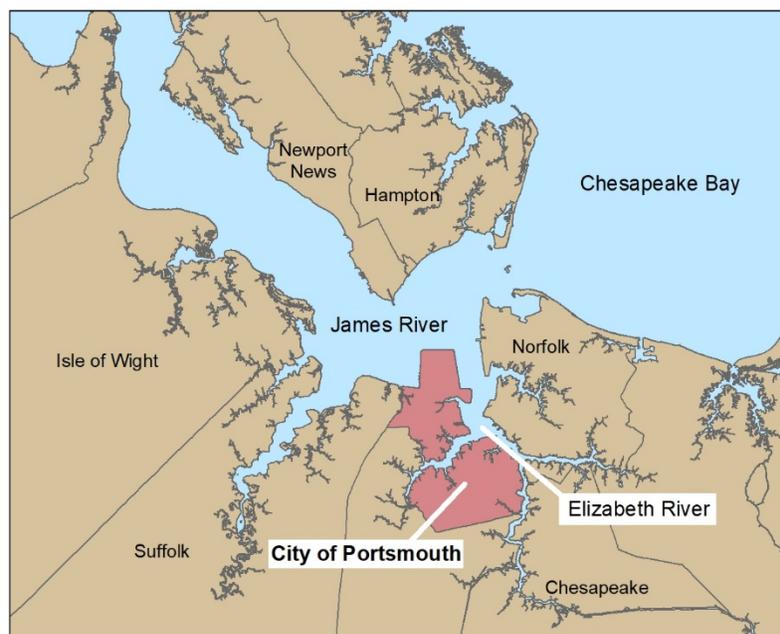


Figure 1. City of Portsmouth

This Plan is organized as follows to address specific MS4 Permit requirements:

- Section 2: Legal Authority for TMDL Implementation:
  - Current Program and Existing Legal Authority (Permit Section I.D.1.b(1b))
  - New or Modified Legal Authority (Permit Section I.D.1.b(1c))
  - Means and Methods to Address Discharges from New Sources (Permit Section I.D.1.b(1-c))

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<sup>1</sup> Virginia DEQ Guidance Memo No. 15-2005, dated May 18, 2015

- Section 3: Pollutant Loads and Required Reductions:
  - Definition of the MS4 service area
  - Baseline Annual Pollutant Loads (Permit Section I.D.1.b(1d))
  - Pollutant of Concern Required Reductions (Permit Section I.D.1.b(1e))
  - Additional Source Loads and Required Reductions (Permit Section I.D.1.b(1f), Section I.D.1.b(1g))
- Section 4: Means and Methods to Meet Required Reductions
  - Historic Best Management Practices (BMPs)
  - Redevelopment BMPs
  - Capital Improvement Projects (1st Permit Cycle) (Permit Section I.D.1.b(1c))
  - Implementation Schedule and Estimated Costs (Permit Section I.D.1.b(1f), Section I.D.1.b(1h))
  - Public Comment Process and Comment Received (Permit Section I.D.1.b(1i), Section I.D.1.b(1j))
  - Conclusions
- Section 5: Public Comment Process
- Section 6: Conclusions
- Section 7: Limitations

## 2 LEGAL AUTHORITY FOR TMDL IMPLEMENTATION

Under the City’s MS4 Permit’s Special Condition for the Chesapeake Bay TMDL, the City of Portsmouth is required to:

- Conduct a review of its currently implemented MS4 program that includes review of the City’s existing legal authorities and the City’s ability to ensure compliance with the Special Condition
- Identify any new or modified legal authority that the City has implemented or needs to implement in order to meet the conditions of the Special Condition

Compliance with the Special Condition represents adequate progress during the current MS4 Permit term towards achieving TMDL waste load allocations consistent with the assumptions and requirements of the Chesapeake Bay TMDL. The Special Condition further defines the compliance expectations for Chesapeake Bay TMDL Action Plan implementation to the maximum extent practicable as well as demonstrating adequate progress. Relevant existing legal authorities include ordinances, permits, orders, contracts, inter-jurisdictional agreements and other enforceable mechanisms.

### 2.1 Current Program and Existing Legal Authority

The City of Portsmouth Department of Engineering and Technical Services, Stormwater Compliance is responsible for the overall implementation of the MS4 Permit and reporting requirements. The City has adopted a MS4 Program Plan that documents its capabilities for implementation of all MS4 Permit requirements, including the programmatic and legal authorities required to meet the Chesapeake Bay TMDL Special Condition. The full MS4 Program Plan can be found online at <https://www.portsmouthva.gov/DocumentCenter/View/3202/MS4-Program-Plan>. The following components of the City’s MS4 Program will be utilized to meet the Special Condition:

- The Stormwater Management Ordinance (Chapter 31.2), Erosion and Sediment Control Ordinance (Chapter 11), Chesapeake Bay Preservation Act Ordinance (Chapter 9.1), Water, Sewers and Sewage Disposal Ordinance (Chapter 38), Fire Prevention Code (Chapter 13), and Garbage and Refuse Code (Chapter 16) provide the authority to control pollutant discharges to the MS4.
- The City has authority as authorized by state law and as stated in local ordinances, including options for escalating enforcement steps as appropriate in the City's exercise of its enforcement discretion as the regulator of covered third party activities. Local enforcement authority includes:
  - Stormwater Management Ordinance (Chapter 31.2): see § 31.2-21. Enforcement and § 31.2-23. Pollution of the Stormwater System.
  - Erosion and Sediment Control Ordinance (Chapter 11): see § 11-7. Violations, Penalties, Legal Remedies.
  - Water, Sewers, and Sewage Disposal Ordinance (Chapter 38): see § 38-2. Violations of Chapter.
  - Fire Prevention Code (Chapter 13): § 13-83. Enforcement and § 13-84. Violations.
  - Chesapeake Bay Preservation Act Ordinance (Chapter 9.1): § 9.1-13. Enforcement
- Contracts and interjurisdictional agreements:
  - To the extent authorized by state law, the City has authority to enter and carry out contracts and, in event of breach of any contract by a counterparty, to enforce such contracts according to the provisions.
- The City has authority to conduct inspections and monitoring related to implementing the permit requirements, including but not limited to:
  - Stormwater Management Ordinance (Chapter 31.2): § 31.2-13. Monitoring and Inspections.
  - Erosion and Sediment Control Ordinance (Chapter 11): § 11-6. Monitoring, Reports and Inspections.
  - Water, Sewers and Sewage Disposal Ordinance (Chapter 38): § 38-53. Right of entry and access to premises.
  - Fire Prevention Code (Chapter 13): § 8.1-9. Investigation.
  - City Portsmouth Code of Ordinances

## **2.2 New or Modified Legal Authority**

No new legal authority or modifications to the existing legal authority are necessary in order to meet the Special Condition requirements.

## **2.3 Means and Methods to Address Discharges from New Sources**

The MS4 Permit requires that the means and methods that will be utilized to address discharges into the MS4 from new sources be described in the Plan. New sources, by definition, means pervious and impervious urban land uses served by the MS4 that are developed or redeveloped on or after July 1, 2009.

The City's Stormwater Management Ordinance was developed from the model ordinance provided by DEQ and was reviewed and approved by DEQ. New sources within the City are required to utilize an average land cover of 16 percent or less for the design of post-development stormwater management facilities in accordance with the Stormwater Management Ordinance (Chapter 31.2). Subdivision and site plans submitted to the City are reviewed by DEQ-certified Plan Reviewers within the City's Engineering &

Technical Services Department to insure compliance with all applicable ordinances. BMP maintenance agreements are required for each development or single-family homes that require BMPs, and BMPs are inspected by City personnel at least once a year. In addition, the City has required that all development and redevelopment meet the 16 percent average land cover condition as part of the Chesapeake Bay Preservation program since 2014.

### 3 POLLUTANT LOADS AND REQUIRED REDUCTIONS

The calculation of pollutant loads and first permit cycle required reductions of nutrients and sediment (Pollutants of Concern) was based on the MS4 service area that was delineated in accordance with the definition of *Regulated Land*, which refers to the conveyances and drainage area served by the permittee's MS4. This section includes the following:

- **Definition of the MS4 Service Area:** This section includes a brief description of the methodology followed to define the MS4 service area, including excluded areas and sources of data used in the delineation.
- **Baseline Annual Pollutant Loads:** This section includes the breakdown of baseline (2009) land use within the MS4 service area and the TN, TP and TSS loads from regulated lands based on the 2009 Edge of Stream (EOS) loading rates for the James River Basin that are included in Table 1 of the City's MS4 Permit.
- **Pollutant of Concern Required Reductions:** This section includes the first permit cycle TN, TP and TSS reductions that must be achieved based on the 2009 land use within the MS4 service area, and the first permit cycle reduction loading rates contained in Tables 1 and 2 of the MS4 Permit. Note that since the MS4 Permit supersedes the DEQ Guidance Memo (GM 15-2005) and also contains more precise loading rates, the rates presented in the permit are used in the calculations presented in this plan.
- **Additional Source Loads and Required Reductions:** This section includes information about grandfathered projects and increased loads from new sources initiating construction between July 1, 2009 and June 30, 2014.

#### 3.1 Definition of the MS4 Service Area

The City of Portsmouth is required to map their MS4 service area and each MS4 outfall, and maintain a database of outfall information, including:

- Individual identification (ID) number
- Local watershed name
- Sixth order Hydrologic Unit Code (HUC) and receiving water
- Latitude and longitude in decimal degrees

The MS4 service map and outfall information were submitted to DEQ in electronic format by December 30, 2017. The City consulted with CH2M, Inc. (CH2M) in 2017 to develop the outfall service area delineation. A copy of the Technical Memorandum prepared to document the methodology and results of this effort is included in **Appendix A**.

### **3.1.1 Summary of MS4 Outfall Delineation Methodology**

An ESRI-automated ArcGIS software tool, ArcHydro, was used to update the outfall drainage area delineations that were developed in the 1990's and recently updated using Light Detection and Ranging (LiDAR) data. LiDAR data allows for better topographic resolution, which aids in drainage area delineation. CH2M in coordination with the City developed a digital elevation model (DEM), based on the latest LiDAR data, for use with ArcHydro.

The drainage areas were categorized to help optimize the outfall service area analysis. Each drainage area was identified as being located within or outside the preliminary MS4 service area boundary. If the drainage area was located outside the boundary, it was removed from the analysis. If the drainage area was located within the preliminary MS4 service boundary, it was designated as flowing or not flowing to an outfall. Drainage areas that were determined as flowing to an outfall were given a downstream outfall ID as provided in the LGIM. When drainage area runoff flowed directly into a stream it was noted in the Outfall ID attribute field. Small drainage areas assigned to the same outfall ID were merged to create a larger total service area for each designated outfall.

New MS4 outfalls were added for storm sewer outfall pipes or ditches found in the field and not included in the City's GIS data. New MS4 outfalls were also added for streets that do not have a pipe or ditch outfall. For street drainage systems that consist of curb and gutter, a MS4 outfall was added in the GIS at the street centerline where the street gutters end and the runoff discharges by sheet flow to surface waters. For streets that do not have curb and gutter, a MS4 outfall point was added at the low point of the street where the runoff would sheet flows to surface waters. The outfall information required by the MS4 Permit including watershed name, sixth order HUC, and latitude and longitude was added to the GIS data for submittal to DEQ.

### **3.1.2 Summary of Current MS4 Boundary**

The total MS4 service area is approximately 13,842 acres and there are 560 MS4 outfalls. The MS4 service area boundary and the MS4 outfalls are shown on Figure 2. The VDOT and Navy properties were excluded from the City's MS4 service area and the MS4 interconnection points were identified, when possible.

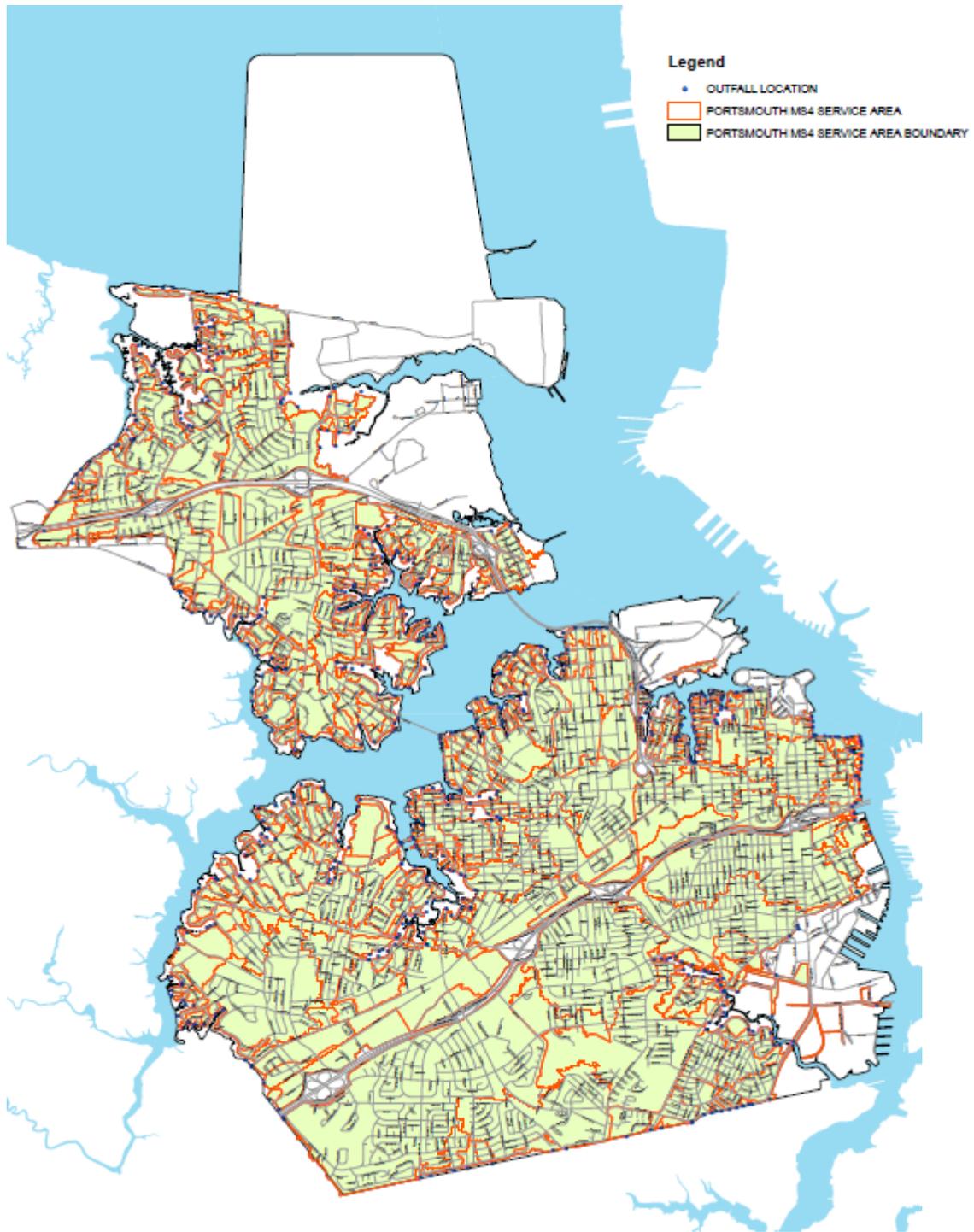


Figure 2. City of Portsmouth MS4 Service Area

### 3.2 Baseline Annual Pollutant Loads

The baseline (2009) annual pollutant loading rates, as documented in the City's MS4 Permit and the DEQ Guidance Memo, were estimated by the Chesapeake Bay Program using the Watershed Model Phase

5.3.2. The annual pollutant loads were calculated using the 2009 land cover conditions within the delineated MS4 service area.

### 3.2.1 Land Cover within the MS4 Service Area

City-maintained impervious cover GIS files were used to estimate the total acreage of impervious cover within the MS4 boundary. The impervious cover layer included building footprints and paved areas such as roads, driveways, and parking lots. The digital geospatial land cover data were not available for the year 2009; therefore, land cover data from the year 2013 was used and modified to account for land cover changes between 2009 and 2013.

Land cover categories that may qualify for exclusion under the Chesapeake Bay TMDL Special Condition guidance are: lands regulated under any general or individual VPDES permit that addresses industrial stormwater, lands regulated under any general or individual VSMP permit for MS4s, forested land, agricultural lands, wetlands, and open waters.

The Virginia Information Technologies Agency (VITA) and construction data provided by the City was used to identify forest land cover within the City of Portsmouth. These data were further refined to isolate those forested areas that are a minimum tree density of 30 meters by 30 meters (900 square meters) in size. Per the DEQ Guidance Memo, forested areas that are 900 square meters or greater in size can be excluded from the urban cover calculations.

Properties with active individual and general VSMP and VPDES permits in 2017 were removed from the MS4 service boundary submitted to the Virginia DEQ in December 2017. These areas include properties owned by the Navy, Wheelabrator, Third Capital Inc., P-Town Recycling, Chesapeake, and the Virginia Department of Transportation.

The United States Fish and Wildlife Service National Wetlands Inventory (NWI) for Virginia was used to identify the wetland locations in the City. The wetlands data is dated 2017 and was vetted for accuracy to 2009 conditions by comparing it to 2009 VITA imagery in GIS. All stormwater best management practices (BMPs) from 2009 that could be classified as open water were identified and excluded from the regulated lands.

A breakdown of the land cover within the City’s MS4 service area is included in Table 1. The technical memorandum, prepared by CH2M, which documents the detailed methodology followed to develop the breakdown of 2009 land use within the City’s MS4 service area is provided in **Appendix B**.

Table 1. Breakdown of 2009 Land Use in City MS4 Service Area

Land Cover within MS4 Service Area	Total Acres
Regulated Urban Impervious	6,345.51
Regulated Urban Pervious	6,989.73
Forested Land, Wetlands and Open Water Area*	506.72
<b>Total MS4 Service Area</b>	<b>13,841.86</b>

\*Areas excluded from baseline loading and reduction calculations

### 3.2.2 Baseline Pollutant Load Calculations

The 2009 regulated impervious and pervious cover presented in Table 1 along with the pollutant loading rates from the City's MS4 Permit were used to calculate the 2009 baseline pollutant loading for TN, TP and TSS. Table 2 contains the estimated total TN, TP and TSS loads based on the 2009 Progress Run.

Table 2. Existing Source Loads from City MS4 Service Area

Subsource	Pollutant	Total Existing Acres Served by MS4 (6/30/2009)	2009 EOS Loading Rate (lbs/ac/yr)	Estimated Total POC Load Based on 2009 Progress Run (lb/yr)	Total POC Load (lb/yr)
Regulated Urban Impervious	Nitrogen	6,345.51	9.574666034	60,756.12	108,592.16
Regulated Urban Pervious		6,989.73	6.843763814	47,836.04	
Regulated Urban Impervious	Phosphorus	6,345.51	1.786015931	11,333.18	14,802.39
Regulated Urban Pervious		6,989.73	0.496330705	3,469.22	
Regulated Urban Impervious	Total Suspended Solids	6,345.51	703.4240675	4,463,583.07	5,188,862.57
Regulated Urban Pervious		6,989.73	103.763636	725,279.49	

Note: Detail information on loading rates can be found in Appendix B

### 3.3 Pollutant of Concern Required Reductions

The pollutant load reduction rates in the City of Portsmouth MS4 Permit were used to calculate the required pollutant reduction requirements for the first permit cycle. As specified in the Virginia Phase I Watershed Improvement Plan, the required first-phase pollutant reductions are 5 percent of the total required reductions specified in the L2 scoping run. The second permit cycle will require an additional 35 percent of the total reduction goal and the third permit cycle will require the reduction of the remaining 60 percent of the total goal. The City has developed projects to achieve the required pollution reductions for the first permit phase as detailed in Section 4 of this Plan. The total required reductions and first-phase reductions, for the City's MS4 service area are identified in Table 3.

**Table 3. First Permit Cycle Pollutant Reduction Requirements**

Subsource	Pollutant	Total Existing Acres Served by MS4 (6/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr)	Total Reduction Required for First Permit Cycle by Subsource (lbs/yr)	Total Reduction Required for First Permit Cycle (lbs/yr)
Regulated Urban Impervious	Nitrogen	6,345.51	0.043085977	273.40	416.91
Regulated Urban Pervious		6,989.73	0.020531291	143.51	
Regulated Urban Impervious	Phosphorous	6,345.51	0.014288127	90.67	103.24
Regulated Urban Pervious		6,989.73	0.001799199	12.58	
Regulated Urban Impervious	TSS	6,345.51	7.034240675	44,635.83	47,808.93
Regulated Urban Pervious		6,989.73	0.453965907	3,173.10	

Note: Detail information on loading rates can be found in Appendix B

### 3.4 Additional Source Loads and Required Reductions

In addition to the required pollution reductions for existing development, the City must account for any increased pollutant loads from new sources (Special Condition 6 and grandfathered projects (Special Condition 7). For the first permit cycle Plan, the City is required to provide additional treatment to remove 15 percent of the net increase in pollutant loads from new sources initiating construction between July 1, 2009 and June 30, 2014 and grandfathered projects, in accordance with 9 VAC 25-870-48.

Special Condition 6 and Special Condition 7 are MS4 Permit requirements that apply to all projects that initiated construction between July 1, 2009, and June 30, 2014, meeting the following requirements:

- Greater than 1 acre land disturbance;
- Increase in the pollutant loads from existing condition; and
- An impervious land cover condition greater than 16 percent for the design of post-development stormwater management facilities

To account for the additional loads from new sources constructed between July 1, 2009 and June 30, 2014 and grandfathered projects with a final impervious land cover condition greater than 16 percent, the City must reduce an additional 15% of their first permit cycle reduction requirements.

The City has required that all new projects meet the 16 percent land cover requirements since 2014, as indicated in the Legal Authority Review in Section 2. Thus, no projects require additional pollutant load reductions under Special Condition 6 or Special Condition 7 as defined in the City's MS4 Permit.

As stated in the City's MS4 permit, the means and methods to reduce an additional 15% from the first permit load reduction obligation is used to offset increased loads from new sources initiating construction between July 1, 2009 and June 30, 2014 and grandfathered projected in accordance with 9 VAC 25-870-48, that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post development stormwater management facilities. This

results in 0.75% increase in load reduction from the first permit cycle load reduction obligation. Table 4 below shows the revised reduction required with the additional 15% reduction.

**Table 4. First Permit Cycle Pollutant Reduction Requirements with additional 15% reduction**

Subsource	Pollutant	Total Existing Acres Served by MS4 (6/30/09)	Reduction Required for Existing Sources for First Permit Cycle by Subsource (lbs/yr)	Reduction Required for Existing and New Sources with Additional 15% Reduction for First Permit Cycle by Subsource (lbs/yr)	Total Reduction Required for Existing and New Sources for First Permit Cycle (lbs/yr)
Regulated Urban Impervious	Nitrogen	6,345.51	273.40	314.41	479.45
Regulated Urban Pervious		6,989.73	143.51	165.03	
Regulated Urban Impervious	Phosphorous	6,345.51	90.67	104.27	118.73
Regulated Urban Pervious		6,989.73	12.58	14.46	
Regulated Urban Impervious	TSS	6,345.51	44635.83	51,331.21	54,980.27
Regulated Urban Pervious		6,989.73	3173.10	3,649.06	

## 4 MEANS AND METHODS TO MEET REQUIRED REDUCTIONS

The City's MS4 Permit requires that the Plan identify the means and methods to meet the required nutrient and sediment reductions for the first permit cycle. The means and methods used by the City to meet the first-phase required reductions include the construction of structural best management practices (BMPs) and as well as the accounting for historical BMPs that were constructed within the MS4 service area between January 1, 2006 and July 1, 2009. The pollutant load reduction calculations that are presented in this Plan follow the DEQ approved methodologies contained in the DEQ Guidance Memo and the loading rates found in the DEQ MS4 permit. Table 6 includes a summary of the first permit cycle projects, the total calculated nutrient and sediment reduction credits, and the location of detailed information and calculations within this Plan. All reductions above the required first permit cycle goals will be applied to the second permit cycle requirements, as documented in Table 5.

Table 5. Summary of Planned Projects and Historic BMPs for 1<sup>st</sup> Permit Cycle

Project Name	TN Load Reduction (lbs/yr)	TP Load Reduction (lbs/yr)	TSS Load Reduction (lbs/yr)	Location of Detailed Information
Victory Blvd Level II Wet Pond BMP Retrofit	49.20	16.05	4,151.64	Section 4.3.1
Churchland Wet Swale	13.60	0.85	793.63	Section 4.3.2
Beaton Drive Level I Wet Pond	25.86	7.28	4,050.36	Section 4.3.3
Court Street Green Street	31.65	5.52	2,804.03	Section 4.3.4
Green Lake #3 Wet Pond	80.02	20.35	20521.941	Section 4.3.5
<b>1<sup>st</sup> Permit Cycle Reductions from Projects</b>	<b>200.33</b>	<b>50.05</b>	<b>32,321.57</b>	
Reductions from Historic BMPs	117.89	34.01	19,335.59	Section 4.1
Reductions from Redevelopment BMPs	169.69	45.88	22,416.54	Section 4.2
<b>1<sup>st</sup> Permit Cycle Reductions from BMPs</b>	<b>287.58</b>	<b>79.89</b>	<b>41,752.13</b>	
<b>Total Reductions Provided</b>	<b>487.91</b>	<b>129.94</b>	<b>74,073.70</b>	
<b>Total Required Reductions</b>	<b>479.45</b>	<b>118.73</b>	<b>54,980.27</b>	
<b>Credit Carried Over to 2<sup>nd</sup> Permit Cycle</b>	<b>8.46</b>	<b>11.21</b>	<b>19,093.43</b>	

## 4.1 Historical BMPs

The DEQ Guidance Memo states that permittees may receive credit for previously unreported BMPs that were installed on or after January 1, 2006 and prior to July 1, 2009. The following information must be included in the first Chesapeake Bay TMDL Action Plan in order to receive credit for these BMPs:

- An affirmative statement that a complete list, to the maximum extent practicable, of historic BMPs was submitted to the DEQ by September 1, 2015.
- Appropriate calculations for the BMPs that the permit is claiming credit towards its required POC load reductions.

The City of Portsmouth submitted to DEQ a list of 62 BMPs that were constructed between January 1, 2006 and July 1, 2009 by the September 1, 2015 deadline. The list received from the DEQ with the 62 sites with BMPs installed between 2006 and 2009. A new list of historical BMPs was assembled using the City's Tidemark data with the assumption that any BMPs determined to qualify as historical BMPs would have been included on the City's original list. The new list has 30 BMPs installed between 2006 and 2009. Each BMP was evaluated for pollutant reduction capacity using the techniques outlined in the Guidance, Appendix V.A. The Chesapeake Bay Program (CBP) efficiencies were applied to this set of BMPs as the current Virginia Stormwater BMP Clearinghouse (Clearinghouse) design criteria were not implemented until 2015. A summary of the credits received from Historic BMPs are shown in Table 6 below.

**Table 6. Summary of Load Reduction Credits from Historic BMPs**

Type of Historic BMPs	Number of BMPs	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	TSS Reduction (lbs/yr)
Bioretention	5	3.2	0.9	399.41
Dry Pond	3	1.45	0.48	185.23
Enhanced Detention	1	1.12	0.19	218.5
Extended Dry Detention	5	22.13	3.94	4,712.84
Filtrerra	2	2.73	0.67	335.06
Grass Swale	3	0.61	0.09	185.38
Infiltration	1	8.28	1.48	630.91
Other (Storm Filter)	1	0.08	0.14	12.06
Wet Pond	9	78.29	26.12	12,656.2
<b>Total</b>	<b>30</b>	<b>117.89</b>	<b>34.01</b>	<b>19,335.59</b>

## 4.2 Redevelopment BMPs

Part III.3.1. of the DEQ Guidance Memo states that permittees may claim credits for pollutant reductions resulting from redevelopment projects completed after July 1, 2009. The City considers ‘redevelopment’ as construction on prior developed lands. Properties that have had demolition activity but were not developed within 5 years of that activity are considered new development. All redevelopment activities for which a BMP was installed result in a reduction in POC loads, so all BMPs installed for redevelopment after July 1, 2009 are included in the pollutant reduction calculations.

A list was compiled of all BMPs installed in the City after July 1, 2009. This list was checked against all construction in the City between 2004 and 2018, for construction activities at the same site address to determine if the demolition occurred within 5 years of the BMP construction.

After the redevelopment sites were identified, data was collected for the POC loading calculations for the BMP drainage areas. Data to complete pollutant load reductions was gathered from Tidemark and site plans (when available) and supplemented with GIS BMP data and aerial photography when necessary. Each site was considered individually for impervious cover within the BMP drainage area and BMP type. BMP type was then correlated with a practice from the CBP or Clearinghouse to assign a reduction efficiency. Efficiencies from both the CBP and Clearinghouse were compared and either the CBP or Clearinghouse efficiency was applied based on available data, and which efficiency provided the highest nutrient removal. BMPs installed before the implementation of the current Clearinghouse types in 2015

were assessed using only CBP efficiencies. The Clearinghouse does not provide TN removal efficiencies for proprietary BMPs, nor TSS efficiencies for any BMPs, so CBP efficiencies were used in these cases. Table 7 provides a summary of the pollutant reduction credits that the City can claim for redevelopment BMPs that were constructed after July 1, 2009.

**Table 7. Summary Load Reduction Credits from Redevelopment BMPs**

	Total TN Credit (lbs/yr)	Total TP Credit (lbs/yr)	Total TSS Credit (lbs/yr)
Bioretention C/D soils, underdrain	32.91	9.01	4,050.87
Dry Detention Ponds	1.93	0.71	276.11
Dry Detention Ponds and Hydrodynamic Structures	6.69	4.88	556.93
Dry Extended Detention Ponds	12.8	2.15	2,445.23
Filtering Practices	42.01	11.24	5,820.85
Infiltration Practices w/o Sand, Veg.	2.81	0.5	213.9
Permeable Pavement w/o Sand, Veg. - A/B soils, underdrain	9.8	1.49	733.54
Permeable Pavement w/o Sand, Veg. - C/D soils, underdrain	3.62	0.76	417.74
Vegetated Open Channels A/B soils, no underdrain	11.98	1.2	544.18
Vegetated Open Channels C/D soils, no underdrain	2.81	0.51	986.16
Wet Ponds and Wetlands	42.33	13.43	6371.03
<b>Total</b>	<b>169.69</b>	<b>45.88</b>	<b>22,416.54</b>

### 4.3 Capital Improvement Projects (1<sup>st</sup> Permit Cycle)

Five projects have been identified by the City for this Plan:

- Victory Boulevard Level II Wet Pond Retrofit
- Churchland Wet Swale
- Beaton Drive Wet Pond
- Court Street Green Streets
- Green Lakes Level I Wet Pond

These projects consist of new BMPs and retrofits to existing BMPs. The projects were constructed after June 30, 2009, or are currently in planning, design, or construction. In total, these projects exceed the first-phase reduction requirement. All projects listed have funds approved as a part of the adopted Capital Improvement Plan (CIP), some projects have been awarded 50% funding through the Stormwater Local Assistance Fund (SLAF) and others have been approved to received funding from the Virginia Clean Water Revolving Loan Fund. The general location of all projects is shown on Figure 3, and the following sections provide details on each project and all assumptions used in the credit calculations.

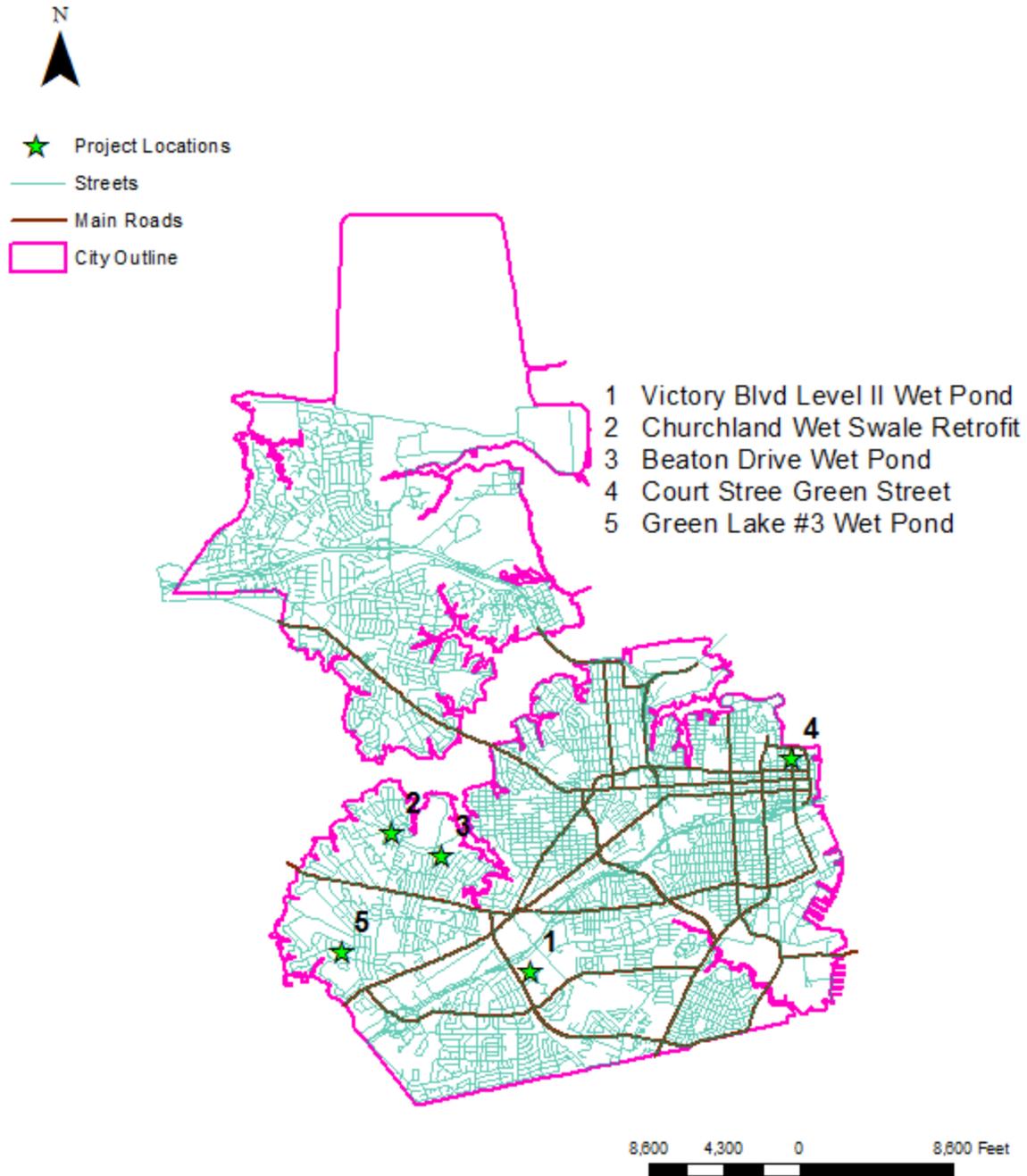


Figure 3. Locations of 1st Permit Cycle CIP Projects

#### 4.3.1 Victory Boulevard Level II Wet Pond Retrofit

This project consists of the conversion of an existing pond into a Level II Wet Pond. The existing wet pond was built in 2003 and is located on a large undeveloped lot adjacent to the Tidewater Community College (TCC) campus off Victory Boulevard. The site is owned by the City of Portsmouth Economic Development Authority, so no land acquisition is required. The contributing drainage area for the pond is 46.84 acres with 32.76 acres of impervious and 14.08 acres of managed turf. This project will address the

Chesapeake Bay TMDL and is needed to reduce pollutant loading on the Chesapeake Bay and helps restore the quality of the bay. This project will also address the City of Portsmouth's MS4 permit requirements.

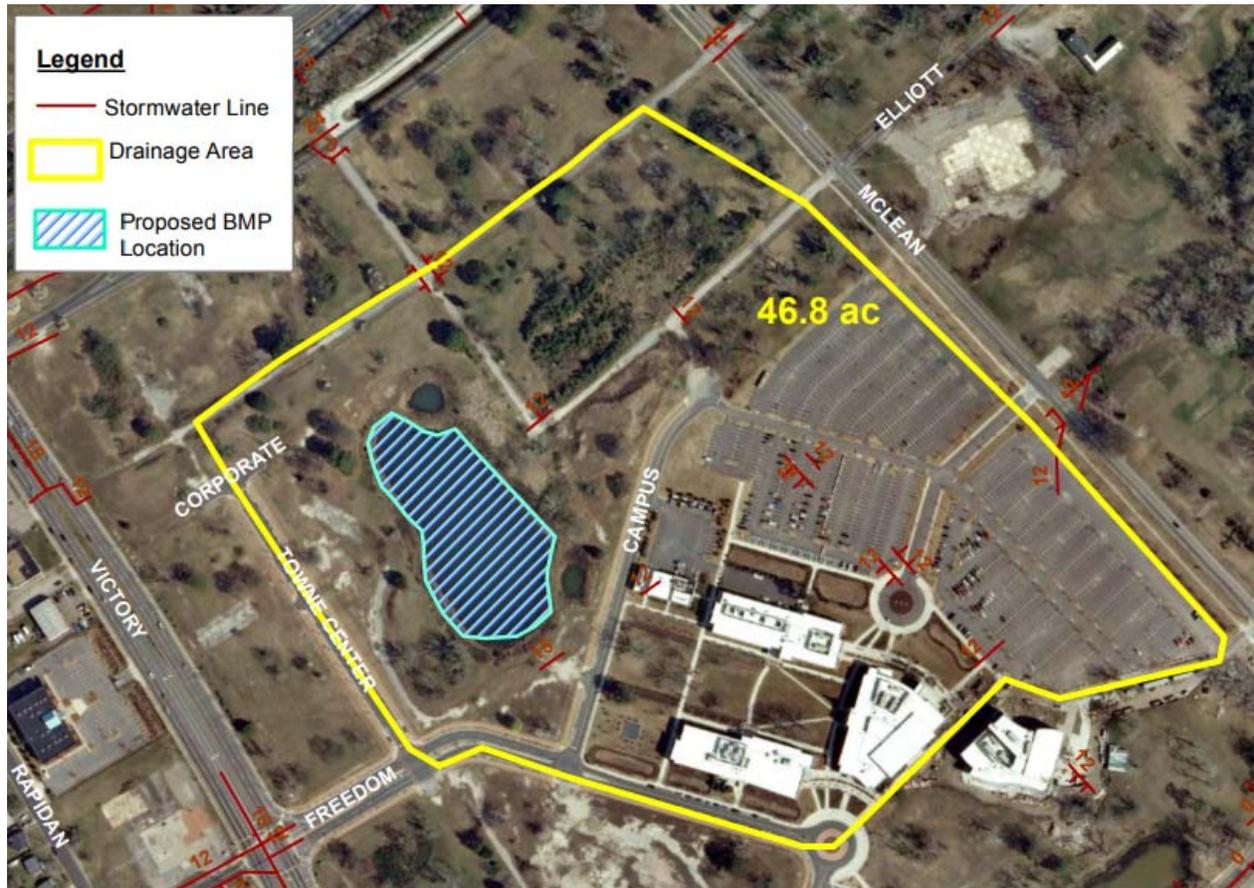


Figure 4. Victory Boulevard Level II Wet Pond Retrofit Drainage Area

Table 8. Summary of Load Reduction Credits for Victory Boulevard Level II Wet Pond Project

Determine Initial Pollutant Loading	
Drainage Area (Acres)	
Impervious	32.76
Pervious	14.08
Forest	0.00
Total	46.84
Starting Loads (lbs/yr) <sup>1</sup>	
TN	410.03
TP	65.50
TSS	24,505.16

<b>Starting Efficiency<sup>2</sup></b>		
TN		20%
TP		45%
TSS		60%
<b>Downward Modification<sup>3</sup></b>		
		10%
<b>Revised Starting Efficiency</b>		
TN		18.0%
TP		40.5%
TSS		54.0%
<b>TSS Reduction Rate Calculation</b>		
Runoff Storage (acre-feet) <sup>4</sup>	RS	2.89
Impervious Acres (acres)	IA	32.76
Runoff Depth Treated (inches)	RD	1.06
<b>Restored Removal Efficiency<sup>5</sup></b>		
TN		30%
TP		65%
TSS		71%
<b>Calculate Total POC Reductions for Project</b>		
<b>Efficiency Improvement</b>		
TN		12%
TP		25%
TSS		17%
<b>Load Reduction (lbs/yr)</b>		
TN		49.20
TP		16.05
TSS		4,151.64
Notes: <sup>1</sup> EOS Loading Rate from City permit used to calculate starting loads		
<sup>2</sup> Chesapeake Bay Program Established Efficiencies for Wet Ponds for starting efficiencies		
<sup>3</sup> Used downward modification to account for missing forebays		
<sup>4</sup> Runoff Storage taken from VRRM spreadsheet		
<sup>5</sup> TN and TP Restored Efficiencies from BMP Clearinghouse, Level II Wet Pond; Retrofit Equations used for TSS		

### 4.3.2 Churchland Wet Swale

This project involves the construction of a Level II Wet Swale in the Churchland area. The existing property is an old railroad right-of-way owned by the City of Portsmouth and existing land cover consists

of managed turf and impervious. The drainage area is 8.99 acres with 1.89 of impervious and 7.10 acres of managed turf. This project will address the Chesapeake Bay TMDL and is needed to reduce pollutant loading on the Chesapeake Bay and helps restore the quality of the Bay. This project will also address the City of Portsmouth's MS4 permit requirements. There were also two city projects and one private development project that was used for additional TP reductions. The Churchland Bridge Project had required reductions of 1.15lbs/year Phosphorus, the Portside projects 0.48lbs/year and .28 lbs/year from the Cottage place projects.

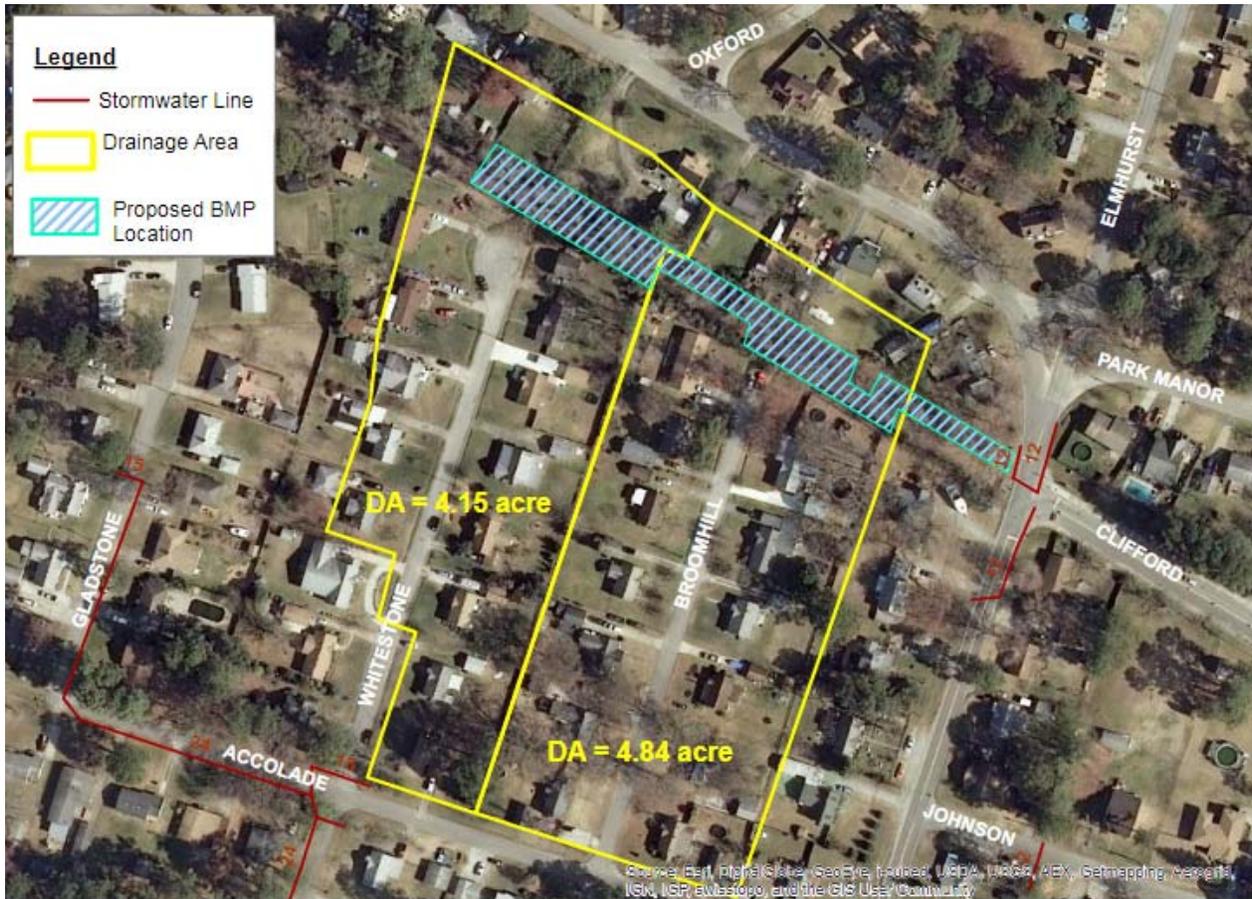


Figure 5. Churchland Wet Swale Retrofit Drainage Area

Table 9. Summary of Load Reduction Credits for Churchland Wet Swale Retrofit

Determine Initial Pollutant Loading	
Drainage Area (Acres)	
Impervious	1.89
Pervious	7.10

Forest		0.00
Total		8.99
<b>Starting Loads (lbs/yr) <sup>1</sup></b>		
TN		66.69
TP		6.90
TSS		2,066.19
<b>Calculate Total POC Reductions for Project</b>		
<b>TSS Reduction Rate Calculation</b>		
Runoff Storage (acre-feet) <sup>2</sup>	RS	0.2798
Impervious Acres (acres)	IA	1.89
Runoff Depth Treated (inches)	RD	1.78
<b>Removal Efficiency<sup>3</sup></b>		
TN		35%
TP		40%
TSS		78%
<b>Load Reduction (lbs/yr)</b>		
TN		13.60
TP		0.85
TSS		793.63
Notes: <sup>1</sup> EOS Loading Rate from City permit used to calculate starting loads		
<sup>2</sup> Runoff Storage taken from VRRM spreadsheet		
<sup>3</sup> TN and TP Restored Efficiencies from BMP Clearinghouse for Wet Swale Retrofit 2; Retrofit Equations used for TSS		

### 4.3.3 Beaton Drive Level I Wet Pond

This project consists of the construction of a new Level I Wet Pond. The new pond will be constructed on a vacant City-owned parcel at the intersection of Beaton Drive and Sykes Avenue, so no land acquisition will be required. This project will also help to address flooding issues in the neighbourhood. The contributing area for the pond is 16.4 acres of residential area with 6.24 acres of impervious and 10.16 acres of managed turf. This project will address the Chesapeake Bay TMDL and is needed to reduce pollutant loading on the Chesapeake Bay and helps restore the quality of the Bay. This project will also address the City of Portsmouth's MS4 permit requirements.



Figure 6. Beaton Drive Level I Wet Pond Drainage Area

Table 10. Summary of Load Reduction Credits for Beaton Drive Wet Pond

Determine Initial Pollutant Loading	
Drainage Area (Acres)	
Impervious	6.24
Pervious	10.16
Forest	0.00
Total	16.40
Starting Loads (lbs/yr) <sup>1</sup>	
TN	129.28
TP	16.19
TSS	5,443.60

**Calculate Total POC Reductions for Project**

**TSS Reduction Rate Calculation**

Runoff Storage (acre-feet) <sup>2</sup>	RS	0.6845
Impervious Acres (acres)	IA	6.24
Runoff Depth Treated (inches)	RD	1.32

**Removal Efficiency<sup>3</sup>**

TN	20%
TP	45%
TSS	74%

**Load Reduction (lbs/yr)**

TN	25.86
TP	7.28
TSS	4,050.36

Notes: <sup>1</sup>EOS Loading Rate from City permit used to calculate starting loads

<sup>2</sup>Runoff Storage taken from VRRM spreadsheet

<sup>3</sup>TN and TP Restored Efficiencies from BMP Clearinghouse for Wet Swale Retrofit 2; Retrofit Equations used for TSS

#### **4.3.4 Court Street Green Streets**

The City of Portsmouth has identified Court Street, located in downtown Portsmouth in the Olde Town Historic District, as an opportunity for conversion to a Green Street to improve water quality, reduce runoff volume, and enhance public space. This is a pilot project for the City to see if Green Streets could be incorporated into the downtown historic districts without impacting any of the cultural and historical features of the area. WSP has conducted a field investigation and gathered information including GIS and available survey information from the City to delineate the contributing drainage area and determine the land cover. The overall drainage area is 5.40 acres.



Figure 7. Court Street Green Streets Rendering

Table 11. Summary of Load Reduction Credits for Court Street Green Streets

<b>Determine Initial Pollutant Loading</b>			
<b>Drainage Area (acres)</b>			
		Permeable Pavers 1	Bioretention 1
Impervious		3.00	2.40
Pervious		0.00	0.00
Forest		0.00	0.00
Total		3.00	2.40
<b>Starting Loads (lbs/yr)<sup>1</sup></b>			
TN		28.72	22.98
TP		5.36	4.29
TSS		2,110.27	1688.22
<b>Determine Removal Efficiency</b>			
<b>TSS Reduction Rate Calculation</b>			
Runoff Storage (acre-feet) <sup>2</sup>	RS	0.2375	0.1900
Impervious Acres (acres)	IA	3.00	2.40
Runoff Depth Treated (inches)	RD	0.95	0.95

Removal Efficiency <sup>3</sup>			
TN	59%	64%	
TP	59%	55%	
TSS	74%	74%	
Load Reduction (lbs/yr)			TOTAL
TN	16.95	14.71	31.65
TP	3.16	2.36	5.52
TSS	1,557.81	1,246.21	2,804.03
Notes: <sup>1</sup> EOS Loading Rate from City permit used to calculate starting loads			
<sup>2</sup> Runoff Storage taken from VRRM spreadsheet			
<sup>3</sup> TN and TP Restored Efficiencies from BMP Clearinghouse for Permeable Pavers 1 and Bioretention 1, respectively;			
Retrofit Equations used for TSS			

#### 4.3.5 Green Lake #3 Wet Pond

This project is the proposed retrofit of Green Lake #3 into a Level 1 Wet Pond. The existing lake is not currently reported as BMP for the City of Portsmouth and is only achieved about 38% phosphorus removal efficiency. With dredging, bank stabilization and the addition of forebays this lake can be converted into a 50% efficient Level I wet pond. This project will also address issues with the outfall structure of the lake. This project will address the Chesapeake Bay TMDL and its need to reduce the pollutant loading on the Chesapeake Bay and helps restore the quality of the bay. It will also address the City of Portsmouth's MS4 permit requirements.

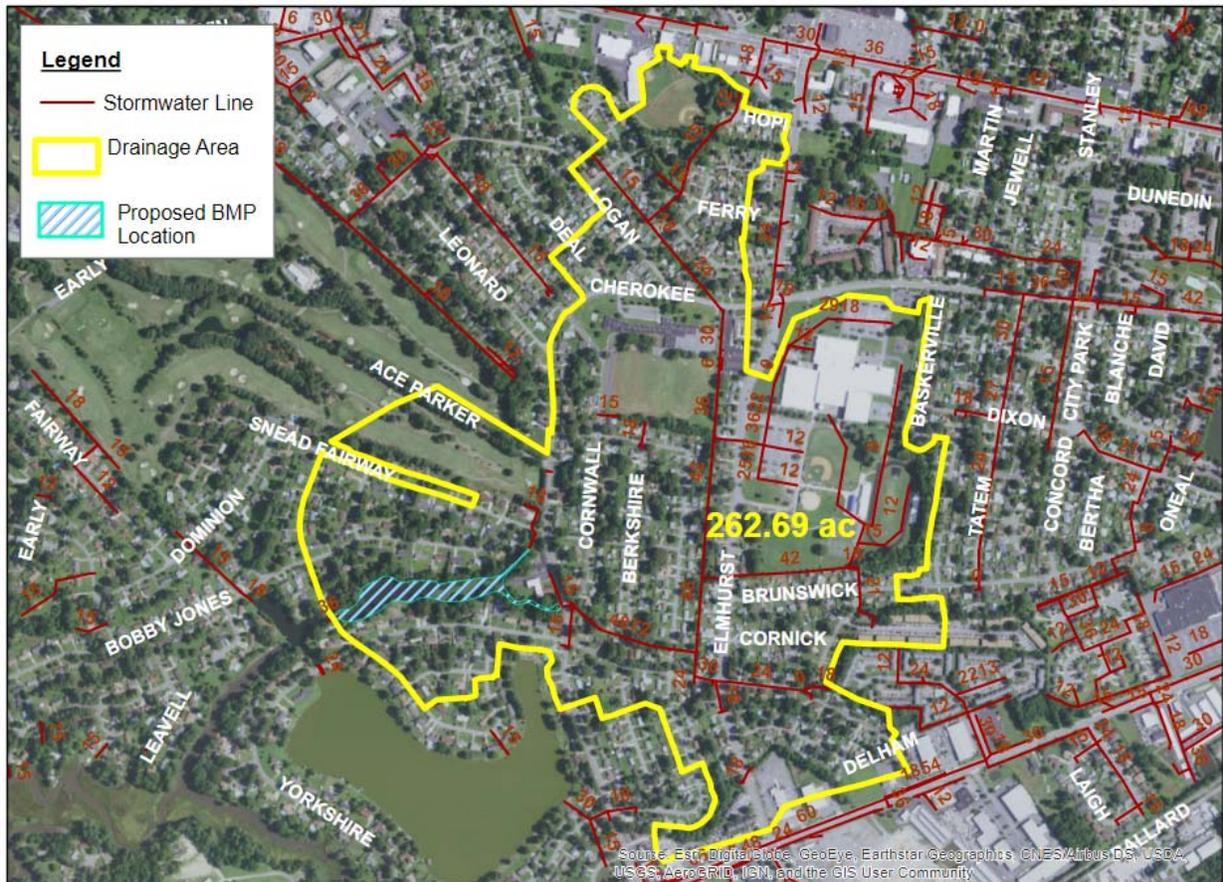


Figure 8. Green Lake #3 Wet Pond Drainage Area

Table 12. Summary of Load Reduction Credits for Green Lake

Determine Initial Pollutant Loading	
Drainage Area (acres)	
Impervious	74.23
Pervious	188.46
Forest	0.00
Total	262.69
Starting Loads (lbs/yr) <sup>1</sup>	
TN	2,000.50
TP	226.11
TSS	71,770.46

<b>Determine Removal Efficiency<sup>2</sup></b>		
<b>Starting Efficiency</b>		
TN		20%
TP		45%
TSS		60%
<b>Downward Modification<sup>3</sup></b>		
		20%
<b>Revised Starting Efficiency</b>		
TN		16.0%
TP		36.0%
TSS		48.0%
<b>TSS Reduction Rate Calculation<sup>4</sup></b>		
Runoff Storage (acre-feet)	RS	9.80
Impervious Acres (acres)	IA	74.23
Runoff Depth Treated (inches)	RD	1.58
<b>Restored Removal Efficiency</b>		
TN		20%
TP		45%
TSS		77%
<b>Calculate Total POC Reductions for Project</b>		
<b>Efficiency Improvement</b>		
TN		4%
TP		9%
TSS		29%
<b>Load Reduction (lbs/yr)</b>		
TN		80.02
TP		20.35
TSS		20,521.91
Notes: <sup>1</sup> EOS Loading Rate from City permit used to calculate starting loads <sup>2</sup> Chesapeake Bay Program Established Efficiencies for Wet Ponds for starting efficiencies <sup>3</sup> Used downward modification to account for missing forebays and volume deficiencies <sup>4</sup> Runoff Storage taken from VRRM spreadsheet, 427,010 ft <sup>3</sup> <sup>5</sup> TN and TP Restored Efficiencies from BMP clearinghouse, Level I Wet Pond; Retrofit Equations used for TSS		

### 4.3.6 Current CIP Budget and Schedule

City of Portsmouth’s budget includes a Storm Water Fund to address flooding and improve water quality. Funding is needed to address MS4 requirements, aging infrastructure and flooding projects. Table 13 shows the Storm Water Fund budgets for the last three fiscal years. The CIP is funded through a Storm Water Utility Fee. The current budget includes a \$1.25 increase to the current Equivalent Residential Unit (ERU) Rate to fund CIP projects. Per FY2018 adopted budget, both residential and commercial properties are charged \$10.50 per ERU per month. This rate is based on amount of impervious area on each property, where one ERU is 1,877 square feet of impervious area. Residential properties are charged for one ERU while commercial properties are billed on their actual amount of impervious.

**Table 13. Summary of Annual Budgets for Storm Water Fund**

Storm Water Fund Budgets	
FY 2016 Actual	\$7,178,793
FY 2017 Adopted	\$7,511,211
FY 2018 Adopted	\$9,356,434
Note: FY 2018 Adopted Budget <a href="https://www.portsmouthva.gov/DocumentCenter/View/2819/FY-2018-Adopted-Budget">https://www.portsmouthva.gov/DocumentCenter/View/2819/FY-2018-Adopted-Budget</a>	

### 4.4 Implementation Schedule and Estimated Costs

Per Sections I.D.1.b(1f) and I.D.1.b(1h) of the MS4 Permit, the Chesapeake Bay TMDL Action Plan must include an estimate of the expected costs to implement the requirements of the Chesapeake Bay Special Condition during the state permit cycle. Table 14 contains a summary of the estimated costs for design and construction of each of the projects included in this Action Plan for the first permit cycle.

**Table 14. Estimated Costs for Design and Construction of Projects Included**

Project Name	Year to Complete Construction	Total Cost <sup>1</sup>	Source of Costs
Victory Blvd Level II Wet Pond Retrofit		\$ 488,000	SLAF/VCWRLF
Churchland Wet Swale <sup>2</sup>		\$ 147,433.30	SLAF/City
Beaton Drive Wet Pond		\$ 157,200	SLAF/VCWRLF
Court Street Green Street		\$ 1,116,019	G3 Grant /VCWRLF
Green Lake #3 Level 1 Wet Pond		\$ 683,336	VCWRLF
<sup>1</sup> Costs include design and construction costs.			
<sup>2</sup> Added 30% design fee to total cost			

## 5 PUBLIC COMMENT PROCESS

A draft version of this plan was published for a public comment period of approximately four weeks and no comments were received.

## 6 CONCLUSIONS

The City developed this Chesapeake Bay TMDL Action Plan as required in the City's MS4 Permit, referenced in Section 1 of this Plan, and in accordance with the DEQ Chesapeake Bay TMDL Action Plan Guidance Document dated May 18, 2015. With this Plan the City concludes that the first permit term pollutant reduction requirements calculated in Section 3 are met by the projects and other load reductions identified in Section 4 of this Plan.

During the second permit term, the City will be required to meet an additional thirty-five percent reduction of the identified pollutants to the maximum extent practicable. The existing projects identified in this first permit cycle Plan exceed the required five percent reductions, and the additional reductions will be applied toward achieving the additional 35 percent reductions required by the second permit term. Portsmouth will evaluate street sweeping, catch basin and storm drain cleaning, tree planting and other non-structural BMPs to develop pollutant removal credits that can be applied in the second permit term. The City will continue to implement compliance projects, and the Plan will be updated as needed through dated revisions to this plan.

## 7 LIMITATIONS

This document was prepared solely for and by the City of Portsmouth in accordance with professional standards at the time the services were performed, and in accordance with the contract between the City of Portsmouth and Arcadis. This document is governed by the specific scope of work authorized by the City; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the City and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

# APPENDIX A

City of Portsmouth MS4 Program: Task 2.4 Outfall Service Area Delineation



# City of Portsmouth MS4 Program

## Task 2.4 Outfall Service Area Delineation

PREPARED FOR: Thomas Quattlebaum, City of Portsmouth  
PREPARED BY: CH2M  
DATE: March 28, 2018  
REVISION NO.: 3

The City of Portsmouth (City) is required by their MS4 Permit to map their municipal separate storm sewer system (MS4) service area and each MS4 outfall. The required information for each MS4 outfall is described in the MS4 Permit Part I.B.2.h)3) and includes:

- Individual identification (ID) number
- Local watershed name
- Sixth order Hydrologic Unit Code (HUC) and receiving water
- Latitude and longitude in decimal degrees

When new outfalls are constructed, they must be included on the City's MS4 map and the outfall information must be included in the City's outfall database. The MS4 service area map including outfall locations and outfall information are required to be submitted to the Virginia Department of Environmental Quality (DEQ) in electronic format by December 30, 2017.

### Background

Storm sewer outfall service areas, or drainage areas, are used to define the principal boundary of the MS4 service area submitted to DEQ. Initial storm sewer system geographic information system (GIS) data was collected by the City in the early 1990s and updates have been made to the storm sewer system information in the GIS in the following years. Not all of the City's storm sewer system is mapped in their GIS.

The initial GIS drainage area layer was developed approximately 20 years ago and was recently updated using Light Detection and Ranging (LiDAR) data. LiDAR data allows for better topographic resolution, which aids in drainage area delineation. The LiDAR and GIS data were organized using the ESRI ArcGIS Local Government Information Model (LGIM) and provided to CH2M HILL, Inc. (CH2M) in 2017 to use for the outfall service area delineation.

### Outfall Service Area Delineation Process

An ESRI-automated ArcGIS software tool, ArcHydro, was used to update the outfall drainage area delineations. CH2M developed a digital elevation model (DEM), based on the latest LiDAR data, for use with ArcHydro. The most recent LGIM GIS data including the street centerlines, storm sewer network, outfall locations, preliminary MS4 boundary, and previous drainage areas were used to build the DEM. The sinks, which are raster cells considered to be an area of internal drainage, were processed using the Portsmouth DEM.

After the original drainage area file was processed, the City’s storm sewer network was embedded into the DEM to create an artificial linear depression. The linear depression served to isolate the flow captured by the storm sewer network and enabled ArcHydro to assess the surface drainage flow patterns independently. The DEM was further manipulated to build up the roads to create simulated drainage area “walls,” where the DEM topology was inaccurate. After the DEM manipulation was complete, the drainage areas were delineated resulting in approximately 29,000 small drainage areas.

The drainage areas were categorized to help optimize the outfall service area analysis. Each drainage area was identified as being located within or outside the preliminary MS4 service area boundary. If the drainage area was located outside the boundary, it was removed from the analysis. If the drainage area was located within the preliminary MS4 service boundary, it was designated as flowing or not flowing to an outfall. Drainage areas that were determined as flowing to an outfall were given a downstream outfall ID as provided in the LGIM. When drainage area runoff flowed directly into a stream it was noted in the Outfall ID attribute field. Small drainage areas assigned to the same outfall ID were merged to create a larger total service area for each designated outfall. The outfall designations are described in Table 1.

**Table 1. Outfall Service Area Designations from Initial Delineation**

Category	Explanation	Designations
Outfall	Category used to determine if the drainage area is located in the preliminary MS4 service area boundary and, if so, does the drainage area flow to an MS4 outfall	Y – Yes (flows to an MS4 outfall) N – No (does not flow to an MS4 outfall) OOB – Outside of MS4 service area boundary
Outfall ID	Outfall service area is assigned the downstream outfall ID that it flows to or not assigned an outfall ID if it does not flow to an outfall	Outfall ID Number No Outfall Outside of MS4 Boundary Stream
Verification	Category used to identify outfall service areas that need field investigation or further verification due to lack of GIS information	VN – Verification needed Null – No verification needed

After the initial delineation, 544 outfall service areas were created and reviewed to determine if additional information was needed to complete the delineation. A verification attribute field was created to identify the outfall service areas that needed further field investigation to determine the correct outfall ID. After review, 43 outfall service areas were determined to need verification.

CH2M performed desktop and field verification of the outfall service areas that could not be confirmed from the initial analysis using the ArcHydro processing. Field investigation was performed to try to identify the storm sewer connectivity and outfalls for the unconfirmed service areas. During the field verification, CH2M staff located and recorded critical pipes and ditches not included in the City’s GIS data. The information from the field investigation resulted in modifications to the 43 outfall service areas and many additional adjacent outfall service areas. The modifications included combining drainage areas, reducing sheet flow areas, adding or reducing drainage area based on field verified topography, adding and relocating outfalls.

Some drainage area boundaries could not be verified in the field and will require further investigation by the City. For example, the storm sewer pipe connectivity could not be verified in some locations because a storm sewer manhole or inlet at a critical junction could not be accessed. Another example is when a pipe appeared to connect the storm sewer system to two separate MS4 outfalls and the flow direction could not be determined. At some Virginia Department of Transportation (VDOT) roadways such as the Martin Luther King Freeway, it was too hazardous to investigate the storm sewer on foot so the system connectivity could not be conclusively determined.

The outer boundary of the MS4 service area was verified and some of the outfall service areas have internal drainage boundaries that could not be verified. The VDOT and Navy properties were excluded from the City's MS4 service area and the MS4 interconnection points were identified, if possible.

Some of the MS4 outfalls identified in the initial delineation were removed because the MS4 system extended downstream and the upstream service areas could be combined. This situation occurred typically where a MS4 ditch outfall was located in the field. The pipes that discharge to City lakes and ponds identified as stormwater best management practices (BMPs) in the City's GIS data were not designated as MS4 outfalls.

New MS4 outfalls were added for storm sewer outfall pipes or ditches found in the field and not included in the City's GIS data. New MS4 outfalls were also added for streets that do not have a pipe or ditch outfall. For street drainage systems that consist of curb and gutter, a MS4 outfall was added in the GIS at the street centerline where the street gutters end and the runoff discharges by sheet flow to surface waters. For streets that do not have curb and gutter, a MS4 outfall point was added at the low point of the street where the runoff would sheet flows to surface waters. The outfall information required by the MS4 Permit including watershed name, sixth order HUC, and latitude and longitude was added to the GIS data for submittal to DEQ.

## Summary and Recommendations

The total MS4 service area is approximately 13,842 acres and there are 560 MS4 outfalls. The MS4 service area boundary and the MS4 outfalls are shown on Figure 1. The individual service areas are shown on Figure 2.

For future MS4 service area delineation coordination, the City should work with VDOT, the Navy and CSX Railroad to clarify the drainage pathways and internal MS4 connection points.

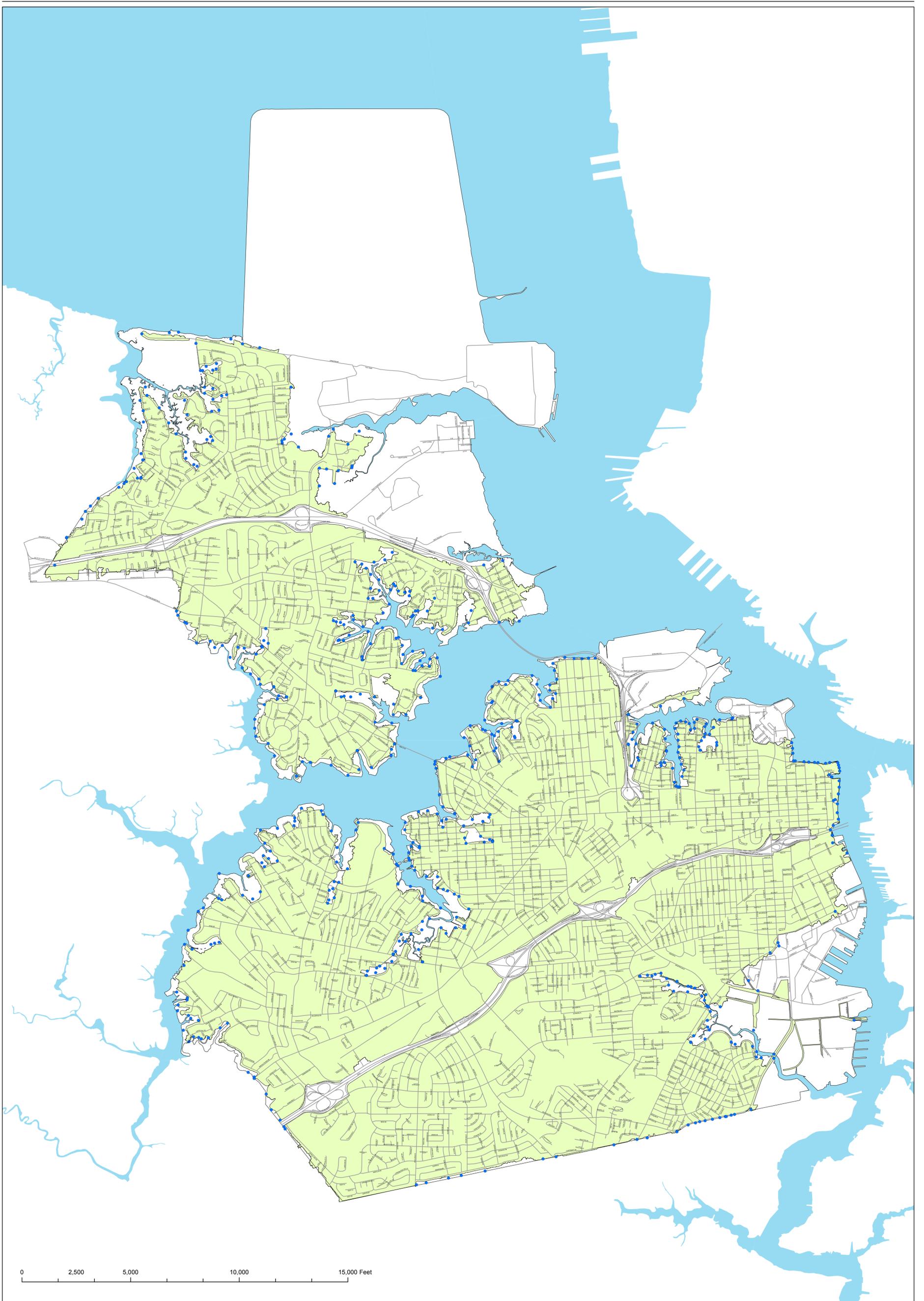
Future field investigation should be performed for those areas where the internal boundaries between service areas could not be determined. These areas include storm sewer manholes or inlets at critical junctions that could not be accessed or where dye testing may be needed to verify the system connectivity and direction of flow. The service areas requiring further field verification are listed in Table 2.

CH2M will provide the City with the field data showing the locations of structures, pipes, and ditches found during the field verification and this information may help the City in ongoing storm sewer system inventory updates.

**Table 2. MS4 Outfall Service Areas Requiring Further Investigation**

Outfall ID	Reason for Further Investigation
33	The outfall from this BMP could not be field verified.
376	Internal drainage area boundary needs to be verified.
4177	Could not determine if the storm sewer system (outfall ID 4177) is interconnected with storm sewer system to the west (outfall ID 4178); could not access MH ID 4235 in the field and upstream pipes in the field did not match the GIS data.
6161	The outfall location could not be field verified.
12557	The drainage area to the stormwater BMP with outlet pipes FacilityIDs 14279, 14280, 14281, 14282 could not be verified; the drainage area to the BMP may be part of the Outfall ID 12557 service area.
20030	Could not verify if the ditch network south of Early Drive drains to the pond to the north.
20122	Internal drainage area boundary needs to be verified.
20127	CH2M could not verify the location of this pipe outfall.
20149	This service area likely has eastern and western drainage areas that can be split; a drainage divide could not be located in the field.
20164	Streets with curb and gutter and no pipe network; internal drainage area boundary needs to be verified.
20165	Streets with curb and gutter and no pipe network; internal drainage area boundary needs to be verified.
NO OUTFALL ID_2	Storm drain gravity main (FacilityID 1100) connectivity could not be verified; designated as City MS4 service area but no outfall ID was assigned.

Figures



**Legend**

- OUTFALL LOCATION
- PORTSMOUTH MS4 SERVICE AREA BOUNDARY



**FIGURE 1**  
**MS4 Service Area Boundary**  
 Portsmouth MS4 Permit and Program



0 2,500 5,000 10,000 15,000 Feet

**Legend**

- OUTFALL LOCATION
- ▭ PORTSMOUTH MS4 SERVICE AREA
- ▭ PORTSMOUTH MS4 SERVICE AREA BOUNDARY



**FIGURE 2**  
MS4 Service Areas  
Portsmouth MS4 Permit and Program

# APPENDIX B

City of Portsmouth MS4 Program: Task 4.2 Setting the Baseline



# City of Portsmouth MS4 Program

## Task 4.2: Setting the Baseline

PREPARED FOR: Thomas Quattlebaum, City of Portsmouth  
PREPARED BY: Juliana Cammarata, EIT, CH2M  
DATE: May 9, 2018  
REVISION NO.: 2  
APPROVED BY: Shelly Frie, PE, CH2M

The City of Portsmouth (City), Virginia must meet the requirements of the Chesapeake Bay Total Maximum Daily Load (TMDL), in accordance with their Virginia Stormwater Management Program (VSMP) Municipal Separate Storm Sewer System (MS4) Permit No. VA0088668. The VPDES MS4 permit Special Condition for the Chesapeake Bay TMDL requires the City to prepare a Chesapeake Bay TMDL Action Plan and submit it to the Virginia Department of Environmental Quality (DEQ) by June 30, 2018, for review and acceptance. To assess the City's pollutant load reductions, a baseline pollutant load level for the MS4 must be established from the 2009 land cover conditions. The Chesapeake Bay TMDL Action Plan Guidance Revision (Virginia DEQ Guidance; 2015) encourages permittees to use geographic information system (GIS) resources to assess the 2009 land cover conditions of their MS4 and asks that they include a summary of their methodology in their action plan. This technical memorandum describes the methodology used to estimate the 2009 baseline pollutant load for the City's Chesapeake Bay TMDL Action Plan.

### Estimated Existing Source Loads and Calculated Total Pollutant of Concern Required Reductions

An estimate of the June 30, 2009 annual pollutant of concern (POC) loads from existing sources within the City's MS4 was calculated to serve as a baseline loading value for the TMDL Action Plan. The POCs include nitrogen, phosphorus, and total suspended solids. The size and extent of the City's MS4 was established in the Portsmouth MS4 Outfall Delineation Technical Memorandum (CH2M, 2017), and revised in March 2018. The City's MS4 drains to the James River Basin, and the City's 2009 edge of stream (EOS) loading rates for regulated urban impervious and pervious sources are listed in Table 1 in the VPDES MS4 permit (2016).

The MS4 land cover conditions for 2009 were determined using 2013 land cover data in conjunction with construction data from between the years of 2009 and 2013. The procedures for determining the 2009 land cover and calculating the 2009 POC existing loads are described in the following paragraphs.

## Establishing 2009 Land Cover Conditions

The urban impervious and pervious surfaces served by the MS4 as of June 30, 2009, were determined using GIS land cover data acquired from the Virginia Information Technologies Agency (VITA), and construction data provided by the City. The digital geospatial land cover data was not available for the year 2009; therefore, land cover data from the year 2013 was used and modified to account for land cover changes between 2009 and 2013.

Land cover polygons for categories of shrubland, grasslands/herbaceous, and pasture/hay were evaluated shape-by-shape by overlaying the 2013 land cover data with the 2009 digital orthophoto. Land cover categories that may qualify for exclusion under the Chesapeake Bay TMDL Special Condition guidance are: lands regulated under any general or individual VPDES permit that addresses industrial stormwater; lands regulated under any general or individual VSMP permit for MS4s; forested land, agricultural lands, wetlands, and open waters.

## Land Cover Exclusions

The Virginia DEQ guidance (2015) on calculating the existing POC annual loads allows for excluding the following land categories from the regulated land used in the calculation:

- Lands regulated under separate VSMP MS4 and VPDES industrial stormwater permits
- Forested lands
- Agricultural lands
- Wetlands
- Open water

Each exclusion category and how the area was evaluated are described in the subsequent sections.

## Lands Regulated Under VSMP and VPDES Permits

Properties with active individual and general VSMP and VPDES permits in 2017 were removed from the MS4 service boundary submitted to the Virginia DEQ in December 2017 and were not changed in the March 2018 boundary revision. These areas include properties owned by the Navy, Wheelabrator, Third Capital Inc., P-Town Recycling, Chesapeake, and the Virginia Department of Transportation.

## Forested Lands

The categories of deciduous and evergreen forest were combined into one shapefile, which was vetted both for correlation with the 2009 imagery, and for areas of forest qualifying under the Virginia DEQ Guidance (2015) as being excluded from the regulated lands calculations. To qualify for exclusion from the regulated lands calculations, wooded areas need to be a minimum of 30 meters by 30 meters (900 square meters) contiguous tree cover, with a density meeting the requirements discussed in Appendix V.H. of the Virginia DEQ Guidance (2015).

The forested land cover GIS layer polygons were evaluated to determine if the areas qualified under the minimum size and density requirements. The forested land cover polygons were first sorted by size. Only the forest areas meeting the minimum contiguous tree cover area were considered for exclusion. From here, the MS4 aerial was considered in sections. Wooded areas with 'holes', or with loose, spiraling forms within residential areas (see Figure 1) were interpreted as not meeting the area and density requirements of qualifying forest; therefore, they were not included in the exclusion area.

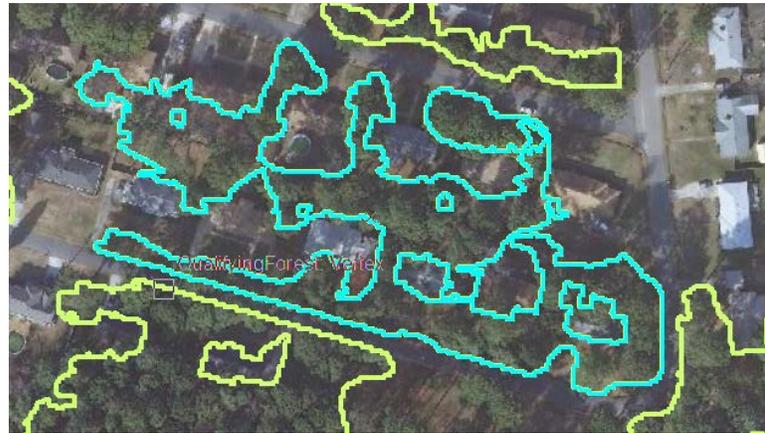


Figure 1. Example of Area with Non-Qualifying Forest

The resulting qualifying forest layer has 78 GIS polygons with a combined area of 208.08 acres of forested land deemed large enough and dense enough to qualify for exclusion from the regulated land.

### **Agricultural Lands**

The City has no agricultural lands located within its boundary, according to both the City's zoning maps and the VITA 2013 GIS land cover data. Therefore, no agriculture lands were excluded from the regulated land.

### **Wetlands and Open Water**

The United States Fish and Wildlife Service National Wetlands Inventory (NWI) for Virginia was used to identify the wetland locations in the City. The wetlands data is dated 2017, and was vetted for accuracy to 2009 conditions by comparing it to 2009 VITA imagery in GIS. The NWI data is organized by waterbody type, which includes Estuarine and Marine Deepwater, Estuarine and Marine Wetland, Freshwater Forested/Shrub Wetland, Freshwater Pond, Riverine, and Freshwater Emergent Wetland. Polygons identified as freshwater ponds were assumed to represent open waters that qualify for exclusion from regulated lands.

All stormwater best management practices (BMPs) from 2009 that could be classified as open water were identified and excluded from the regulated lands. To confirm that all open waters were identified, the open water land cover from the 2013 orthophotography was compared to the wetlands data. The 2009 VITA imagery was then reviewed for any open water that may have been missed or misidentified in the data. The City's golf course ponds are one example of areas missing classification as open water land cover. Open water found in this way were individually added to the wetland GIS layer to create one GIS layer of all excluded wetlands and open water. Polygons representing open water were later sorted into their own GIS layer.

The NWI shapefile data were reviewed for areas that were not wetlands in 2009, specifically the City's stormwater ditch network, which often fell under the riverine category in the NWI dataset, but cannot be excluded from the MS4 regulated land as wetland. The NWI data were compared to the City's stormwater ditch network and, in areas where the NWI data clearly overlapped the City's stormwater ditch network, the polygons representing ditches were removed from the NWI GIS layer. In areas where the NWI wetland polygons overlapped with

forest land cover polygons from the 2013 VITA geospatial land cover data, the area was classified only as forest as forested areas were more easily confirmed using the 2009 aerial imagery. As both land cover categories are exclusions, this classification does not affect the final POC loading calculation.

Areas of open water that are not urban stormwater BMPs maintained by the City were removed from the MS4 service area submitted to Virginia DEQ in December 2017, and were not changed in the March 2018 revision. Therefore, they were not included in the open waters and wetland calculations.

### **Calculating Regulated Pervious and Impervious Cover**

After the 2013 VITA land cover data were adjusted for 2009 land cover conditions, the total area for each land cover category was calculated. Land cover categories in the VITA data identified as pervious were deciduous and evergreen forest not counted as exclusions, shrubland, grasslands/herbaceous, pasture/hay, woody wetlands, and selected areas of bare rock/sand/clay. Land cover categories in the VITA data identified as impervious were low-intensity residential, high-intensity residential, and selected areas of bare rock/sand/clay.

### **Regulated Pervious Cover**

The 2013 VITA land cover categories of shrubland, grasslands/herbaceous, bare rock/sand/clay, and pasture/hay were evaluated polygon-by-polygon against the 2009 aerial imagery, to determine 2009 pervious cover. Polygons were added, removed, or adjusted according to the 2009 imagery, as needed. Some areas of bare rock/sand/clay were identified as impervious and included in the regulated impervious cover calculation. The pervious areas were summed to determine the total 2009 regulated pervious area and, excluding forested lands, wetlands, and open water, the total pervious area is 6989.73 acres.

### **Regulated Impervious Cover**

Assessing the City's 2009 regulated impervious cover required data collection using GIS sources and the City's recordkeeping and tracking software program called Tidemark. The City's 2013 impervious area was calculated using the VITA data. All polygons in the low- and high-intensity residential categories were found to be impervious, as well as some polygons in the bare rock/sand/clay category. All areas of impervious cover were summed to determine the 2013 regulated impervious land cover area for the City, which was found to be 6457.37 acres.

To determine the 2009 regulated impervious land cover, the impervious area from construction activities that occurred between July 1, 2009 through the 2013 orthophotography was subtracted from the 2013 regulated impervious land cover area. Orthophotography of the region was gathered throughout the Spring of 2013, so the date of March 30, 2013 was used for the period end date. The City provided a list of all construction projects occurring between July 1, 2009 and March 30, 2013 from Tidemark.

The City's construction data were first evaluated for duplicate entries with the BMP data from the same time period. Addresses were sorted, and those addresses associated with a BMP installed during the study period were removed and only the impervious area listed on the BMP construction plans was used for the change in impervious cover. The change in impervious cover from construction projects completed between July 1, 2009 and March 30, 2013 that included BMPs was estimated to be 42.71 acres.

The remaining construction sites from the City’s list were grouped into sites with Agreements in Lieu of a Stormwater Management Plan, Plans with Landcover Data, and Plans with no Landcover Data.

**Development Sites with Agreements in Lieu of a Stormwater Management Plan**

After discussion with City staff, it was determined that the single family residential (SFR) development with Agreements in Lieu of a Stormwater Management Plan (Agreements in Lieu of), for which there is no impervious or pervious landcover data, would be assigned an impervious cover of 0.043 acre (1 Equivalent Residential Unit, or ERU), in accordance with the City's stormwater utility billing policy. There were 218 SFR and two multifamily residential development properties granted Agreements in Lieu of, during the study period. The impervious cover for the two multifamily residential properties was calculated by estimating the number of ERUs for these properties. The total change in impervious cover from Agreements in Lieu of development properties was estimated to be 9.71 acres.

**Development Sites with Land Cover Data**

For many of the developed properties without BMPs installed between July 1, 2009 and March 30, 2013, the impervious area added or removed during construction was provided by Tidemark. The proposed impervious areas and impervious area reductions provided by Tidemark were used to calculate the change in total impervious area from 2009 to 2013. The change in impervious area from 2009 to 2013 for development sites without BMPs and with available land cover data is 56.55 acres.

**Development Sites with No Land Cover Data**

Land cover data was not available for 43 sites developed during the study period. These sites were treated as if they had Agreements in Lieu of. The number of ERUs for each of these sites was estimated and the total change in impervious cover was calculated to be 2.90 acres.

**2009 Land Cover Conditions**

The impervious land cover for all development occurring between 2009 and 2013 was 111.87 acres. This value represents the change in impervious cover from 2009 to 2013, and was subtracted from the total impervious land cover value determined from the 2013 land cover VITA data (6,457.37 acres). The total 2009 impervious land cover area is 6,345.51 acres.

The final values calculated for regulated urban impervious and regulated urban pervious area with forested land, wetlands, and open water excluded from the total regulated areas are provided in Table 1.

**Table 1. MS4 Regulated Urban Impervious and Pervious Area as of June 30, 2009**

Area Description	Area (acres)
Portsmouth MS4 Regulated Area	13,841.96
Portsmouth MS4 Regulated Area Excluding Forested Land, Wetlands, and Open Water Area	13,335.24
MS4 Regulated Impervious Area	6,345.51
MS4 Regulated Pervious Area	7,496.45
Forested Land, Wetlands and Open Water Area	506.73
MS4 Regulated Pervious Area Excluding Forested Land, Wetlands, and Open Water Area	6,989.73

### Estimated 2009 Existing Pollutant Source Loads

An estimate of the annual POC loads from existing sources as of June 30, 2009, and the total required pollutant load reductions were calculated according to the VPDES MS4 permit (2016) and Virginia DEQ Guidance (2015) and are provided in Table 2.

**Table 2. Existing Source Loads**

Area Type	Pollutant	Total Existing Acres Served by MS4 (6/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)	Total Impervious and Pervious POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	6,345.51	9.574666034	60,756.12	108,592.16
Regulated Urban Pervious		6,989.73	6.843763814	47,836.04	
Regulated Urban Impervious	Phosphorous	6,345.51	1.786015931	11,333.18	14,802.39
Regulated Urban Pervious		6,989.73	0.496330705	3,469.22	
Regulated Urban Impervious	Total Suspended Solids	6,345.51	703.4240675	4,463,583.07	5,188,862.57
Regulated Urban Pervious		6,989.73	103.763636	725,279.49	

Notes:

EOS = edge of stream

lbs/acre/yr = pounds per acre per year

lbs/yr = pounds per year

### Pollutant of Concern Required Reductions

The total Chesapeake Bay TMDL POC required reductions for this permit cycle were calculated using the reduction loading rate values from Table 2 and Part I.D.1.b.1.g of the City's MS4 permit and are provided in Table 3.

**Table 3. Total Pollutant of Concern Required Reductions**

Area Type	Pollutant	Total Existing Acres Served by MS4 (6/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr)	Reduction Required for Existing Sources for First Permit Cycle (lbs/yr)	Reduction Required for Existing and New Sources for First Permit Cycle (lbs/yr)	Total Impervious and Pervious Reduction Required First Permit Cycle (lbs/yr)
Regulated Urban Impervious	Nitrogen	6,345.51	0.043085997	273.40	314.41	479.45
Regulated Urban Pervious		6,989.73	0.020531291	143.51	165.03	
Regulated Urban Impervious	Phosphorous	6,345.51	0.014288127	90.67	104.27	118.73
Regulated Urban Pervious		6,989.73	0.001799199	12.58	14.46	
Regulated Urban Impervious	Total Suspended Solids	6,345.51	7.034240675	44,635.83	51,331.21	54,980.27
Regulated Urban Pervious		6,989.73	0.453965907	3,173.10	3,649.06	

## References

CH2M HILL, Inc. (CH2M). 2017. *Portsmouth MS4 Outfall Delineation Technical Memorandum*. December.

Chesapeake Bay TMDL Action Plan Guidance Revision. 2015.  
<http://www.deq.virginia.gov/Portals/0/DEQ/Water/Guidance/152005.pdf>.

City of Portsmouth MS4 Permit. 2016.  
<https://www.portsmouthva.gov/DocumentCenter/View/1480>.

National Wetlands Inventory. U.S. Fish and Wildlife Service. 2017.  
<https://www.fws.gov/wetlands/Data/State-Downloads.html>

Attachment A  
Portsmouth TMDL Load Calculations

City of Portsmouth Chesapeake Bay TMDL Action Plan  
5/8/2018

**James River Basin 2009 Land cover Conditions**

Regulated Impervious Area	6345.51 acres
Pervious Area	7496.45 acres
Contiguous Tree Cover Area	208.08 acres
Wetlands Area	43.71 acres
Open Water Area	254.93 acres
Regulated Pervious Area	6989.73 acres

**Table 1**  
**Calculation of Existing Source Loads for the James River Basin**  
**Based on the Chesapeake Bay Program Watershed Model Phase 5.3.2**

Subsource	Pollutant	Total Existing Acres Served by MS4 (6/30/09)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)	Total Impervious and Pervious POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	6,345.51	9.574666034	60,756.12	108,592.16
Regulated Urban Pervious		6,989.73	6.843763814	47,836.04	
Regulated Urban Impervious	Phosphorous	6,345.51	1.786015931	11,333.18	14,802.39
Regulated Urban Pervious		6,989.73	0.496330705	3,469.22	
Regulated Urban Impervious	TSS	6,345.51	703.4240675	4,463,583.07	5,188,862.57
Regulated Urban Pervious		6,989.73	103.763636	725,279.49	

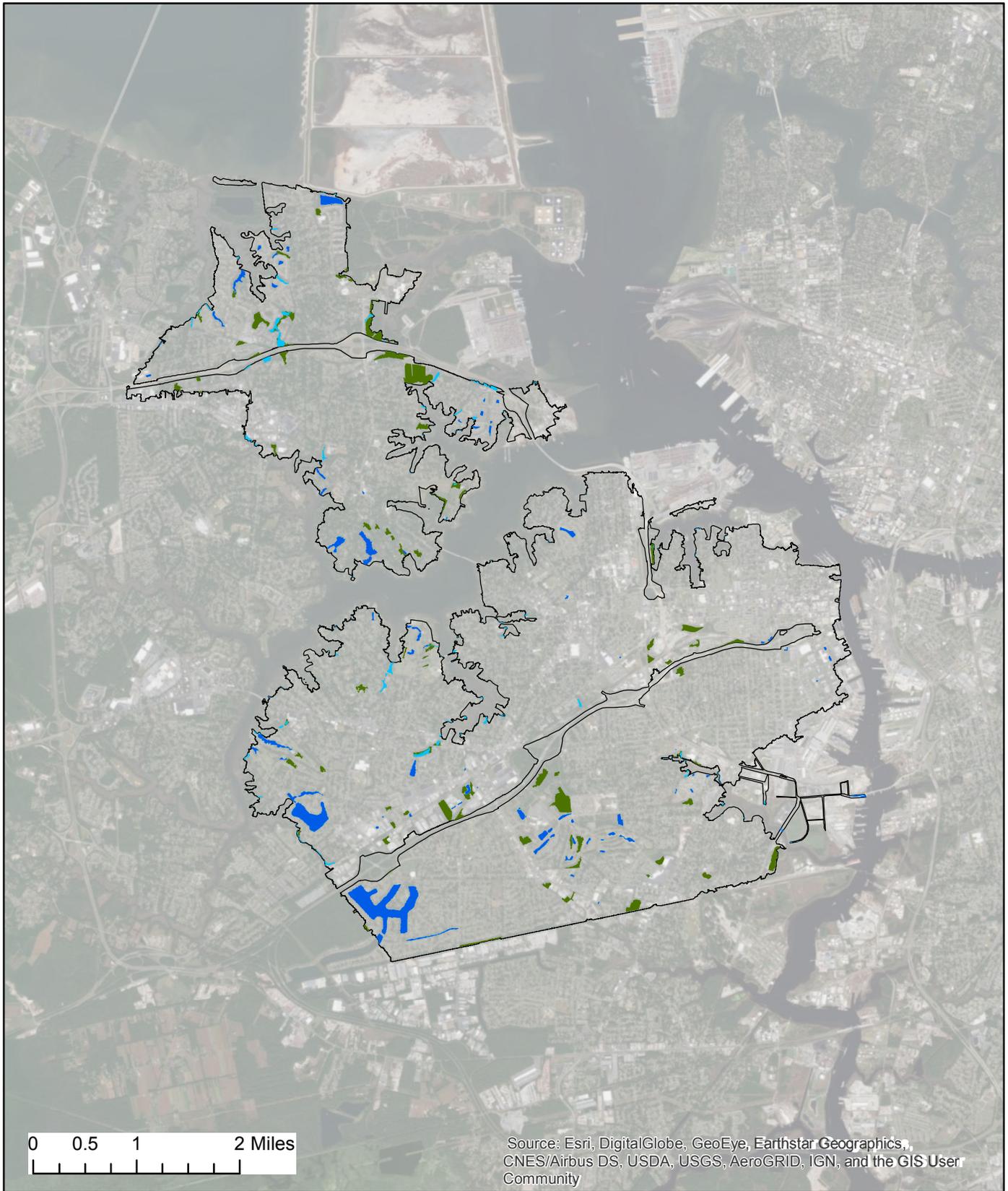
**Table 2**  
**Calculation Sheet for Determining the POC Reductions Required for Existing Sources During the First Permit Cycle for the James River Basin**  
**Based on the Chesapeake Bay Program Watershed Model Phase 5.3.2**

Subsource	Pollutant	Total Existing Acres Served by MS4 (6/30/09)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr)	Reduction Required for Existing Sources for First Permit Cycle by Subsource(lbs/yr)	Total Reduction Required for Existing Sources for First Permit Cycle (lbs/yr)	Estimated Total Reduction Required for Existing Sources by 2025 (lbs/yr)
Regulated Urban Impervious	Nitrogen	6,345.51	0.043085997	273.40	416.91	8,338.21
Regulated Urban Pervious		6,989.73	0.020531291	143.51		
Regulated Urban Impervious	Phosphorous	6,345.51	0.014288127	90.67	103.24	2,064.83
Regulated Urban Pervious		6,989.73	0.001799199	12.58		
Regulated Urban Impervious	TSS	6,345.51	7.034240675	44,635.83	47,808.93	956,178.57
Regulated Urban Pervious		6,989.73	0.453965907	3,173.10		

**Table 3****Calculation Sheet for Determining the POC Reductions Required for Existing and New Sources During the First Permit Cycle for the James River Basin Based on the Chesapeake Bay Program Watershed Model Phase 5.3.2**

<b>Subsource</b>	<b>Pollutant</b>	<b>Total Existing Acres Served by MS4 (6/30/09)</b>	<b>Reduction Required for Existing Sources for First Permit Cycle by Subsource(lbs/yr)</b>	<b>Reduction Required for Existing and New Sources with Additional 15% Reduction for First Permit Cycle by Subsource (lbs/yr)</b>	<b>Total Reduction Required for Existing and New Sources for First Permit Cycle (lbs/yr)</b>
Regulated Urban Impervious	Nitrogen	6,345.51	273.40	314.41	479.45
Regulated Urban Pervious		6,989.73	143.51	165.03	
Regulated Urban Impervious	Phosphorous	6,345.51	90.67	104.27	118.73
Regulated Urban Pervious		6,989.73	12.58	14.46	
Regulated Urban Impervious	TSS	6,345.51	44635.83	51,331.21	54,980.27
Regulated Urban Pervious		6,989.73	3173.10	3,649.06	

Attachment B  
Land Cover Exclusions



LEGEND

- Open Waters
- Wetlands
- Forest Qualifying for Exclusion
- MS4 Boundary



**FIGURE 2**

**Land Cover Exclusions**

Areas excluded from POC base load calculations.  
*City of Portsmouth, VA MS4 Permit and Program*

# APPENDIX C

City of Portsmouth MS4 Program: Pollutant Reductions from Historical and Redevelopment Stormwater Best Management Practices



# City of Portsmouth MS4 Program Pollutant Reductions from Historical and Redevelopment Stormwater Best Management Practices

PREPARED FOR: Thomas Quattlebaum, City of Portsmouth  
PREPARED BY: Juliana Cammarata, EIT, CH2M  
DATE: May 9, 2018  
REVISION NO.: 3  
APPROVED BY: Shelly Frie, PE, CH2M

This technical memorandum summarizes the assessment of the City of Portsmouth's (City's) Best Management Practices (BMPs) installed between January 1999 and January 2018, for pollutant load reduction credits to meet the City's Chesapeake Bay Total Maximum Daily Load (TMDL) requirements.

The City is required to meet the requirements of the Chesapeake Bay TMDL as described in their municipal separate storm sewer system (MS4) permit Part 1.D., and in the Chesapeake Bay TMDL Special Condition Guidance (the Guidance) Part IV.2. Part I.D.1.c.2.d. of the City's MS4 permit states that the City, to the maximum extent practicable, should implement means and measures sufficient to reduce their required pollutants of concern (POC) loads by 5 percent by the end of the first permit term.

Permittees were encouraged to submit historical data for water quality BMPs installed before June 30, 2013, to meet this requirement. Permittees will receive full credit for BMPs installed between January 1, 2006 and June 30, 2009 that were constructed with the express purpose of addressing water quality. BMPs installed before 2006 can generate load reduction credits if they were retrofitted or enhanced to meet the Virginia Stormwater Management Program (VSMP) water quality design criteria requirements for development on prior developed lands (9VAC25-870-63). BMPs installed after 2009 may generate additional load reduction credits if they were constructed to exceed existing load reduction regulations (Guidance Part III.3). Additionally, Part III.3.1. of the Guidance states that permittees may claim credits for pollutant reductions resulting from redevelopment projects completed after July 1, 2009. The City's BMPs were reviewed to determine if they qualified for pollutant load reduction credits under any of these provisions, and POC reductions were calculated.

## Estimating Nutrient Pollutant Reductions from Best Management Practices

Part II.2. of the Guidance instructs that to assess the City's pollutant load reductions, a baseline pollutant load level for the MS4 must be established from the June 30, 2009 land cover conditions. The baseline pollutant load level is then used to estimate pollutant reductions

attributable to installed BMPs. This process is further discussed in the document, *Task 4.2 Setting the Baseline* (CH2M, 2018). After the 2009 baseline pollutant load was established, CH2M HILL, Inc. (CH2M) reviewed the City's construction records between 2004 and January 2018 to identify BMPs eligible for pollutant load reduction credits and to determine redevelopment status. The BMPs were sorted by type and grouped by installation date.

### Historical Best Management Practices

The City submitted a list of historical BMPs to the Virginia Department of Environmental Quality (DEQ) by September 1, 2015, per the instructions in the Guidance. A list of historical BMPs was provided to CH2M by City staff in October 2017, but City staff were not certain if it was the exact list submitted to Virginia DEQ. A list of the submitted BMPs was requested from the Virginia DEQ and received, but the Virginia DEQ BMP list had no information about the BMP locations and therefore could not be correlated with BMP data from the City's development recordkeeping and tracking software program called Tidemark. The list received from the DEQ has 62 sites with BMPs installed between 2006 and 2009. A new list of historical BMPs was assembled using the City's Tidemark data with the assumption that any BMPs determined to qualify as historical BMPs would have been included on the City's original list. The new list has 30 BMPs installed between 2006 and 2009.

The BMP type, impervious area in the BMP drainage area, and the pervious area in the BMP drainage area were obtained from the City's Tidemark database and from the site development plans for BMPs installed between 2006 and 2009, when available. Each BMP was evaluated for pollutant reduction capacity using the techniques outlined in the Guidance, Appendix V.A. The Chesapeake Bay Program (CBP) efficiencies were applied to this set of BMPs as the current Virginia Stormwater BMP Clearinghouse (Clearinghouse) design criteria were not implemented until 2015.

BMPs installed between 1999 and 2006 qualify for credits only if they were retrofitted after 2006 to meet the new water quality regulations. Historical construction data from 1999 to 2003 was incomplete so BMP water quality retrofits could not be determined; however, any of the BMPs installed before January 1, 2006 qualifying under this provision would have been part of a redevelopment project between 2006 and 2018. Sites with redevelopment activities and BMPs installed between 2006 and 2018 were reviewed in depth for historical and redevelopment BMP credits. During this process, a water quantity BMP located at 3204 Tyre Neck Road was modified to have increased storage volume. No pollutant load reduction credits can be claimed for this BMP since the retrofit does not address water quality.

BMPs installed between 2009 and 2013 qualify to receive reduction credits if they were oversized for their required treatment volume. CH2M could not determine if any of the BMPs were oversized for water quality treatment because there was not adequate historical design calculation data.

The results of the historical BMP assessment are summarized in Table 1 and the TMDL pollutant reduction information for historical BMPs is provided in Attachment 1.

The 2009 baseload POC is discussed in the document, *Task 4.2: Setting the Baseline* (CH2M, 2018). Table 1 presents the 2009 POC loads, the first permit cycle required reductions, credits from historical BMPs, and the percent of first permit cycle required reduction achieved.

**Table 1. Pollutants of Concern Reductions from Historical Best Management Practices**

	<b>TN</b>	<b>TP</b>	<b>TSS</b>
2009 POC LOADS (LBS)	108,592.16	14,802.39	5,188,862.57
REQUIRED REDUCTION FROM NEW AND EXISTING SOURCES (LBS)	479.45	118.73	54,980.27
REDUCTION FROM HISTORICAL BMPS (LBS)	117.89	34.01	19,335.59
PERCENT OF FIRST PERMIT CYCLE REQUIRED REDUCTION ACHIEVED	24.6%	28.6%	35.2%

**Notes:**

LBS = pounds

TN = Total Nitrogen

TP = Total Phosphorous

TSS = Total Suspended Solids

**Redevelopment Pollutant Reduction Credits**

Part III.3.1. of the Guidance states that permittees may claim credits for pollutant reductions resulting from redevelopment projects completed after July 1, 2009. The City considers ‘redevelopment’ as construction on prior developed lands. Properties that have had demolition activity but were not developed within 5 years of that activity are considered new development. All redevelopment activities for which a BMP was installed result in a reduction in POC loads, so all BMPs installed for redevelopment after July 1, 2009 are included in the pollutant reduction calculations.

A list was compiled of all BMPs installed in the City after July 1, 2009. This list was checked against all construction in the City between 2004 and 2018, for construction activities at the same site address to determine if the demolition occurred within 5 years of the BMP construction. Construction activities with the same site address were reviewed for redevelopment activities using data from Tidemark, aerial imagery, and site plan sets when available. Sites with both new construction and redevelopment were noted so that only the BMP serving the redevelopment area was included in the pollutant load reduction calculations.

After the redevelopment sites were identified, data was collected for the POC loading calculations for the BMP drainage areas. Data to complete pollutant load reductions was gathered from Tidemark and site plans (when available), and supplemented with GIS BMP data and aerial photography when necessary. Each site was considered individually for impervious cover within the BMP drainage area and BMP type. BMP type was then correlated with a practice from the CBP or Clearinghouse to assign a reduction efficiency. Efficiencies from both the CBP and Clearinghouse were compared and either the CBP or Clearinghouse efficiency was applied based on available data, and which efficiency provided the highest nutrient removal. BMPs installed before the implementation of the current Clearinghouse types in 2015 were assessed using only CBP efficiencies. The Clearinghouse does not provide TN removal efficiencies for proprietary BMPs, nor TSS efficiencies for any BMPs, so CBP efficiencies were

used in these cases. The results of this analysis are provided in Table 2 and in the TMDL Pollutant Reduction Calculations in Attachment 2.

Table 2. Pollutants of Concern Reductions from Best Management Practices Installed for Redevelopment

	<b>TN</b>	<b>TP</b>	<b>TSS</b>
2009 POC LOADS (LBS)	108,592.16	14,802.39	5,188,862.57
REQUIRED REDUCTION FROM NEW AND EXISTING SOURCES (LBS)	479.45	118.73	54,980.27
REDUCTION FROM REDEVELOPMENT BMPS (LBS)	169.69	45.88	22,416.54
PERCENT OF FIRST PERMIT CYCLE REQUIRED REDUCTIONS ACHIEVED	35.4%	38.6%	40.8%

### Summary of Pollutant Reductions from Best Management Practices

The total combined pollutant reductions from historical and redevelopment BMPs are provided in Table 3.

Table 3. Pollutants of Concern Reductions from Historical and Redevelopment Best Management Practices

	<b>TN</b>	<b>TP</b>	<b>TSS</b>
2009 POC LOADS (LBS)	108,592.16	14,802.39	5,188,862.57
REQUIRED REDUCTION FROM NEW AND EXISTING SOURCES (LBS)	479.45	118.73	54,980.27
TOTAL REDUCTION FROM HISTORICAL AND REDEVELOPMENT BMPS (LBS)	287.58	79.89	41,752.13
PERCENT OF REQUIRED REDUCTION REDUCED BY HISTORICAL AND REDEVELOPMENT BMPS	60.0%	67.3%	75.9%
PERCENT OF REQUIRED REDUCTION REMAINING	40.0%	32.7%	24.1%

### References

- CH2M HILL, Inc. (CH2M). 2018. *Task 4.2 Setting the Baseline* Technical Memorandum. March.
- Chesapeake Bay TMDL Action Plan Guidance Revision. 2015.  
<http://www.deq.virginia.gov/Portals/0/DEQ/Water/Guidance/152005.pdf>.
- City of Portsmouth MS4 Permit. 2016.  
<https://www.portsmouthva.gov/DocumentCenter/View/1480>.

Attachment 1  
Historical Best Management Practices

City of Portsmouth Chesapeake Bay TMDL Action Plan

Pollutant Reduction from Structural BMPs Installed After 2009

Use method described in Appendixes V.C from VDEQ Chesapeake Bay TMDL Action Plan Guidance Memo No. 15-2005.

Drainage impervious and pervious area are from the Williamsburg historical BMP reporting spreadsheet.

Use BMP removal efficiency values from Chesapeake Bay Program BMP Efficiencies.

Totals

TN	TP	TSS	acres
117.89	34.01	19335.59	66.39

No.	Address	BMP ID	Lat.	Long.	HUC12	BMP Type (including Clearinghouse)	Chesapeake Bay Program BMP	Drainage Area (acres)	Impervious Drainage Area (acres)	Impervious TN Loading Rate (lbs/ac/yr)	Impervious TP Loading Rate (lbs/ac/yr)	Impervious TSS Loading Rate (lbs/ac/yr)	Pervious Drainage Area (acres)	Pervious TN Loading Rate (lbs/ac/yr)	Pervious TP Loading Rate (lbs/ac/yr)	Pervious TSS Loading Rate (lbs/ac/yr)	Impervious and Pervious TN (lbs/yr)	Impervious and Pervious TP (lbs/yr)	Impervious and Pervious TSS (lbs/yr)	TN Removal Eff.	TP Removal Eff.	TSS Removal Eff.	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	TSS Reduction (lbs/yr)
1	2219 FREDERICK BLVD	SIT2004-00045_1	36.822569	-76.33068	0202802080203	Wetpond	Wet Ponds and Wetlands	0.62	0.45	9.574666034	1.786015931	703.4240675	0.17	6.843763814	0.496330705	103.763636	5.47	0.89	334.18	20%	45%	60%	1.09	0.40	200.51
2	2503 WOODROW ST	SIT2004-00056_1	36.844732	-76.332897	0202802080206	Bioretention	Bioretention C/D soils, underdrain	0.52	0.34	9.574666034	1.786015931	703.4240675	0.18	6.843763814	0.496330705	103.763636	4.50	0.70	259.76	25%	45%	55%	1.12	0.32	142.87
3	4900 W HIGH ST	SIT2005-00042_1	36.852591	-76.377014	0202802080205	Dry Pond	Dry Detention Ponds	1.45	1.00	9.574666034	1.786015931	703.4240675	0.45	6.843763814	0.496330705	103.763636	12.65	2.01	750.12	5%	10%	10%	0.63	0.20	75.01
4	4900 W HIGH ST	SIT2005-00042_2	36.851403	-76.376783	0202802080205	Dry Pond	Dry Detention Ponds	0.55	0.42	9.574666034	1.786015931	703.4240675	0.13	6.843763814	0.496330705	103.763636	4.91	0.81	308.93	5%	10%	10%	0.25	0.08	30.89
5	TALLWOOD DR (1070 University Blvd Portsmouth)	SIT2006-00003_1	36.869181	-76.415899	020802080301	Wetpond	Wet Ponds and Wetlands	16.25	3.40	9.574666034	1.786015931	703.4240675	12.85	6.843763814	0.496330705	103.763636	120.50	12.45	3725.00	20%	45%	60%	24.10	5.60	2235.00
6	4005 VICTORY BLVD	SIT2006-00011_1	36.810301	-76.360035	0202802080205	Wetpond	Wet Ponds and Wetlands	2.63	1.81	9.574666034	1.786015931	703.4240675	0.82	6.843763814	0.496330705	103.763636	22.94	3.64	1358.28	20%	45%	60%	4.59	1.64	814.97
7	2917 QUEEN ST	SIT2006-00017_1	36.834983	-76.37152	0202802080205	Extended dry detention	Dry Extended Detention Ponds	0.47	0.25	9.574666034	1.786015931	703.4240675	0.22	6.843763814	0.496330705	103.763636	3.90	0.56	198.68	20%	20%	60%	0.78	0.11	119.21
8	3708 ADAMS ST (Adams St plan)	SIT2006-00027_1	36.860436	-76.352457	0202802080205	Filterra	Filtering Practices	0.64	0.44	9.574666034	1.786015931	703.4240675	0.20	6.843763814	0.496330705	103.763636	5.57	0.88	327.38	40%	60%	80%	2.23	0.53	261.90
9	3708 ADAMS ST (Adams St plan)	SIT2006-00027_2	36.860627	-76.352047	0202802080205	Grass Swale	Vegetated Open Channels C/D soils, no underdrain	0.29	0.20	9.574666034	1.786015931	703.4240675	0.09	6.843763814	0.496330705	103.763636	2.52	0.40	148.34	10%	10%	50%	0.25	0.04	74.17
10	3708 ADAMS ST (Adams St plan)	SIT2006-00027_3	36.860661	-76.351944	0202802080205	Grass Swale	Vegetated Open Channels C/D soils, no underdrain	0.17	0.12	9.574666034	1.786015931	703.4240675	0.05	6.843763814	0.496330705	103.763636	1.49	0.24	89.60	10%	10%	50%	0.15	0.02	44.80
11	3505 TYRE NECK RD	SIT2006-00029_1	36.865066	-76.394401	0202802080205	Bioretention	Bioretention C/D soils, underdrain	0.09	0.04	9.574666034	1.786015931	703.4240675	0.05	6.843763814	0.496330705	103.763636	0.71	0.09	30.93	25%	45%	55%	0.18	0.04	17.01
12	3505 TYRE NECK RD	SIT2006-00029_2	36.865066	-76.394401	0202802080205	Bioretention	Bioretention C/D soils, underdrain	0.14	0.09	9.574666034	1.786015931	703.4240675	0.05	6.843763814	0.496330705	103.763636	1.21	0.19	70.30	25%	45%	55%	0.30	0.09	38.66
13	3300 AIRLINE BLVD	SIT2006-00033_1	36.807493	-76.3786355	0202802080205	Wetpond	Wet Ponds and Wetlands	3.36	2.79	9.574666034	1.786015931	703.4240675	0.57	6.843763814	0.496330705	103.763636	30.61	5.26	2020.98	20%	45%	60%	6.12	2.37	1212.59
14	260 ELM AVE	SIT2006-00035_1	36.838699	-76.314162	0202802080206	Extended dry detention	Dry Extended Detention Ponds	7.18	7.18	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	68.75	12.82	5050.58	20%	20%	60%	13.75	2.56	3030.35
15	3325 FREDERICK BLVD	SIT2006-00036_1	36.813615	-76.31807	0202802080205	Extended dry detention	Dry Extended Detention Ponds	2.45	2.31	9.574666034	1.786015931	703.4240675	0.14	6.843763814	0.496330705	103.763636	22.17	3.77	1639.44	20%	20%	60%	4.43	0.75	983.66
16	2401 TURNPIKE RD	SIT2006-00039_1	36.831164	-76.329258	0202802080206	Dry Pond	Dry Detention Ponds	1.23	1.11	9.574666034	1.786015931	703.4240675	0.12	6.843763814	0.496330705	103.763636	11.45	2.04	793.25	5%	10%	10%	0.57	0.20	79.33
17	500 LINCOLN ST	SIT2007-00007_1	36.825987	-76.301892	0202802080203	Extended dry detention	Dry Extended Detention Ponds	1.03	1.03	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	9.86	1.84	724.53	20%	20%	60%	1.97	0.37	434.72
18	700 PORTCENTRE PKWY	SIT2007-00008_1	36.8255	-76.298212	0202802080203	Infiltration	Infiltration Practices w/o Sand, Veg.	1.15	0.91	9.574666034	1.786015931	703.4240675	0.24	6.843763814	0.496330705	103.763636	10.35	1.74	664.12	80%	85%	95%	8.28	1.48	630.91
19	700 PORTCENTRE PKWY	SIT2007-00008_2	36.824927	-76.297982	0202802080203	Grass Swale	Vegetated Open Channels C/D soils, no underdrain	0.23	0.18	9.574666034	1.786015931	703.4240675	0.05	6.843763814	0.496330705	103.763636	2.07	0.35	132.82	10%	10%	50%	0.21	0.03	66.41
20	3120 TYRE NECK RD	SIT2007-00011_1	36.859498	-76.397519	0202802080205	Bioretention	Bioretention C/D soils, underdrain	0.22	0.12	9.574666034	1.786015931	703.4240675	0.10	6.843763814	0.496330705	103.763636	1.84	0.27	95.39	25%	45%	55%	0.46	0.12	52.46
21	361 EFFINGHAM ST	SIT2007-00027_1	36.837813	-76.306622	020802080206	Bioretention	Bioretention C/D soils, underdrain	0.52	0.36	9.574666034	1.786015931	703.4240675	0.16	6.843763814	0.496330705	103.763636	4.54	0.72	269.83	25%	45%	55%	1.14	0.33	148.41
22	4934 W HIGH ST	SIT2007-00030_1	36.85202	-76.378768	0202802080205	Wetpond	Wet Ponds and Wetlands	1.85	1.39	9.574666034	1.786015931	703.4240675	0.46	6.843763814	0.496330705	103.763636	16.46	2.71	1025.49	20%	45%	60%	3.29	1.22	615.29
23	2306 AIRLINE BLVD	SIT2007-00038_1	36.818515	-76.353929	0202802080205	Enhanced Detention	Dry Extended Detention Ponds	0.62	0.50	9.574666034	1.786015931	703.4240675	0.12	6.843763814	0.496330705	103.763636	5.61	0.95	364.16	20%	20%	60%	1.12	0.19	218.50
24	ALABAMA AVE (development @ west end of street)	SIT2007-00045_1	36.809727	-76.322031	0202802080203	Wetpond	Wet Ponds and Wetlands	2.94	2.26	9.574666034	1.786015931	703.4240675	0.68	6.843763814	0.496330705	103.763636	26.30	4.38	1662.70	20%	45%	60%	5.26	1.97	997.62
25	ALABAMA AVE (development @ west end of street)	SIT2007-00045_2	36.809727	-76.322031	0202802080203	Wetpond	Wet Ponds and Wetlands	5.53	4.26	9.574666034	1.786015931	703.4240675	1.27	6.843763814	0.496330705	103.763636	49.48	8.24	3128.37	20%	45%	60%	9.90	3.71	1877.02
26	ALABAMA AVE (development @ west end of street)	SIT2007-00045_3	36.809727	-76.322031	0202802080203	Wetpond	Wet Ponds and Wetlands	4.00	3.08	9.574666034	1.786015931	703.4240675	0.92	6.843763814	0.496330705	103.763636	35.79	5.96	2262.01	20%	45%	60%	7.16	2.68	1357.21
27	3959 GARWOOD AVE	SIT2007-00046_1	36.801814	-76.381417	0202802080205	Extended dry detention	Dry Extended Detention Ponds	0.77	0.27	9.574666034	1.786015931	703.4240675	0.50	6.843763814	0.496330705	103.763636	6.01	0.73	241.51	20%	20%	60%	1.20	0.15	144.90
28	2716 AIRLINE BLVD	SIT2007-00051_1	36.811631	-76.363763	0202802080205	Filterra	Filtering Practices	0.13	0.13	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	1.24	0.23	91.45	40%	60%	80%	0.50	0.14	73.16
29	HOWARD ST (109-134 Howard St plan)	SIT2008-00003_1	36.82811	-76.334541	0202802080205	Wetpond	Wet Ponds and Wetlands	9.18	7.71	9.574666034	1.786015931	703.4240675	1.47	6.843763814	0.496330705	103.763636	83.88	14.50	5576.65	20%	45%	60%	16.78	6.53	3345.99
30	1445 CENTRE AVE	SIT2008-00023_1	36.816201	-76.315751	0202802080203	Other (storm filter)	Dry Detention Ponds and Hydrodynamic Structures	0.18	0.17	9.574666034	1.786015931	703.4240675	0.01	6.843763814	0.496330705	103.763636	1.70	0.31	120.62	5%	45%	10%	0.08	0.14	12.06

Attachment 2  
Redevelopment Best Management  
Practices

City of Portsmouth Chesapeake Bay TMDL Action Plan

Pollutant Reduction from Structural BMPs Installed During Redevelopment After 2009  
 Use method described in Appendix V-C from VDEQ Chesapeake Bay TMDL Action Plan Guidance Memo No. 15-2005.  
 Drainage Impervious and pervious area are from Portsmouth's Tidemark database and plan sets.  
 Use BMP removal efficiency values from Chesapeake Bay Program BMP and Virginia Stormwater BMP Clearinghouse.

TN	TP	TSS	acres
169.69	45.88	22416.54	89.01

No.	Address	BMP ID	Lat.	Long.	HUC12	BMP Type (including Clearinghouse)	Chesapeake Bay Program BMP	Drainage Area (acres)	Impervious Drainage Area (acres)	Impervious TN Loading Rate (lbs/ac/yr)	Impervious TP Loading Rate (lbs/ac/yr)	Impervious TSS Loading Rate (lbs/ac/yr)	Pervious Drainage Area (acres)	Pervious TN Loading Rate (lbs/ac/yr)	Pervious TP Loading Rate (lbs/ac/yr)	Pervious TSS Loading Rate (lbs/ac/yr)	Impervious and Pervious TN (lbs/yr)	Impervious and Pervious TP (lbs/yr)	Impervious and Pervious TSS (lbs/yr)	TN Removal Eff.	Source of TN Removal Eff.	TP Removal Eff.	Source of TP Removal Eff.	TSS Removal Eff. (Bay Prog)	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	TSS Reduction (lbs/yr)
54	1 HIGH ST	SIT2015-00029_1	36.834413	-76.296757	20802080203	Filterra	Filtering Practices	0.13	0.13	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	1.24	0.23	91.45	40%	Bay Prog.	60%	Bay Prog.	80%	0.50	0.14	73.16
35	1009 VICTORY BLVD	SIT2015-00037_1	36.798234	-76.306802	20802080203	Rainwater Harvesting	Dry Detention Ponds and Hydrodynamic Structures	0.04	0.04	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	0.38	0.07	28.14	50%	Clearinghouse	50%	Clearinghouse	10%	0.19	0.04	2.81
36	1009 VICTORY BLVD	SIT2015-00037_2	36.798234	-76.306802	20802080203	Bioretenion 1	Bioretenion C/D soils, underdrain	0.18	0.04	9.574666034	1.786015931	703.4240675	0.14	6.843763814	0.496330705	103.763636	1.34	0.14	42.66	64%	Clearinghouse	55%	Clearinghouse	55%	0.86	0.08	23.47
37	1009 VICTORY BLVD	SIT2015-00037_3	36.798234	-76.306802	20802080203	Permeable Pavement 1	Permeable Pavement w/o Sand, Veg. - C/D soils, underdrain	0.52	0.52	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	4.98	0.93	365.78	59%	Clearinghouse	59%	Clearinghouse	55%	2.94	0.55	201.18
49	1098 FREDERICK BLVD	SIT2017-00004_1	36.829264	-76.340431	20802080205	Filterra	Filtering Practices	0.25	0.23	9.574666034	1.786015931	703.4240675	0.02	6.843763814	0.496330705	103.763636	2.34	0.42	163.86	40%	Bay Prog.	60%	Bay Prog.	80%	0.94	0.25	131.09
12	1100 PORTSMOUTH BLVD	SIT2015-00002_1	36.820704	-76.310871	20802080203	Grass Channel A/B soils	Vegetated Open Channels A/B soils, no underdrain	2.95	0.00	9.574666034	1.786015931	703.4240675	2.95	6.843763814	0.496330705	103.763636	20.19	1.46	306.10	45%	Bay Prog.	45%	Bay Prog.	70%	9.09	0.66	214.27
50	1116 COUNTY ST	SIT2007-00032_1	36.834024	-76.311365	20802080203	Storm Filter	Dry Detention Ponds and Hydrodynamic Structures	0.02	0.96	9.574666034	1.786015931	703.4240675	0.06	6.843763814	0.496330705	103.763636	9.60	1.74	681.51	5%	Bay Prog.	45%	Clearinghouse	10%	0.48	0.78	68.15
68	1140 LONDON BLVD	SIT2013-00004_1	36.837807	-76.312036	20802080206	Filterra	Filtering Practices	1.25	0.25	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	2.39	0.45	175.86	40%	Bay Prog.	60%	Bay Prog.	80%	0.96	0.27	140.68
69	1140 LONDON BLVD	SIT2013-00004_2	36.837565	-76.312264	20802080206	Filterra	Filtering Practices	0.07	0.07	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	0.67	0.13	49.24	40%	Bay Prog.	60%	Bay Prog.	80%	0.27	0.08	39.39
39	115 CAVALIER BLVD	SIT2005-00001_1	36.814364	-76.345496	20802080203	Bioretenion	Bioretenion C/D soils, underdrain	0.02	0.02	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	0.14	0.03	10.55	25%	Bay Prog.	40%	Bay Prog.	55%	0.04	0.01	5.80
40	115 CAVALIER BLVD	SIT2005-00001_2	36.81439	-76.344759	20802080203	Bioretenion	Bioretenion C/D soils, underdrain	0.01	0.01	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	0.09	0.02	6.33	25%	Bay Prog.	45%	Bay Prog.	55%	0.02	0.01	3.48
94	1200 FREDERICK BLVD	SIT2014-00009	36.828152	-76.339555	020802080205	Other (unknown)	Dry Detention Ponds and Hydrodynamic Structures	0.46	0.391	9.574666034	1.786015931	703.4240675	0.07	6.843763814	0.496330705	103.763636	4.22	0.73	282.20	5%	Bay Prog.	10%	Bay Prog.	10%	0.21	0.07	28.22
5	1201 FREDERICK BLVD	SIT2014-00025_1	36.829109	-76.338339	20802080205	Vegetated Filter/Channel Impervious Disconnection	Vegetated Open Channels C/D soils, no underdrain	0.30	0.30	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	2.84	0.53	208.92	10%	Bay Prog.	10%	Bay Prog.	50%	0.28	0.05	104.46
55	132 BYERS AVE	SIT2009-00008_1	36.827186	-76.36641	20802080205	Bioretenion	Bioretenion C/D soils, underdrain	1.05	0.66	9.574666034	1.786015931	703.4240675	0.39	6.843763814	0.496330705	103.763636	8.99	1.37	504.73	25%	Bay Prog.	45%	Bay Prog.	55%	2.25	0.62	277.60
56	132 BYERS AVE	SIT2009-00008_2	36.826604	-76.367157	20802080205	Bioretenion	Bioretenion C/D soils, underdrain	0.39	0.25	9.574666034	1.786015931	703.4240675	0.14	6.843763814	0.496330705	103.763636	3.35	0.51	190.38	25%	Bay Prog.	45%	Bay Prog.	55%	0.84	0.23	104.71
57	132 BYERS AVE	SIT2009-00008_3	36.826381	-76.367306	20802080205	Bioretenion	Bioretenion C/D soils, underdrain	0.23	0.08	9.574666034	1.786015931	703.4240675	0.15	6.843763814	0.496330705	103.763636	1.79	0.22	71.84	25%	Bay Prog.	45%	Bay Prog.	55%	0.45	0.10	39.51
58	132 BYERS AVE	SIT2009-00008_4	36.826018	-76.366841	20802080205	Bioretenion	Bioretenion C/D soils, underdrain	0.24	0.08	9.574666034	1.786015931	703.4240675	0.16	6.843763814	0.496330705	103.763636	1.86	0.22	72.88	25%	Bay Prog.	45%	Bay Prog.	55%	0.47	0.10	40.08
59	132 BYERS AVE	SIT2009-00008_5	36.826172	-76.366718	20802080205	Bioretenion	Bioretenion C/D soils, underdrain	0.38	0.17	9.574666034	1.786015931	703.4240675	0.21	6.843763814	0.496330705	103.763636	3.06	0.41	141.37	25%	Bay Prog.	45%	Bay Prog.	55%	0.77	0.18	77.75
60	132 BYERS AVE	SIT2009-00008_6	36.826134	-76.366326	20802080205	Stormceptor	Dry Detention Ponds and Hydrodynamic Structures	0.70	0.03	9.574666034	1.786015931	703.4240675	8.67	6.843763814	0.496330705	103.763636	59.62	4.36	920.73	5%	Bay Prog.	20%	Clearinghouse	10%	2.98	0.87	92.07
61	132 BYERS AVE	SIT2009-00008_7	36.826728	-76.366418	20802080205	Vegetated Roof 1	Vegetated Open Channels A/B soils, no underdrain	0.67	0.67	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	6.42	1.20	471.29	45%	Clearinghouse	45%	Clearinghouse	70%	2.89	0.54	329.91
62	132 BYERS AVE	SIT2009-00008_8	36.827186	-76.36641	20802080205	Porous Pavers	Permeable Pavement w/o Sand, Veg. - A/B soils, underdrain	0.72	0.72	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	6.89	1.29	506.47	45%	Bay Prog.	50%	Bay Prog.	70%	3.10	0.64	354.53
110	1401 CRAWFORD PKWY	SIT2008-00027	36.840866	-76.315395	020802080206	Enhanced Detention	Dry Extended Detention Ponds	3.11	2.94	9.574666034	1.786015931	703.4240675	0.17	6.843763814	0.496330705	103.763636	29.31	5.34	2085.71	20%	Bay Prog.	20%	Bay Prog.	60%	5.86	1.07	1251.42
112	1503 LONDON BLVD	SIT2009-00026	36.836711	-76.317995	020802080206	Dry Pond	Dry Detention Ponds	4.11	3.895	9.574666034	1.786015931	703.4240675	0.21	6.843763814	0.496330705	103.763636	38.70	7.06	2761.11	5%	Bay Prog.	10%	Bay Prog.	10%	1.93	0.17	276.11
114	1600 SOUTH ST	SIT2009-00010_1	36.829535	-76.317553	20802080203	Porous Pavers	Permeable Pavement w/o Sand, Veg. - A/B soils, underdrain	1.95	0.5655	9.574666034	1.786015931	703.4240675	1.38	6.843763814	0.496330705	103.763636	14.89	1.70	541.45	45%	Bay Prog.	50%	Bay Prog.	70%	6.70	0.85	379.01
41	18 DAHLGREN AVE	SIT2009-00022_1	36.798096	-76.320903	20802080203	Bioretenion	Bioretenion C/D soils, underdrain	0.55	0.55	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	5.27	0.98	386.88	25%	Bay Prog.	45%	Bay Prog.	55%	1.32	0.44	212.79
42	18 DAHLGREN AVE	SIT2009-00022_2	36.798418	-76.320345	20802080203	Bioretenion	Bioretenion C/D soils, underdrain	1.01	1.01	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	9.67	1.80	710.46	25%	Bay Prog.	45%	Bay Prog.	55%	2.42	0.81	390.75
43	18 DAHLGREN AVE	SIT2009-00022_3	36.798788	-76.319936	20802080203	Bioretenion	Bioretenion C/D soils, underdrain	0.99	0.99	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	9.48	1.77	696.39	25%	Bay Prog.	45%	Bay Prog.	55%	2.37	0.80	383.01
44	18 DAHLGREN AVE	SIT2009-00022_4	36.798374	-76.319532	20802080203	Bioretenion	Bioretenion C/D soils, underdrain	0.25	0.25	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	2.39	0.45	175.86	25%	Bay Prog.	45%	Bay Prog.	55%	0.60	0.20	96.72
45	18 DAHLGREN AVE	SIT2009-00022_5	36.7988	-76.319365	20802080203	Bioretenion	Bioretenion C/D soils, underdrain	0.14	0.14	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	1.34	0.25	98.48	25%	Bay Prog.	45%	Bay Prog.	55%	0.34	0.11	54.16
46	18 DAHLGREN AVE	SIT2009-00022_6	36.798402	-76.319022	20802080203	Bioretenion	Bioretenion C/D soils, underdrain	0.62	0.62	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	5.94	1.11	436.12	25%	Bay Prog.	45%	Bay Prog.	55%	1.48	0.50	239.87
71	1800 FREDERICK BLVD	SIT2010-00016_1	36.824388	-76.339155	020802080205	Storm Filter	Dry Detention Ponds and Hydrodynamic Structures	1.12	0.83	9.574666034	1.786015931	703.4240675	0.29	6.843763814	0.496330705	103.763636	9.93	1.62	613.21	5%	Bay Prog.	45%	Clearinghouse	10%	0.50	0.73	61.32
14	1800 FREDERICK BLVD	SIT2010-00016_2	36.824331	-76.339707	20802080205	Storm Filter	Dry Detention Ponds and Hydrodynamic Structures	0.46	0.45	9.574666034	1.786015931	703.4240675	0.01	6.843763814	0.496330705	103.763636	4.37	0.80	315.30	5%	Bay Prog.	45%	Clearinghouse	10%	0.22	0.36	31.53
15	1800 FREDERICK BLVD	SIT2010-00016_3	36.824331	-76.339707	20802080205	Storm Filter	Dry Detention Ponds and Hydrodynamic Structures	0.28	0.25	9.574666034	1.786015931	703.4240675	0.03	6.843763814	0.496330705	103.763636	2.60	0.46	178.49	5%	Bay Prog.						

No.	Address	BMP ID	Lat.	Long.	HUC12	BMP Type (including Clearinghouse)	Chesapeake Bay Program BMP	Drainage Area (acres)	Impervious Drainage Area (acres)	Impervious TN Loading Rate (lbs/ac/yr)	Impervious TP Loading Rate (lbs/ac/yr)	Impervious TSS Loading Rate (lbs/ac/yr)	Pervious Drainage Area (acres)	Pervious TN Loading Rate (lbs/ac/yr)	Pervious TP Loading Rate (lbs/ac/yr)	Pervious TSS Loading Rate (lbs/ac/yr)	Impervious and Pervious TN (lbs/yr)	Impervious and Pervious TP (lbs/yr)	Impervious and Pervious TSS (lbs/yr)	TN Removal Eff.	Source of TN Removal Eff.	TP Removal Eff.	Source of TP Removal Eff.	TSS Removal Eff. (Bay Prog)	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	TSS Reduction (lbs/yr)
101	417 COUNTY ST	SIT2014-00011_1	36.833504	-76.30153	020802080203	Filterra	Filtering Practices	0.08	0.065	9.574666034	1.786015931	703.4240675	0.02	6.843763814	0.496330705	103.763636	0.73	0.12	47.28	40%	Bay Prog.	60%	Bay Prog.	80%	0.29	0.07	37.82
102	417 COUNTY ST	SIT2014-00011_2	36.833179	-76.301758	020802080203	Filterra	Filtering Practices	0.2	0.2	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	1.91	0.36	140.68	40%	Bay Prog.	60%	Bay Prog.	80%	0.77	0.21	112.55
103	417 COUNTY ST	SIT2014-00011_3	36.833179	-76.301758	020802080203	Filterra	Filtering Practices	0.09	0.083	9.574666034	1.786015931	703.4240675	0.01	6.843763814	0.496330705	103.763636	0.84	0.15	59.11	40%	Bay Prog.	60%	Bay Prog.	80%	0.34	0.09	47.29
92	4211 COUNTY ST	SIT2013-00020_1	36.832006	-76.355024	020802080205	Bioretention	Bioretention C/D soils, underdrain	0.37	0.259	9.574666034	1.786015931	703.4240675	0.11	6.843763814	0.496330705	103.763636	3.24	0.52	193.70	25%	Bay Prog.	45%	Bay Prog.	55%	0.81	0.23	106.54
93	4211 COUNTY ST	SIT2013-00020_2	36.832006	-76.355024	020802080205	Other (Filter Strip)	Filtering Practices	0.82	0.574	9.574666034	1.786015931	703.4240675	0.25	6.843763814	0.496330705	103.763636	7.18	1.15	429.29	40%	Bay Prog.	60%	Bay Prog.	80%	2.87	0.69	343.43
85	4825 PORTSMOUTH BLVD	SIT2014-00002	36.817632	-76.37129	020802080205	Infiltration (Pervious Pavement SPEC 7)	Permeable Pavement w/o Sand, Veg., C/D soils, underdrain	0.17	0.1661	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	1.62	0.30	117.24	10%	Bay Prog.	20%	Bay Prog.	55%	0.16	0.06	64.48
108	4916 WEST NORFOLK RD	SIT2008-00020_1	36.869665	-76.37684	020802080205	Detention	Dry Extended Detention Ponds	1.06	0.67	9.574666034	1.786015931	703.4240675	0.39	6.843763814	0.496330705	103.763636	9.08	1.39	511.76	20%	Bay Prog.	20%	Bay Prog.	60%	1.82	0.28	307.06
109	4916 WEST NORFOLK RD	SIT2008-00020_2	36.869665	-76.37684	020802080205	Detention	Dry Extended Detention Ponds	0.58	0.31	9.574666034	1.786015931	703.4240675	0.27	6.843763814	0.496330705	103.763636	4.82	0.69	246.08	20%	Bay Prog.	20%	Bay Prog.	60%	0.96	0.14	147.65
111	5100 DEEP CREEK BLVD	SIT2007-00041	36.793827	-76.336582	020802080203	Other (Dry Wells)	Filtering Practices	0.14	0.119	9.574666034	1.786015931	703.4240675	0.02	6.843763814	0.496330705	103.763636	1.28	0.22	85.89	80%	Bay Prog.	85%	Bay Prog.	95%	1.03	0.19	81.59
80	5515 PORTSMOUTH BLVD	SIT2011-00027	36.819014	-76.378653	020802080205	Infiltration (Perforated pipe wrapped in filter fabric)	Infiltration Practices w/o Sand, Veg.	0.11	0.099	9.574666034	1.786015931	703.4240675	0.01	6.843763814	0.496330705	103.763636	1.02	0.18	70.78	80%	Bay Prog.	85%	Bay Prog.	95%	0.82	0.15	67.24
75	5700 HEDGEROW LN	SIT2010-00012_1	36.889893	-76.38496	020802080301	Filterra	Filtering Practices	0.71	0.71	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	6.80	1.27	499.43	40%	Bay Prog.	60%	Bay Prog.	80%	2.72	0.76	399.54
76	5700 HEDGEROW LN	SIT2010-00012_2	36.889893	-76.38496	020802080301	Other (Hydrodynamic Separator)	Dry Detention Ponds and Hydrodynamic Structures	0.7	0.7	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	6.70	1.25	492.40	5%	Bay Prog.	10%	Bay Prog.	10%	0.34	0.13	49.24
77	5700 HEDGEROW LN	SIT2010-00012_3	36.889893	-76.38496	020802080301	Other (Hydrodynamic Separator)	Dry Detention Ponds and Hydrodynamic Structures	0.7	0.7	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	6.70	1.25	492.40	5%	Bay Prog.	10%	Bay Prog.	10%	0.34	0.13	49.24
78	5700 HEDGEROW LN	SIT2010-00012_4	36.889893	-76.38496	020802080301	Other (Pervious Concrete)	Permeable Pavement w/o Sand, Veg., C/D soils, underdrain	0.29	0.29	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	2.78	0.52	203.99	10%	Bay Prog.	20%	Bay Prog.	55%	0.28	0.10	112.20
99	5811 W HIGH ST	SIT2014-00032	36.859667	-76.39454	20802080205	FMD (Contech Storm Filter)	Dry Detention Ponds and Hydrodynamic Structures	1.06	0.92	9.574666034	1.786015931	703.4240675	0.14	6.843763814	0.496330705	103.763636	9.77	1.71	661.68	5%	Bay Prog.	45%	Clearinghouse	10%	0.49	0.77	66.17
84	5829 W HIGH ST	SIT2013-00001	36.860201	-76.394872	020802080205	Filterra	Filtering Practices	0.3	0.2811	9.574666034	1.786015931	703.4240675	0.02	6.843763814	0.496330705	103.763636	2.82	0.51	199.69	40%	Bay Prog.	60%	Bay Prog.	80%	1.13	0.31	159.75
100	600 WASHINGTON ST	SIT2014-00010	36.834313	-76.304245	020802080203	Filterra	Filtering Practices	0.1	0.1	9.574666034	1.786015931	703.4240675	0.00	6.843763814	0.496330705	103.763636	0.96	0.18	70.34	40%	Bay Prog.	60%	Bay Prog.	80%	0.38	0.11	56.27
86	611 SIXTH ST	SIT2012-00018_1	36.825118	-76.302046	020802080203	Filterra	Filtering Practices	0.22	0.1628	9.574666034	1.786015931	703.4240675	0.06	6.843763814	0.496330705	103.763636	1.95	0.32	120.45	40%	Bay Prog.	60%	Bay Prog.	80%	0.78	0.19	96.36
87	611 SIXTH ST	SIT2012-00018_2	36.825118	-76.302046	020802080203	Filterra	Filtering Practices	0.24	0.168	9.574666034	1.786015931	703.4240675	0.07	6.843763814	0.496330705	103.763636	2.10	0.34	125.65	40%	Bay Prog.	60%	Bay Prog.	80%	0.84	0.20	100.52
81	726 SOUTH ST	SIT2010-00025_1	36.832825	-76.306454	020802080203	Infiltration (Pervious Asphalt)	Permeable Pavement w/o Sand, Veg., C/D soils, underdrain	0.269	0.060525	9.574666034	1.786015931	703.4240675	0.21	6.843763814	0.496330705	103.763636	2.01	0.21	64.21	10%	Bay Prog.	20%	Bay Prog.	55%	0.20	0.04	35.31
82	726 SOUTH ST	SIT2010-00025_2	36.832825	-76.306454	020802080203	Underground Infiltration (Infiltration Chamber)	Bioretention C/D soils, underdrain	0.5	0.2725	9.574666034	1.786015931	703.4240675	0.23	6.843763814	0.496330705	103.763636	4.17	0.60	215.29	25%	Bay Prog.	45%	Bay Prog.	55%	1.04	0.27	118.41
72	ADAMS ST (3504 Shipwright Street)	SIT2010-00021_1	36.860129	-76.348603	020802080205	Extended Dry Detention	Dry Extended Detention Ponds	0.8	0.568	9.574666034	1.786015931	703.4240675	0.23	6.843763814	0.496330705	103.763636	7.03	1.13	423.62	20%	Bay Prog.	20%	Bay Prog.	60%	1.41	0.23	254.17
73	ADAMS ST (3504 Shipwright Street)	SIT2010-00021_2	36.860129	-76.348603	020802080205	Filterra	Filtering Practices	0.27	0.1917	9.574666034	1.786015931	703.4240675	0.08	6.843763814	0.496330705	103.763636	2.37	0.38	142.97	40%	Bay Prog.	60%	Bay Prog.	80%	0.95	0.23	114.38
74	RIVER POINTE PKWY (3812 Falling River Point Road)	SIT2007-00040	36.86282	-76.357603	020802080205	Wetpond	Wet Ponds and Wetlands	17.7	8.673	9.574666034	1.786015931	703.4240675	9.03	6.843763814	0.496330705	103.763636	144.82	19.97	7037.47	20%	Bay Prog.	45%	Bay Prog.	60%	28.96	8.99	4222.48
97	SOUTH ST (1139 South Street)	SIT2012-00019_1	36.830724	-76.308854	020802080203	Bioretention (Rain Garden)	Bioretention C/D soils, underdrain	0.21	0.1218	9.574666034	1.786015931	703.4240675	0.09	6.843763814	0.496330705	103.763636	1.77	0.26	94.83	25%	Bay Prog.	45%	Bay Prog.	55%	0.44	0.12	52.16
98	SOUTH ST (1139 South Street)	SIT2012-00019_2	36.830724	-76.308854	020802080203	Bioretention (Rain Garden)	Bioretention C/D soils, underdrain	0.07	0.0406	9.574666034	1.786015931	703.4240675	0.03	6.843763814	0.496330705	103.763636	0.59	0.09	31.61	25%	Bay Prog.	45%	Bay Prog.	55%	0.15	0.04	17.39

**Part I.D.2**

**TMDL Action Plans other than the Chesapeake Bay TMDL**

**Part I.D.2.a)**

**TMDL Action Plan Development**

*“No later than 24 months after the effective date of this state permit (July 1, 2018), the permittee shall submit to the Department TMDL Action Plans to address any new or modified requirements established under this Special Condition for pollutants identified in TMDL wasteload allocations approved prior to the effective date of this state permit” (July 1, 2016).*

A Bacteria TMDL Action Plan for the Hoffer Creek and Elizabeth River watersheds has been developed and is attached below.

# BACTERIA TMDL ACTION PLAN

for

Elizabeth River Watershed and  
Hoffler Creek Watershed



City of Portsmouth, VA  
Permit No. VA0088668

June 20, 2018

Prepared by Arcadis

# CONTENTS

1	Introduction .....	4
1.1	Elizabeth River Watershed .....	5
1.2	Hoffler Creek Watershed .....	5
2	Pollutant(s) Causing Impairment(s) .....	6
2.1	Elizabeth River Watershed .....	6
2.2	Hoffler Creek Watershed .....	8
3	Waste Load Allocations Assigned to MS4 .....	10
3.1	Elizabeth River Watershed .....	10
3.2	Hoffler Creek Watershed .....	10
4	Significant Sources of POC(s) .....	10
4.1	Elizabeth River Watershed .....	10
4.2	Hoffler Creek Watershed .....	12
5	Existing or New Best Management Practices .....	13
6	Legal Authority for TMDL Implementation .....	18
6.1	Current Program and Existing Legal Authority .....	18
6.2	New or Modified Legal Authority .....	19
7	Enhancements to Public Education, Outreach, and Employee Training Programs .....	19
8	Milestone Implementation Schedule .....	20
9	Methods to Assess TMDL Action Plan .....	21
9.1	Elizabeth River Watershed .....	21
9.2	Hoffler Creek Watershed .....	21
10	Measurable Goals and Metrics to Track Compliance .....	23
11	Public Comments Process .....	23
12	Conclusions .....	23
13	Limitations .....	23

## TABLES

Table 1. Waste Load Allocation for Enterococci for the City of Portsmouth Elizabeth River Watershed ...	10
Table 2. Land Use in the Elizabeth River Drainage Area* .....	11
Table 3. Land Use in the Hoffer Creek Drainage Area* .....	12
Table 4. Sanitary Sewer Overflows.....	14
Table 5. CCTV Quantities .....	15

## FIGURES

Figure 1. City of Portsmouth, Hoffer Creek and Elizabeth River Locations .....	4
Figure 2. Elizabeth River Watershed Overview and Monitoring (by The Louis Berger Group, Inc.) .....	7
Figure 3. Hoffer Creek Watershed Overview (by The Louis Berger Group, Inc.) .....	9
Figure 4. Pet Waste Stations .....	17
Figure 5. Water Quality Monitoring Stations for Hoffer Creek (by CH2M) .....	22

# 1 INTRODUCTION

The City of Portsmouth (City) has developed this Bacteria Total Maximum Daily Load (TMDL) Action Plan (Plan) for the approved local TMDL reports for Elizabeth River and Hoffer Creek watersheds, as required by the Virginia Stormwater Management Program (VSMP) Individual Municipal Separate Storm Sewer System (MS4) Permit (Permit No. VA0088668), which was effective on July 1, 2016 and expires on June 30, 2021. This Plan was developed to comply with Part 1.D.2 of the Permit, TMDL Action Plans other than the Chesapeake Bay TMDL, and is required to be submitted to the Virginia Department of Environmental Quality (DEQ) no later than 24 months after the effective date of the Permit (by July 1, 2018). The DEQ TMDL Action Planning for Local TMDLs Guidance Memo (DEQ Guidance Memo)<sup>1</sup> was used to prepare this Plan, which is the first permit term of Bacteria TMDL Action Plan to be developed by the City to document the planned reductions of the pollutant(s) of concern (POC) in order to address the waste load allocations (WLA) identified by the permit.

The City is located within the James River Basin in coastal Virginia. The City is bordered on the west by the City of Suffolk, on the south, east, and west by the City of Chesapeake, on the north by the James River and on the east by the City of Norfolk. The Elizabeth River watershed is in central and eastern Portsmouth. The Hoffer Creek watershed is in the northwestern portion of the City, as shown in Figure 1.



Figure 1. City of Portsmouth, Hoffer Creek and Elizabeth River Locations

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<sup>1</sup> Virginia DEQ Guidance Memo No. 16-2006, dated November 21, 2016

*The name(s) of the Final TMDL Report(s) (DEQ Guidance Memo)*

## **1.1 Elizabeth River Watershed**

This TMDL Action Plan has been prepared to address the approved local TMDL report *Bacteria Total Maximum Daily Load (TMDL) Development for the Elizabeth River Watershed (dated April 2010 and approved by the SWCB on September 30, 2010)*. A portion of the Elizabeth River watershed falls within the City of Portsmouth, and therefore the city is subject to the previously mentioned bacteria TMDL for the Elizabeth River.

## **1.2 Hoffler Creek Watershed**

This TMDL Action Plan has been prepared to address the approved local TMDL report *Bacteria Total Maximum Daily Load (TMDL) Development for the Hoffler Creek Watershed (dated September 2011 and approved by the SWCB on June 29, 2012)*. The northwest corner of the City of Portsmouth falls under the Hoffler Creek watershed and therefore the City is subject to the previously mentioned bacteria TMDL for Hoffler Creek.

This Plan is organized as follows to address specific MS4 Permit requirements:

- Section 2: Pollutant(s) Causing Impairment(s)
  - Elizabeth River Watershed
  - Hoffler Creek Watershed
- Section 3: Waste Load Allocations assigned to MS4
  - Elizabeth River Watershed
  - Hoffler Creek Watershed
- Section 4: Significant Sources of POC(s) (Permit Section I.D.2.b(3))
  - Elizabeth River Watershed
  - Hoffler Creek Watershed
- Section 5: Existing or New Best Management Practices (Permit Section I.D.2.b(2))
- Section 6: Legal Authority for TMDL Implementation (Permit Section I.D.2.b(1))
- Section 7: Enhancements to Public Education, Outreach and Employee Training Programs (Permit Section I.D.2.b(3))
- Section 8: Milestone Implementation Schedule
- Section 9: Methods to Assess TMDL Action Plan (Permit Section I.D.2.b(5))
  - Elizabeth River Watershed
  - Hoffler Creek Watershed
- Section 10: Measurable Goals and Metrics to Track Compliance (Permit Section I.D.2.b(5))
- Section 11: Public Comment Process (Permit Section I.D.2.b(6))
- Section 12: Conclusions
- Section 13: Limitations

## 2 POLLUTANT(S) CAUSING IMPAIRMENT(S)

*The pollutant(s) causing the impairment(s) (DEQ Guidance Memo)*

Enterococcus bacteria is the pollutant of concern for the Elizabeth River and Hoffer Creek watersheds. Both are listed on Impaired Waters – 303(d) List for Recreation, due to exceedances of the criteria for enterococcus bacteria for primary contact: Elizabeth River (2008) and Hoffer Creek (2010).

### 2.1 Impairments in the Elizabeth River Watershed

The Elizabeth River watershed has nine impaired segments covered in four TMDLs. The City of Portsmouth covers 17,544 acres in the Elizabeth River watershed and is broken down into the following segments:

- TMDL 1 (Upper Mainstem, Lower Southern branch, Lower Eastern Branch, Indian River, and Broad Creek),
- TMDL 2 (Western Branch), and
- TMDL 4 (Paradise Creek).

Figure 2 shows the boundaries of the watershed. The segments are listed as impaired according to the VA DEQ criteria for recreational uses (VA DEQ, 2016) of waterbodies located in saltwater or in a transition zone:

Enterococci bacteria shall not exceed a geometric mean of 35 counts per 100 ml of water for four or more samples over a calendar month nor shall more than 10% of the total samples in the assessment period exceed enterococci 104 CFU/100ml.

Analysis of physical, chemical, biological, and observational data indicate potential key sources of bacteria. Land use characterization was based on the latest available land cover data from the National Land Cover Dataset (NLCD) 2005 Dataset. The primary land uses in the watershed are 58% developed and 24% wetland.

Potential sources of bacteria include run-off from grazing livestock, industrial waste, agricultural practices, residential waste, and pet waste. The TMDL identified and characterized potential bacteria sources in the watershed to include MS4 permitted facilities, failed septic systems, sanitary sewer overflows, marinas, livestock, wildlife, and pets. Eight MS4 permits are held in the Elizabeth River Watershed TMDL: four Phase I MS4 permits (Portsmouth, Chesapeake, Norfolk, Virginia Beach) and four Phase II MS4 permits (Suffolk, Norfolk State University, Portsmouth Naval Medical Center, Scott Center Annex). An inventory of livestock, wildlife, and pets was collected from data provided by the Cities, Census of Agriculture (2007), the Virginia Department of Game and Inland Fisheries (VDGIF), the American Veterinary Medical Association (AVMA), as well as from other sources.

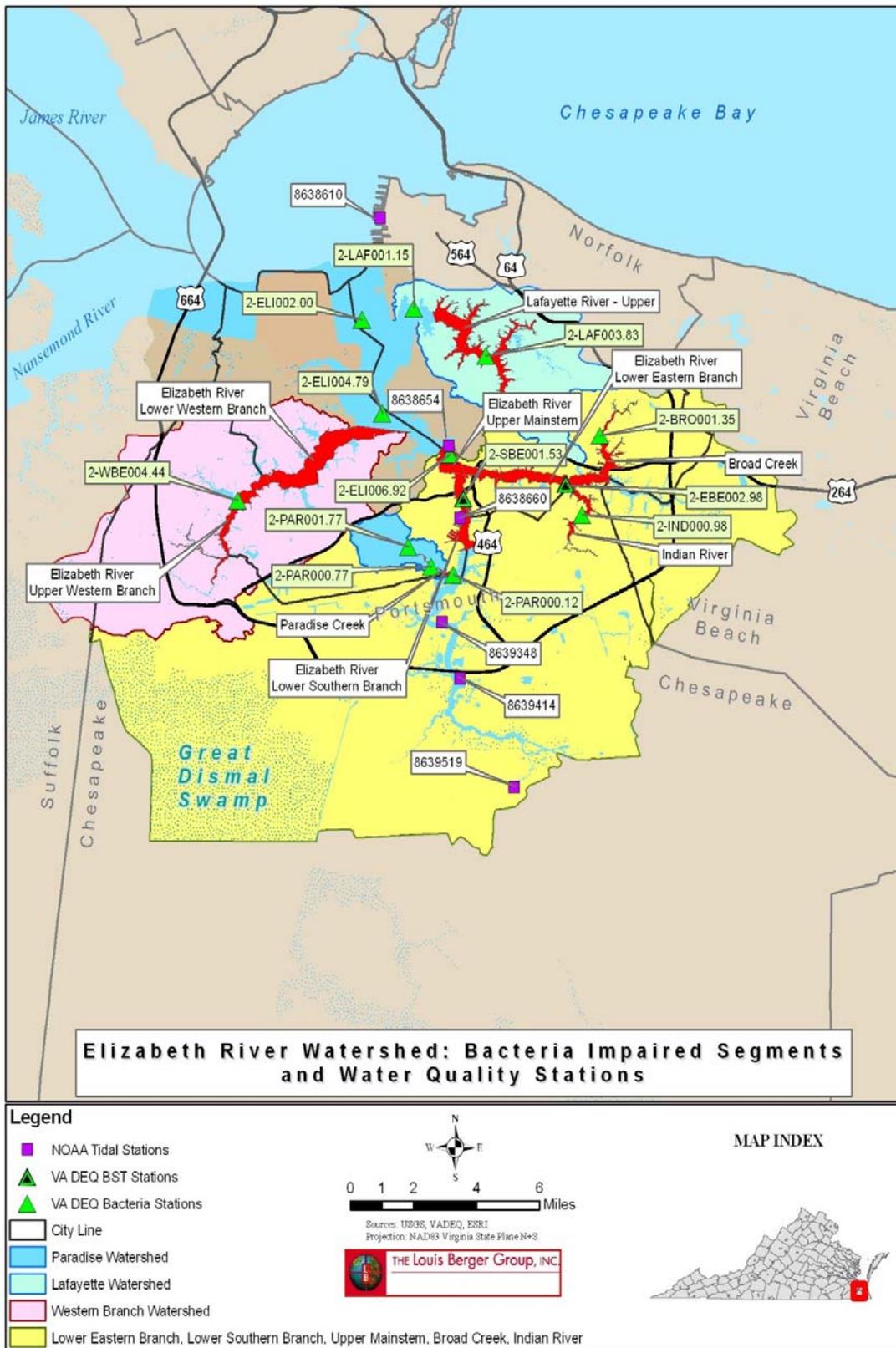


Figure 2. Elizabeth River Watershed Overview and Monitoring (by The Louis Berger Group, Inc.)

## 2.2 Impairments on the Hoffler Creek Watershed

The impaired segment within the Hoffler Creek watershed covers 1,781 acres with 1,122 acres within the city of Portsmouth MS4 permit, see Figure 3. The segment is listed as impaired according to the VA DEQ criteria for recreational uses (VA DEQ, 2001) of waterbodies located in saltwater or in a transition zone:

Enterococci bacteria shall not exceed a geometric mean of 35 counts per 100 ml of water for four or more samples over a calendar month nor shall more than 10% of the total samples in the assessment period exceed enterococci 104 CFU/100ml.

Analysis of physical, chemical, biological, and observational data indicate potential key sources of bacteria. Land use characterization was based on the latest available land cover data from the National Land Cover Dataset (NLCD) 2006 Dataset. The primary land uses in the watershed are 72% developed and 12% wetland. Potential sources of bacteria include run-off from wildlife, residential waste, and pet waste. The TMDL identified and characterized potential bacteria sources in the watershed to include sanitary sewer overflows, wildlife, and pets. Three MS4 permits are held in the Hoffler Creek Watershed TMDL: one Phase I MS4 (Portsmouth) and two Phase II MS4 (Suffolk, VDOT). An inventory of livestock, wildlife, and pets was collected from data provided by the Cities, Census of Agriculture (2007), the Virginia Department of Game and Inland Fisheries (VDGIF), the American Veterinary Medical Association (AVMA), as well as from other sources.

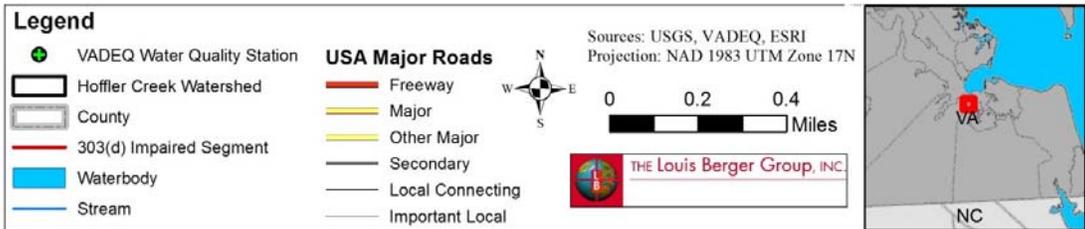
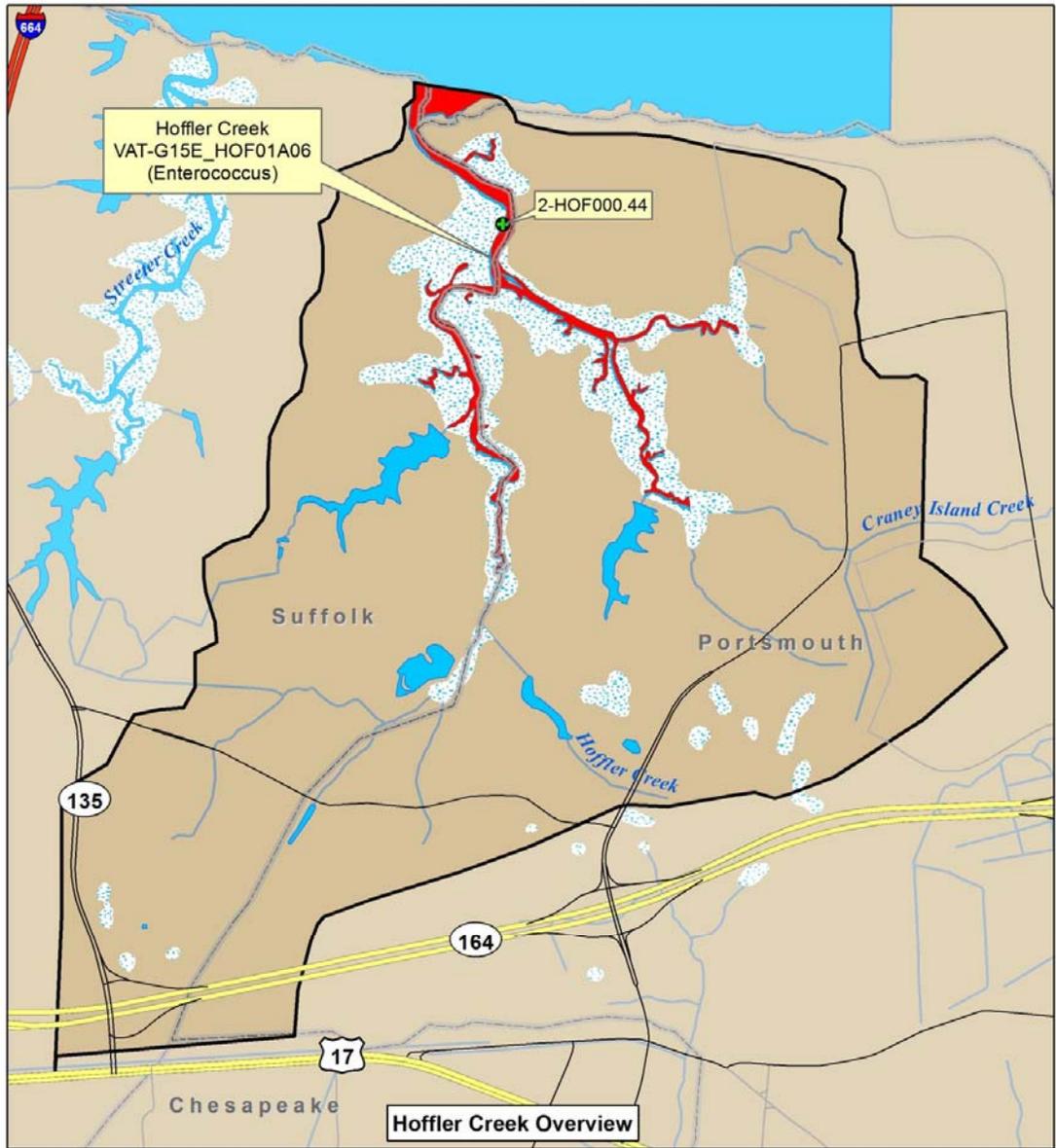


Figure 3. Hoffer Creek Watershed Overview (by The Louis Berger Group, Inc.)

### 3 WASTE LOAD ALLOCATIONS ASSIGNED TO MS4

The WLA(s) assigned to the MS4 as aggregate or individual WLAs (DEQ Guidance Memo)

A simple volumetric approach was used to calculate current loads, allocation, and determine reductions for each source. The load allocation was calculated using the following equation:

$$\text{TMDL} = \sum \text{WLA} + \sum \text{LA} + \text{MOS}$$

Where,

WLA = waste load allocation (point source contributions);

LA = load allocation (non-point source allocation); and

MOS = margin of safety.

#### 3.1 WLA for the Elizabeth River Watershed

The Waste Load Allocation (WLA) for Enterococci for the City of Portsmouth Elizabeth River Watershed based on MS4 Permit #VA0088668 is shown in Table 1 below.

Table 1. Waste Load Allocation for Enterococci for the City of Portsmouth Elizabeth River Watershed

TMDL #	River Sections	MS4 Permit #	Existing Load Counts/day	Allocated Load Counts/day	Required Reduction %
1	Upper Mainstem, Lower Southern Branch, Lower Eastern Branch, Broad Creek, Indian River	VA0088668	9.28E+13	4.42E+12	95%
2	Western Branch	VA0088668	2.10E+14	9.77E+12	95%
4	Paradise Creek	VA0088668	1.01E+13	4.79E+11	95%

#### 3.2 WLA for the Hoffler Creek Watershed

The WLA for Enterococci for the City of Portsmouth based on MS4 Permit #VA0088668 is 3.34E+11 counts/day, with a 95.6% required reduction.

### 4 SIGNIFICANT SOURCES OF POC

*Significant sources of POC(s) from facilities of concern owned or operated by the MS4 permittee that are not covered under a separate VPDES permit. A significant source of pollutant(s) from a facility of concern means a discharge where expected pollutant loading is greater than the average allocated pollutant loading for the land use identified in the TMDL (DEQ Guidance Memo)*

#### 4.1 Significant Sources of POC in the Elizabeth River Watershed

Land use characteristics in Table 2 were collected from the sources previously listed in section 2.1

Table 2. Land Use in the Elizabeth River Drainage Area\*

General Land Use Category	Specific Land Use Type	Acres	Total Acres	Percentage of Watershed (%)	Total Percent (%)
Developed	High Intensity Developed	7,700	68,887	6%	58%
	Medium Intensity Developed	13,048		11%	
	Low Intensity Developed	32,322		27%	
	Developed Open Space	15,816		13%	
Agriculture	Cultivated Crops	4,537	5,370	4%	5%
	Pasture/Hay	833		<1%	
Forest	Deciduous Forest	3,137	5,462	3%	5%
	Evergreen Forest	1,764		1%	
	Mixed Forest	560		<1%	
Wetlands	Estuarine Emergent Wetland	2,588	28,735	2%	24%
	Estuarine Forested Wetland	<1		<1%	
	Estuarine Scrub/Shrub Wetland	87		<1%	
	Palustrine Emergent Wetland	357		<1%	
	Palustrine Forested Wetland	23,589		20%	
	Palustrine Scrub/Shrub Wetland	2,113		2%	
Water	Palustrine Aquatic Bed	5	6,909	<1%	6%
	Water	6,905		6%	
Other	Barren Land	150	3,344	<1%	3%
	Grassland (not used in agriculture)	625		<1%	
	Scrub/Shrub	2,514		2%	
	Unconsolidated Shore	55		<1%	
<b>Total</b>			<b>118,707</b>	<b>100%</b>	<b>100%</b>

\*Data is for the entire Elizabeth River Watershed

No municipal permitted facilities discharge into the bacteria impaired watershed, therefore no waste load was allocated to permitted facilities. To account for future growth, one percent of the LA for Elizabeth River was allocated to the WLA. The bacteria load was allocated using a weighted approach. A margin of safety (MOS) which accounts for any lack of knowledge is applied to the waste load allocation. Non-point source reduction was incorporated into the load allocation. In addition to this, the total load from sanitary sewer overflows (SSOs) was included in load allocation but not the WLA for several reasons stemming from quantifying overflows. The load allocation was based on the proportion of bacteria sources, and estimated from the EPA's bacteria indicator tool.

## 4.2 Significant Sources of POC in the Hoffler Creek Watershed

Data in Table 3 was collected from sources on land use characteristics, mentioned previously in section 2.2.

Table 3. Land Use in the Hoffler Creek Drainage Area\*

General Land Use Category	NLCD 2006 Land Use Category	Acres	Total Acres	Percentage of Watershed (%)	Total Percent (%)
Developed	Developed High Intensity	30.6	1,280.2	1.7%	71.9%
	Developed Medium Intensity	232.2		13.0%	
	Developed Low Intensity	559.9		31.5%	
	Developed Open Space	457.5		25.7%	
Agriculture**	Cultivated Crops	4.9	8.3	0.3%	0.5%
	Pasture/Hay	3.3		0.2%	
Forest	Deciduous Forest	51.6	124.4	2.9%	6.9%
	Evergreen Forest	61.4		3.4%	
	Mixed Forest	11.4		0.6%	
Wetland	Palustrine Emergent Wetland	19.2	220.1	1.1%	12.4%
	Palustrine Forested Wetland	110.5		6.2%	
	Palustrine Scrub/Shrub Wetland	9.6		0.5%	
	Estuarine Emergent Wetland	79.5		4.5%	
	Estuarine Scrub/Shrub Wetland	1.3		0.1%	
Water	Open Water	106.3	106.3	6.0%	6.0%
Other	Scrub/Shrub	32.6	42.0	1.8%	2.3%
<b>Total</b>		<b>1,781.3</b>		<b>100%</b>	<b>100%</b>

\*Data is for the entire Hoffler Creek Watershed

\*\*The portion of Hoffler Creek Watershed within the City of Portsmouth contains no Agricultural Lands

No municipal permitted facilities discharge into the bacteria impaired watershed, therefore no waste load was allocated to permitted facilities. To account for future growth, one percent of the LA for Hoffler Creek was allocated to the WLA. The bacteria load was allocated using a weighted approach. The allocation was based on the urban area that is covered in each TMDL watershed. The reduction of loading from non-point sources (livestock, wildlife, pets, failed septic systems) including those that are not covered under MS4 area and the non-urban area of the MS4 was incorporated into the load allocation. In addition to this, the total load from the SSOs was included in load allocation.

## 5 EXISTING OR NEW BEST MANAGEMENT PRACTICES

*Existing or new management practices, control techniques, and system design and engineering methods, that have been or will be implemented as part of the MS4 Program Plan that are applicable to reducing the pollutant for which the WLA was established (DEQ Guidance Memo)*

The following BMPs will be implemented by the city to reduce Enterococci pollution from entering the watersheds. The BMP implementation will reflect the ratio of the watershed areas in the City with the majority being installed in the Elizabeth River watershed.

**BMP 1: Site Inspections** – As part of the stormwater management program, the City will continue to perform routine site inspections on projects that disturb 2,500 square feet or more of land, including demolition projects. Enforcement actions will be performed to ensure violators correct deficiencies, such as portable toilet care and placement. Site inspections will be performed once every two weeks and following any runoff-producing storm events. Following a repeat violation, inspections will be performed weekly until compliance is achieved. Inspection forms will be filled out and kept in an electronic database as well as in a paper filing system. Total number of inspections and active projects will be reported in the annual report. As a goal, the City will continue to perform the inspections and actions above routinely.

**BMP 2: Education/Public Awareness** – The City of Portsmouth works with Ask HR Green and HR Storm to produce publications for the City, including handouts, pledges, brochures, business education, storm drain medallions and more. To help reduce the amount of pollutants that enter area waterways, efforts are made to educate the general public and specific businesses to raise their awareness of stormwater pollution and ways to prevent it (see Section 7). The City goal will be to continue producing publications and collaborating with Ask HR Green and HR Storm.

**BMP 3: Illicit Discharge Program** – There are multiple pages on the City website that allow for the reporting of potential stormwater issues. City stormwater publications all contain a phone number and email address to help promote the reporting process. Directions for City employees on how to handle major and minor spill responses are on laminated cards and placed in all the City's trash, recycling, and public works vehicles. Routine field screenings will continue, and upon detection of dry weather flow, the source will be determined, and the City will attempt to resolve. Preventative measures will continue with inspections performed by the Fire Department to ensure materials are handled and stored in a safe manner. The goal of the City will be to continue preventative routine field screenings, and any Illicit Discharge Detection and Elimination (IDDE) incident to be documented, reported, and resolved.

**BMP 4: Sanitary Sewer Overflows** - The City requires any discharge from the sanitary sewer system to the stormwater system to be reported. Table 4 shows the number of SSOs and estimated gallons since the TMDL has been implemented.

Table 4. Sanitary Sewer Overflows

Fiscal Year	Number of Incidences	Gallons Spilled
2011	47	3,637
2012	18	622
2013	34	2,001
2014	34	1,369
2015	70	1,689
2016	32	2,539
2017	79	1,959
2018	26	945

As part of the DEQ Region-wide Consent Decree, the Department of Public Utilities is aggressively taking measures to control SSOs. The department submits all documentation and reports required by the consent order. All requirements are on schedule for completion and 99% of all recommended manhole inserts and wash out box plugs have been installed. As a goal, each incident will be reported to the VA DEQ and corrective actions will be taken by the wastewater utility through the Sanitary Sewer Overflow Reporting System (SSORS).

**BMP 5: Sanitary Sewer Monitoring** – The City continuously monitors flow at 3 sites and all 65 City pump stations to help identify any blockages, overflows, or overloaded areas. All flow and SSES (Sanitary Sewer Evaluation Survey) data is evaluated and each basin evaluated. The City goal will be to continue to perform field investigations on the sanitary system in order to maintain system integrity and prevent future SSOs. This monitoring will be on-going.

**BMP 6: Capital Improvement Program** – The City of Portsmouth Capital Improvement Program (CIP) aims to address physical conditions in the system that may contribute to an SSO or have potential adverse impacts to health and safety. This is done through CCTV inspections, responding to calls, and proactively investigating system conditions. The total miles of CCTV performed annually since 2011 are shown in Table 5 below. These focus on the backbone sewer and inspection of gravity sewers, extending from reoccurring SSO locations to the location of stoppage. Faults will be prioritized and addressed based on urgency. The City will continue to assess potential replacement areas through CCTV and create rehabilitation plans annually. For fiscal year 2019, The City plans to rehab 6,546 linear feet of pipe. The goal of the City will be to CCTV 119,000 linear feet (22.5 miles) of sanitary sewer each year as required in the MS4 permit.

Table 5. CCTV Quantities

Fiscal Year	CCTV by City (mi)	CCTV by Contractors (mi)	Total CCTV (mi)	Percent of City Sewers
2011	3.5	41.9	45.4	11.8%
2012	4.9	32.1	37.0	10.1%
2013	4.3	18.6	22.9	6.3%
2014	6.9	15.3	22.2	6.1%
2015	5.2	7.9	13.1	3.6%
2016	4.7	15.8	20.5	5.6%
2017	1.3	10.4	11.7	3.2%
2018	0.7	5.2	5.9	1.6%

**BMP 7: Pet Waste Stations** – The Hoffer Creek bacteria TMDL determined 72% of the bacteria contribution was from pet waste. The Portsmouth portion of the contribution from pets to the Elizabeth River is unknown. Beginning in 2012, 18 pet waste stations have been installed and maintained in the City of Portsmouth; 4 stations are in the Hoffer Creek watershed (Stations Hoffer 3-6) and 12 within the Elizabeth River watershed, three of which are in close proximity of the Hoffer Creek watershed (Hoffer 1-2, 7). See Figure 4 for station locations within the City. Along with maintaining existing stations, the City will continue to identify areas with high pet concentrations in need of potential stations. To encourage proper pet waste disposal, a goal of 10 new pet waste stations will be installed from these identified locations.

# Portsmouth Pet Waste Stations

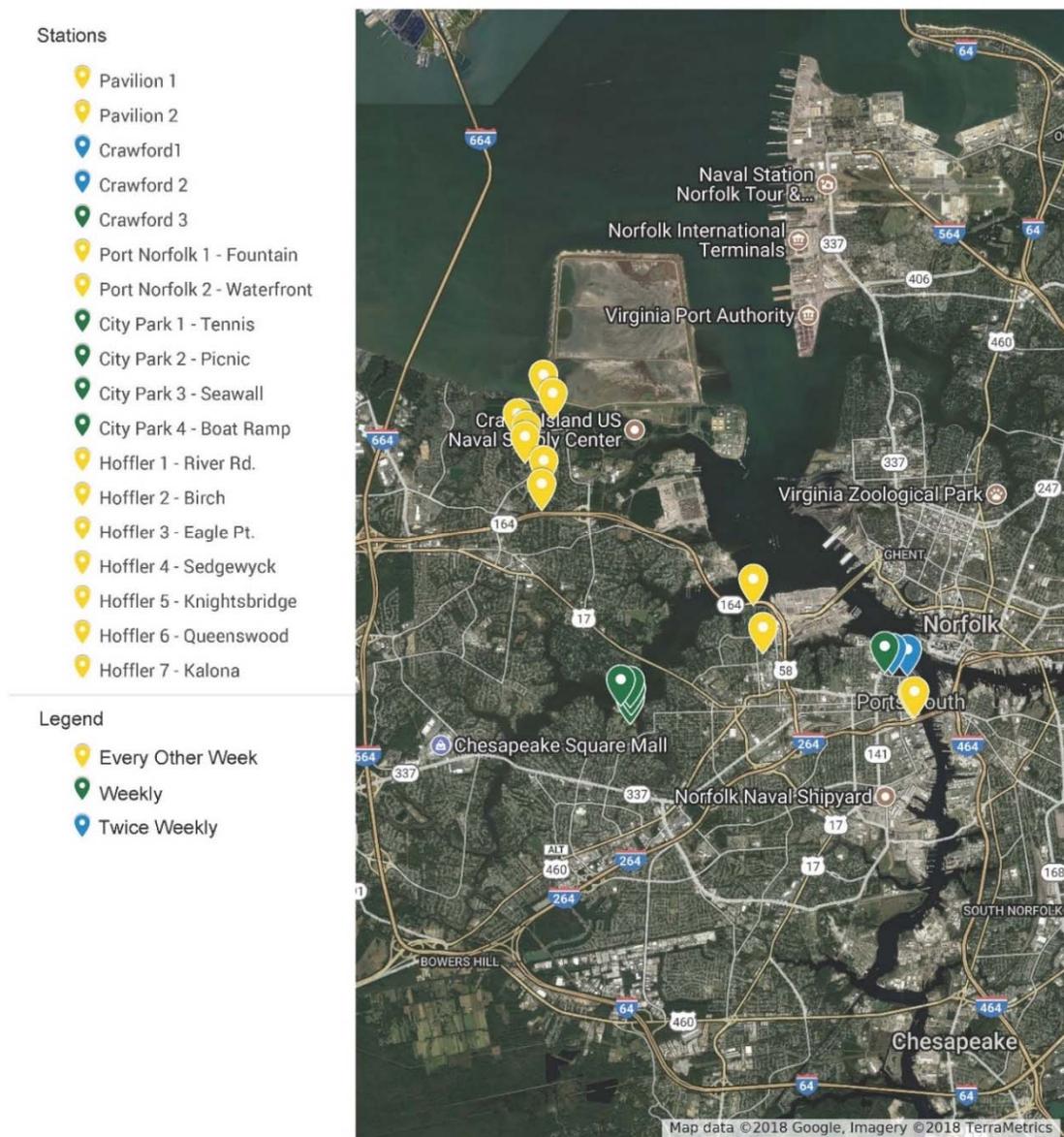


Figure 4. Pet Waste Stations

**BMP 8: Dog Parks** – The environment of dog parks encourages patrons to pick up after their pets. Currently there are no dog parks in the City of Portsmouth. Parks, Recreation, and Leisure Services are continuing to promote pocket dog parks within communities throughout the City. A dog park would encourage people to exercise their dogs in the designated area rather than walking them in neighborhoods where there is a higher chance of waste not being properly disposed of. A goal of the City will be to identify 1 potential location for a dog park of ranging from 0.5 acre to 1 acre.

**BMP 9: Structural BMPs** - The City proposes to continue to perform routine maintenance as needed on City-owned structural BMPs. City staff will continue to annually review assessments and budget for specific projects.

**BMP 10: Septic System Management** – Portsmouth still has 70 active septic systems citywide, 5 of which are in the Hoffer Creek watershed and the remainder in the Elizabeth River watershed. Since the implementation of the TMDL report, 7 systems have been tied to the City sewer system, 1 from the Hoffer Creek Watershed. Currently there is no system to track septic maintenance and pumping. The City goal is to work with VDH on developing and implementing a septic management plan during the permit cycle.

**BMP 11: Marina Waste Collection and Enforcement** – Marinas can be a significant source of human waste pollution when waste is not properly disposed of or pump stations do not work properly. The City sponsors the HRSD Boater Education and Pump Out Program, providing dedicated HRSD teams to service Portsmouth marinas. The program educates users and provides pump out services free of charge. Marinas with existing pump outs may obtain supplemental support if their system malfunctions or fails. The program currently services select marinas and boat ramps as well as service call-ins, walk-up, and residential appointments. The City's goal is to maintain this program and spread awareness and participation in the free pump out service.

## 6 LEGAL AUTHORITY FOR TMDL IMPLEMENTATION

*Legal authorities such as ordinances, state, federal, and other permits, orders, specific contract language, and interjurisdictional agreements applicable to reducing the POCs identified in each respective TMDL (DEQ Guidance Memo)*

Under the City's MS4 Permit's TMDLs Action Plans other than the Chesapeake Bay TMDL (Part I, D.2), the City of Portsmouth is required to:

- Conduct a review of its currently implemented MS4 program that includes review of the City's existing legal authorities and the City's ability to ensure compliance with the Permit.

Compliance with this Plan represents adequate progress during the current MS4 Permit term towards achieving TMDL waste load allocations consistent with the assumptions and requirements of the local TMDLs. Relevant existing legal authorities include ordinances, permits, orders, contracts, inter-jurisdictional agreements and other enforceable mechanisms.

### 6.1 Current Program and Existing Legal Authority

The City of Portsmouth Department of Engineering and Technical Services, Stormwater Compliance is responsible for the overall implementation of the MS4 Permit and reporting requirements. The City has adopted an MS4 Program Plan that documents its capabilities for implementation of all MS4 Permit requirements, including the programmatic and legal authorities required to meet the local TMDLs requirements. The full MS4 Program Plan can be found online at <https://www.portsmouthva.gov/DocumentCenter/View/3202/MS4-Program-Plan>. The following components of the City's MS4 Program will be utilized to meet this Plan requirements:

- The Stormwater Management Ordinance (Chapter 31.2), Erosion and Sediment Control Ordinance (Chapter 11), Water, Sewers and Sewage Disposal Ordinance (Chapter 38), Fire Prevention Code (Chapter 13), and Garbage and Refuse Code (Chapter 16) provide the authority to control pollutant discharges to the MS4.

- The City has authority as authorized by state law and as stated in local ordinances, including options for escalating enforcement steps as appropriate in the City's exercise of its enforcement discretion as the regulator of covered third party activities. Local enforcement authority includes:
  - Stormwater Management Ordinance (Chapter 31.2): see § 31.2-21. Enforcement and § 31.2-23. Pollution of the Stormwater System.
  - Erosion and Sediment Control Ordinance (Chapter 11): see § 11-7. Violations, Penalties, Legal Remedies.
  - Water, Sewers, and Sewage Disposal Ordinance (Chapter 38): see § 38-2. Violations of Chapter.
  - Fire Prevention Code (Chapter 13): § 13-83. Enforcement and § 13-84. Violations.
  - Chesapeake Bay Preservation Act Ordinance (Chapter 9.1): § 9.1-13. Enforcement
- Contracts and interjurisdictional agreements:
  - To the extent authorized by state law, the City has authority to enter and carry out contracts and, in event of breach of any contract by a counterparty, to enforce such contracts according to the provisions.
- The City has authority to conduct inspections and monitoring related to implementing the permit requirements, including but not limited to:
  - Stormwater Management Ordinance (Chapter 31.2): § 31.2-13. Monitoring and Inspections.
  - Erosion and Sediment Control Ordinance (Chapter 11): § 11-6. Monitoring, Reports and Inspections.
  - Water, Sewers and Sewage Disposal Ordinance (Chapter 38): § 38-53. Right of entry and access to premises.
  - Fire Prevention Code (Chapter 13): § 8.1-9. Investigation.
  - City Portsmouth Code of Ordinances

## 6.2 New or Modified Legal Authority

No new legal authority or modifications to the existing legal authority are necessary in order to meet the local TMDL Action Plans requirements.

## 7 ENHANCEMENTS TO PUBLIC EDUCATION, OUTREACH, AND EMPLOYEE TRAINING PROGRAMS

*Enhancements to public education, outreach, and employee training programs to also promote methods to eliminate and reduce discharges of POC(s) for which a WLA has been assigned (DEQ Guidance Memo)*

The City continues to implement a public education and outreach program as part of its MS4 Program Plan. This program has many goals including making the public aware of the results of polluting the stormwater system, involving the community in improving the quality of the area waters, and educating the public on ways to decrease the amount of pollution that is entering the area's waterways. The City will continue to distribute educational material to citizens throughout the year. HR Storm, Ask HR Green, Chesapeake Club, and the City work together to distribute various materials from pet waste information to yard care to violation letters. Included with all education materials is a number to call if citizens have any questions about the stormwater management program. The City participates in many regional and

national events, such as cleaning up the bay, public parks, and land to increase public participation and awareness.

There are two pages on the City's website allowing for reporting of potential stormwater issues, including illicit discharges. The City Manager's webpage and the Public Works page each contain drop-downs that allow for ease of use of the web reporting method. All city stormwater publications contain a phone number and/or an email address to promote the reporting process. Any report will be promptly addressed, and necessary actions taken to resolve the illicit discharge reported.

The City will also continue to participate in the Storm Drain Medallion Program. Storm inlets are identified with a medallion marked "No Dumping. Drains to Waterway" to help remind citizens about pollution and the importance of preventing pollution from entering the waterways.

The City sponsors the HRSD Boater Education and Pump Out program, providing free service and education. The program operates year round, with a crew dedicated to visiting Portsmouth marinas at least one day each weekend. With each visit the crew provides pump out services as well as a face-to-face instructional session. The program will also attend water themed events and festivals in Portsmouth to promote the program and City sponsorship.

The City's stormwater website (<https://www.portsmouthva.gov/397/Stormwater-Management>) contains easy access to city stormwater information, pollution prevention, the MS4 permit, and illicit discharge information and reporting. The website will be updated continually as the program develops.

The City will continue to provide SWM training and SWPPP training for employees. The City of Portsmouth staff is involved with the DEQ training program to ensure that individuals are properly trained to implement the VSMP and continues to train other local staff for the VSMP.

## 8 MILESTONE IMPLEMENTATION SCHEDULE

*A schedule of interim milestones and implementation of the items in 5, 6, and 7 (DEQ Guidance Memo)*

As permitted in the MS4 General Permit and referred to in the DEQ's Draft Local TMDL Action Plan Guidance Document, the City is proposing to implement this Action Plan in multiple stages over multiple permit cycles using an adaptive iterative approach. This approach will allow the City to gather the necessary data and information to determine the most effective strategy for minimizing the POC loads and targeting the implementation to meet the TMDL WLA for bacteria. The schedule below is proposed for implementation of the BMPs for the current permit cycle ending on June 30, 2021.

<u>BMP/Milestone</u>	<u>Schedule</u>
Submission of Local TMDL Action Plan to DEQ	July 1, 2018
BMP 1: <u>Site Inspections</u>	Biweekly
BMP 2: <u>Education/Public Awareness</u>	Quarterly
BMP 3: <u>Illicit Discharge Program</u>	On-Going
BMP 4: <u>Sanitary Sewer Overflows</u>	As-Needed
BMP 5: <u>Sanitary Sewer Monitoring</u>	On-Going
BMP 6: <u>Capital Improvement Program</u>	On-Going

BMP 7: <u>Pet Waste Stations</u>	Annually
BMP 8: <u>Dog Park</u>	June 30, 2021
BMP 9: <u>Structural BMPs</u>	On-Going
BMP 10: <u>Septic System Management</u>	On-Going
BMP 11: <u>Marina Waste Collection and Enforcement</u>	On-Going

## 9 METHODS TO ASSESS TMDL ACTION PLAN

*Methods to assess TMDL Action Plans for their effectiveness in reducing the pollutants identified in the WLAs (DEQ Guidance Memo)*

The City of Portsmouth will continue the water quality monitoring city wide and in Elizabeth River and Hoffer Creek as part of the MS4 permit requirements.

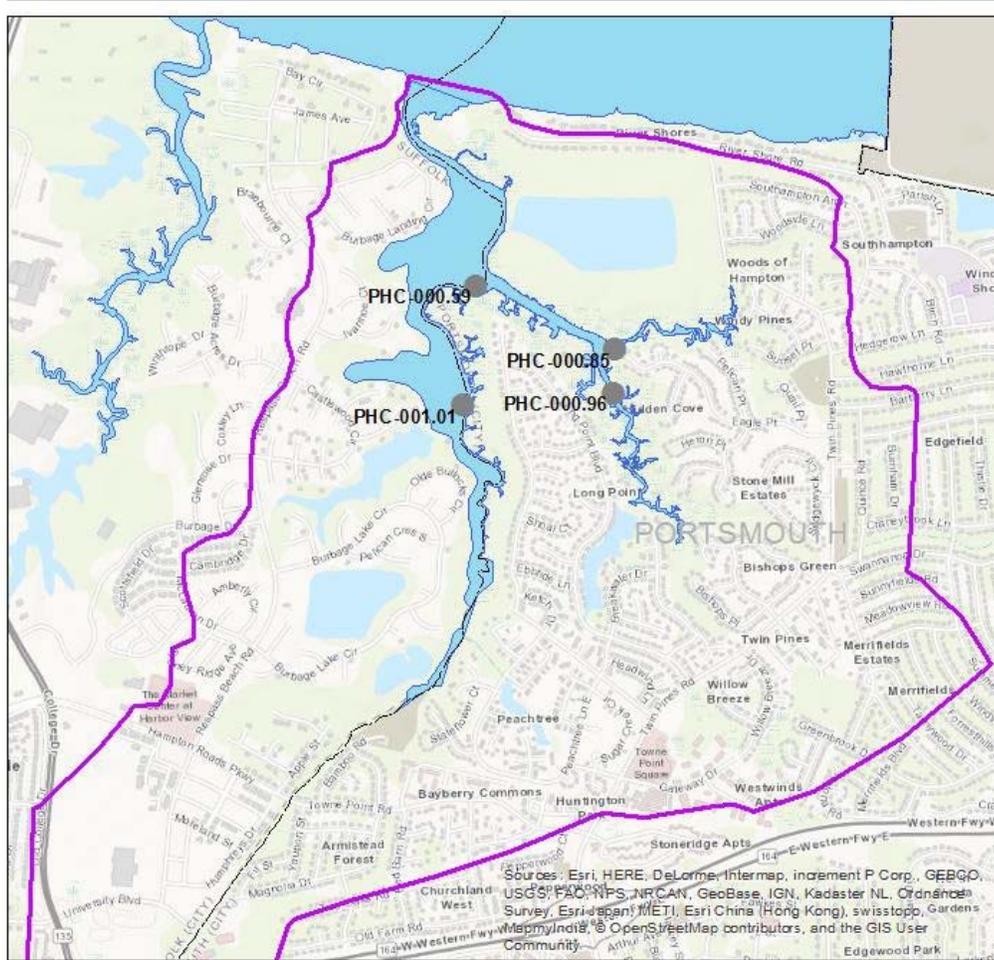
The City will provide all documentation of the Water Quality (WQ) Monitoring Program and analysis of the data to determine if any adjustments are necessary to the Action Plan with regards to the BMPs/management strategies for controlling POC loads. At the end of each MS4 permit reporting period, the City will also prepare an annual WQ monitoring report to be included with the City's MS4 Annual Report.

### 9.1 Elizabeth River Watershed Monitoring

There are 8 monitoring stations within the Portsmouth portion of the Elizabeth River watershed. Three located within the Upper Mainstem, three within Paradise Creek, one within Lower Southern Branch, and one within Western Branch. The locations of these can be seen in Figure 2: Elizabeth River Watershed Overview and Monitoring (by The Louis Berger Group, Inc.), found in Section 2.1.

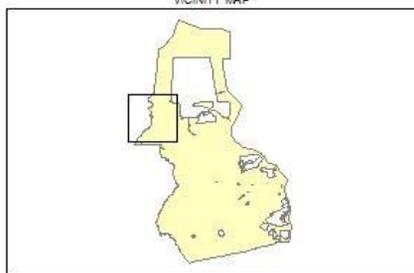
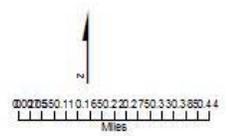
### 9.2 Hoffer Creek Watershed Monitoring

Monitoring at four locations within Hoffer Creek will continue to be performed on a monthly basis to meet MS4 permit requirements. The City's monthly bacteria monitoring is used to assess the overall health and evaluate long-term trends in Hoffer Creek. These monitoring locations, shown in Figure 5, are sampled during ebb tide. Until July 2014, the samples were analyzed for *E. coli* and *Enterococcus* bacteria. Since that time, the samples are analyzed for fecal coliform and *Enterococcus* bacteria.



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, Gardens of Eden, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

- LEGEND**
- Sampling Status**
- Active
  - ▭ HofferCkDrainage
  - ▭ CityBoundary
  - ▭ Waterbodies



**FIGURE**  
**Station Locations**  
 2016 - 2017 Bacteria Monitoring  
 MS4 Permitting Program

LINK: I:\BROOKS\DEGIS\_SHARE\WB\G\PORTSMOUTH\_684281\WORKING\ALBERT\STATION\_LOCATIONS.MXD KALBERT 5/25/2017 2:05:21 PM



Figure 5. Water Quality Monitoring Stations for Hoffer Creek (by CH2M)

## 10 MEASURABLE GOALS AND METRICS TO TRACK COMPLIANCE

*Measurable goals and the metrics that the permittee and DEQ will use to track those goals (and the milestones required by the permit). Evaluation metrics other than monitoring may be used to determine compliance with the TMDL(s) (DEQ Guidance Memo)*

The City intends to demonstrate its progress on implementation of this Action Plan by tracking, monitoring, and reporting on BMP/milestone activity progress in its MS4 Program Annual Report that is submitted to DEQ on October 1st of each permit year. In the Annual Report, the City will provide updates on the status of each of the BMP/milestone activities listed under Section 5 of this Action Plan to include compliance with the proposed schedule, found in Section 8. In accordance with the adaptive approach adopted by the City, referenced in this Action Plan, the City may modify/replace BMPs, as necessary, to achieve the most effective plan for reducing the discharge of bacteria from the City's MS4 and meeting the assigned TMDL WLA.

## 11 PUBLIC COMMENTS PROCESS

A draft version of this plan was published for a public comment period of approximately four weeks and no comments were received.

## 12 CONCLUSIONS

The City developed this Bacteria TMDL Action Plan as required in the City's MS4 Permit, referenced in Section 1 of this Plan, and in accordance with the DEQ TMDL Action Plan Guidance Document dated November 21, 2016.

## 13 LIMITATIONS

This document was prepared solely for and by the City of Portsmouth in accordance with professional standards at the time the services were performed, and in accordance with the contract between the City of Portsmouth and Arcadis. This document is governed by the specific scope of work authorized by the City; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the City and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

## Annual Report: In-system Wet Weather Stormwater Monitoring Program

### Introduction

In order to characterize nutrient and sediment concentrations related to urban stormwater, the six Phase I MS4 localities within Hampton Roads, in partnership with the U.S. Geological Survey (USGS) and the Hampton Roads Sanitation District (HRSD), created a regional stormwater monitoring network. This network is dual-purposed, simultaneously addressing local water quality issues and fulfilling MS4 permit requirements, while providing useful data to support Chesapeake Bay Program modeling efforts. The Chesapeake Bay Program's watershed model is responsible for estimating loads of total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) throughout the Bay watershed. However, there are no calibration stations within the Coastal Plain, and therefore no verifiable loading rates of these constituents. By providing high frequency and high quality data through the USGS quality control and quality assurance framework, the Hampton Roads region will be well-represented with accurate estimates of loading rates for future phases of the model. This report was developed to fulfill the requirements stated in the Phase I localities' MS4 permits.

### Monitoring Network

The six Phase I MS4 localities (Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, and Virginia Beach) participate in the Hampton Roads Regional Water Quality Monitoring Program (RWQMP). Each locality has two monitoring sites, draining land between 3 and 30 acres with no tidal water influence, that represent a range of urban land uses including high-density residential, single-family residential, and commercial/industrial (Fig. 1; Table 1). Site selection was also based on the goal of having very few, if any, best management practices (BMPs) upstream of the sampling

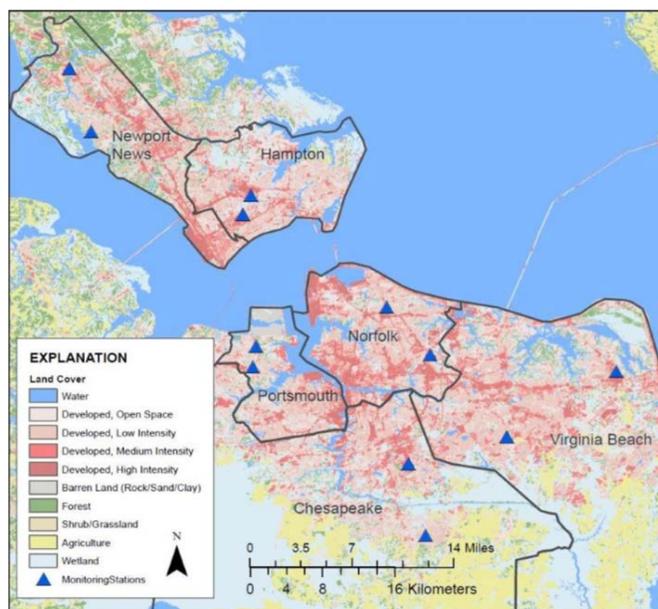


Figure 1. Locations of the 12 water quality monitoring stations, overlaid on land cover, in Hampton Roads, VA.

area. By characterizing the range in loadings that are typical of a given land-use type that do not yet have BMPs implemented, variability can be assessed within land use types, and meaningful comparisons can be made between the three dominant land use types in the region. This should significantly enhance the understanding of how management activities can be directed efficiently in the future.

Table 1. Locality names, station names, and land use types for all localities participating in the monitoring program.

<b>Locality</b>	<b>Station Name</b>	<b>Land Use Type</b>
Chesapeake	Professional Place	Commercial
Chesapeake	Ramsgate Lane	Single-family Residential
Hampton	Coliseum Drive	Commercial
Hampton	Garrett Drive	Single-family Residential
Newport News	Lakewood Park Drive	Single-family Residential
Newport News	Rivers Ridge Circle	High Density Residential
Norfolk	Sheppard Avenue	Single-family Residential
Norfolk	USAA Drive	Commercial
Portsmouth	Craneybrook Lane	High Density Residential
Portsmouth	Daisy Drive	Single-family Residential
Virginia Beach	Lindsley Drive	High Density Residential
Virginia Beach	Ludlow Drive	Single-family Residential

Operation of the monitoring network is the joint responsibility of USGS and HRSD. Data collection is supervised by the USGS Virginia Water Science Center to ensure that data quality meets the requirements established by USGS. Discrete sample collection and analysis plus system maintenance are conducted by HRSD's Central Environmental Laboratory (CEL) while data analysis, interpretation, and reporting are conducted by USGS. All 12 stations collect real-time, high frequency data including flow (stage, velocity, and discharge), turbidity, specific conductance, and water temperature. Discrete samples for nutrients and sediments are taken during storm events over a range of flows and for quarterly baseflow sampling. Nutrient concentrations consist of measurements of TN, total Kjeldahl nitrogen (TKN), organic nitrogen,

nitrate + nitrite, ammonia + ammonium, TP, and orthophosphate. Sediments are measured as TSS.

### Monitoring Protocols

Each station is equipped with a continuous flow meter, a water quality sonde for continuous water quality monitoring, a refrigerated automated sampler for the collection of stormwater water quality samples, an internal data logger for recording and storing all measured values, a satellite telemetry unit to transmit data hourly, a power system supporting all components (AC power with battery backup), and a ruggedized housing that protects all equipment (Fig. 2).

Continuous flow is measured at 5 minute intervals and flow meters are connected to the data logger and satellite telemetry system to provide data in near real time. Instruments are operated in

accordance to manufacturer guidance, and USGS guidance (see

<http://water.usgs.gov/osw/pubs.html>). Continuous water quality monitors measure water temperature, specific conductance, and turbidity and are operated in accordance to standard protocol (Wagner et al. 2006).

Discrete sampling for nutrients and sediment are triggered by the datalogger when stormflow conditions exist (as indicated by flow and water quality conditions). Samples are retained in the refrigerated sampler ( $\leq 6^{\circ}\text{C}$ ) until retrieved by HRSD field staff. Samples are retrieved within 24 hours of collection, transported in coolers ( $\leq 6^{\circ}\text{C}$ ), and delivered to the laboratory for preservation and analysis. The analytes measured have defined laboratory methods within 40 CFR Part 136 and TN is calculated as the sum of TKN and nitrate + nitrite. Detailed standard operating procedures for nutrient and sediment analysis are maintained at HRSD's CEL and available upon request.



Figure 2. Ruggedized housing and components present at each stormwater monitoring station.

All data collected for this monitoring program, including continuous time series data and discrete sample data, is retained in the USGS National Water Information System (NWIS) and made publicly available online via NWISweb (<http://waterdata.usgs.gov/HRStormwater>). Continuous data from the flow meter and water quality monitors are transmitted via GOES satellite hourly and uploaded directly into NWIS via automated processes. These data are made publicly available on NWISweb within minutes of the hourly transmission. Discrete sample data is entered into the Laboratory Information Management System (LIMS) at HRSD. These data are electronically transferred monthly to USGS for entry into NWIS, at which time they are publicly accessible via NWISweb.

## Results

Monitoring station installation began in April 2015 with all stations on-line and collecting data by December 2016. Between July 1, 2017 and June 30, 2018, a total of over 500 discrete sampling events were logged, inclusive of baseline and event-triggered sampling and thousands of continuous monitoring data points have been collected and evaluated. In addition, meteorological data was collected from the Norfolk International Airport and from rain gauges throughout the region. Annual precipitation in 2016 was the highest observed in the last 10 years, 2017 was on par with the 10-year mean, and 2018 so far is considered a dry year but there are still several months left for data collection (Fig. 3) therefore data comparisons for these years must be put into hydrological context.

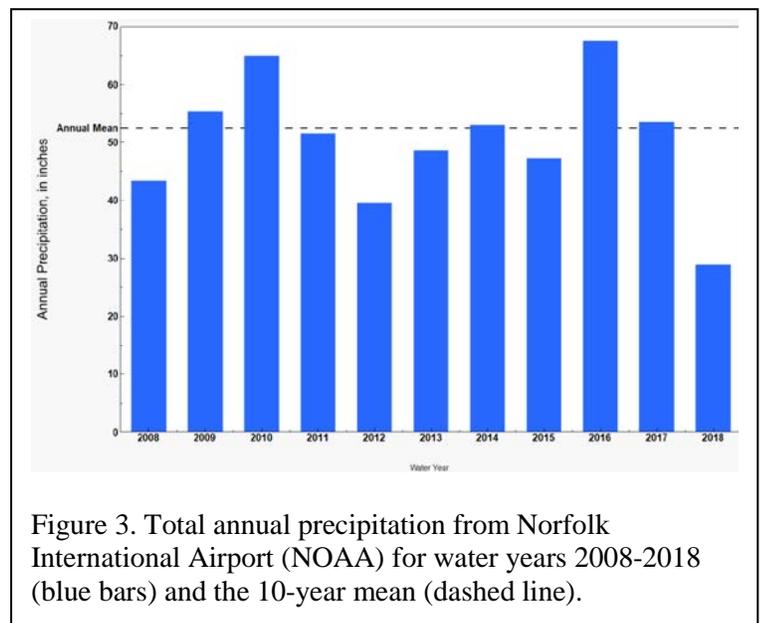


Figure 3. Total annual precipitation from Norfolk International Airport (NOAA) for water years 2008-2018 (blue bars) and the 10-year mean (dashed line).

As observed in the previous year's analysis, total annual discharges were highest at the commercial sites, followed by high density residential, and single family residential (Fig. 4). Commercial sites had the greatest amount of impervious surface compared to other land use types which were comprised more of turf grass and tree cover.

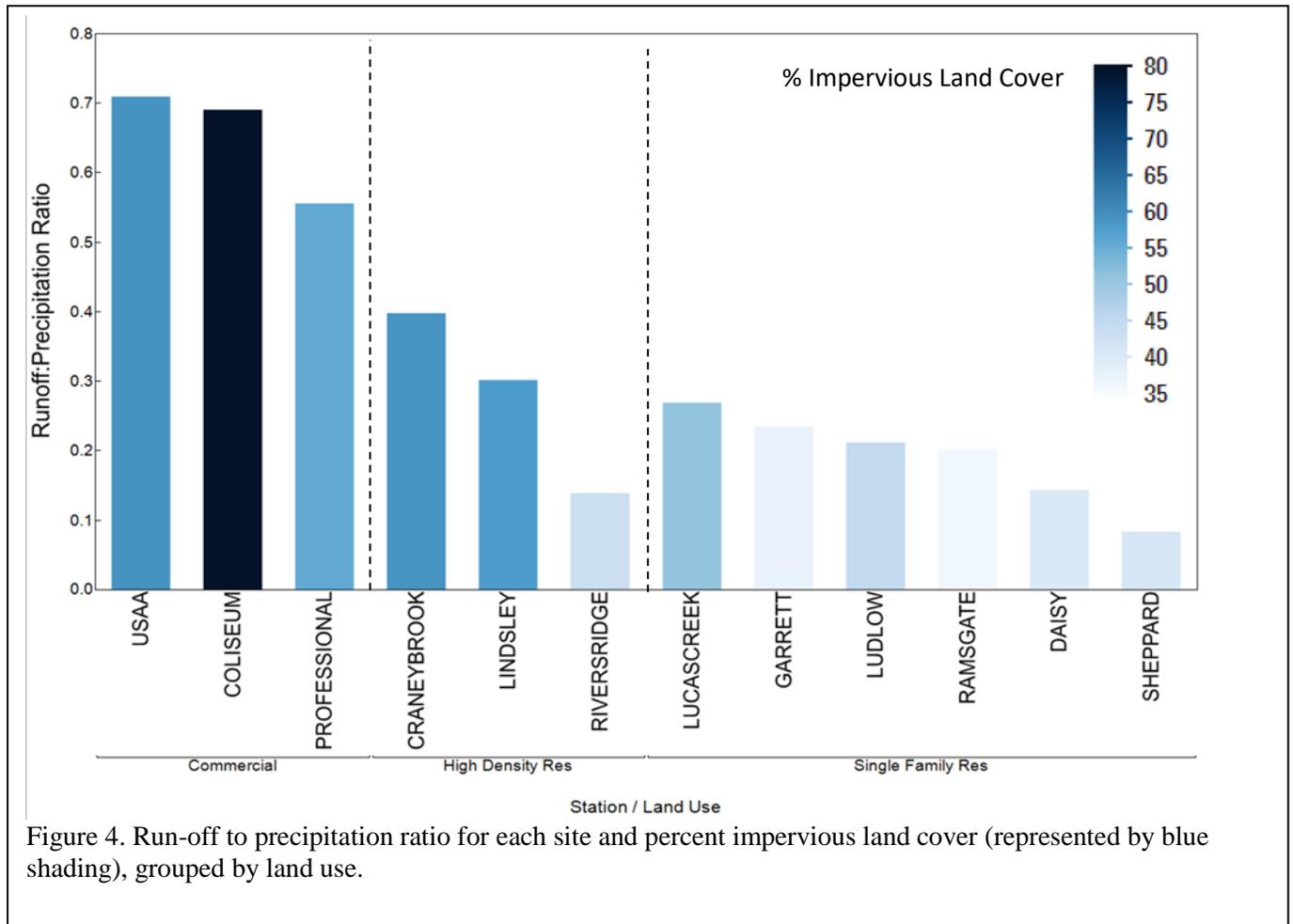


Figure 4. Run-off to precipitation ratio for each site and percent impervious land cover (represented by blue shading), grouped by land use.

TN, organic N, and nitrate + nitrite concentrations were significantly greater in the single-family and high density residential land use compared to commercial land use (Fig. 5A). Ammonia + ammonium concentrations were very low making it difficult to calculate loads or compare across land use types (Fig. 5B). Normalized annual TN and nitrate + nitrite loads (lbs/acre) were not significantly different between land use types on average (Figs. 6A & 6B) however, organic N total annual loads were significantly greater in commercial land use compared to the residential land uses (Fig. 6C). For all land use types, the bulk of the TN load was comprised of organic N (Fig. 7).

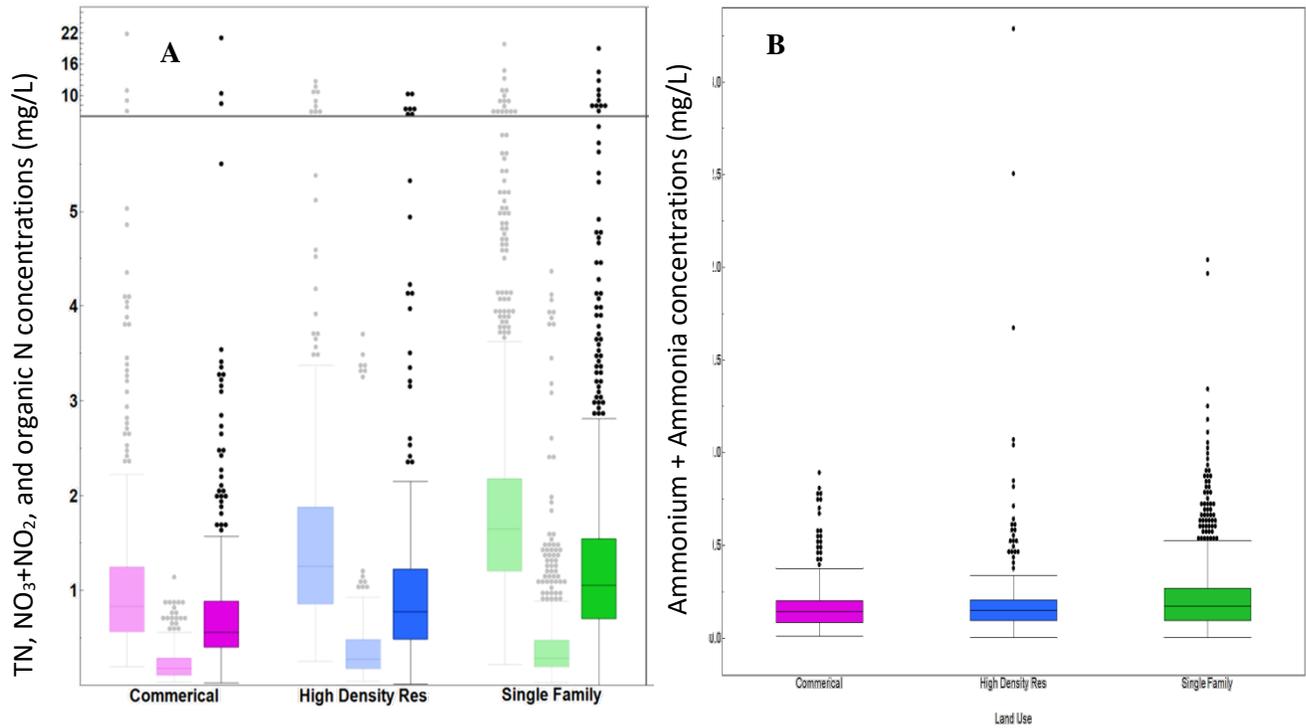


Figure 5. Box and whisker plots of concentrations (mg/L) for TN (left box), nitrate + nitrite (middle box), and organic N (right box) (A) and ammonium + ammonia (B) for the three land use types for water years 2016 and 2017. Outliers (black dots) denote concentrations outside error bars from higher discharge events.

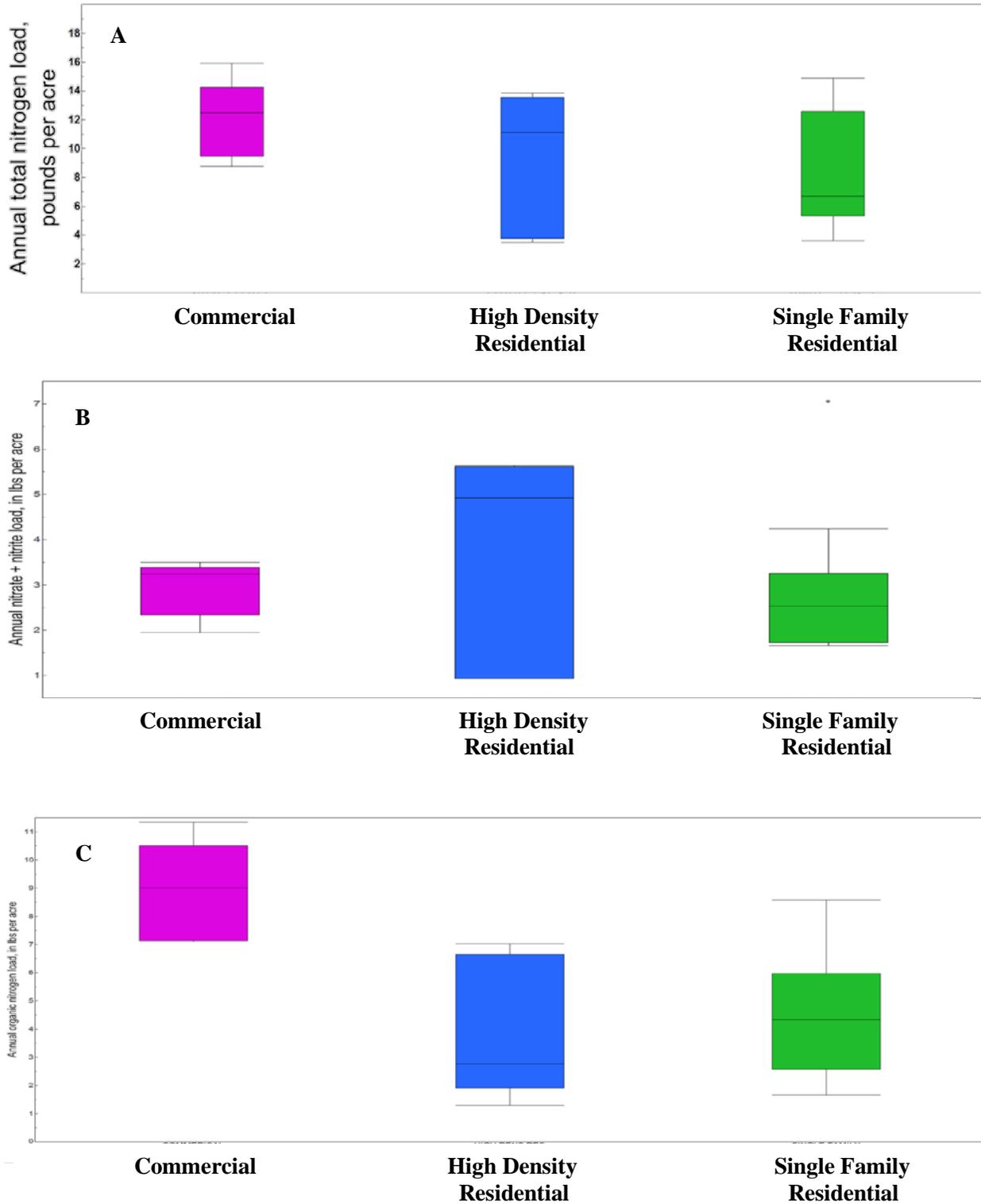


Figure 6. Box and whisker plots of total annual load (lbs/acre) for TN (A), nitrate + nitrite (B), and organic N (C) for the three land use types for water years 2016 and 2017.

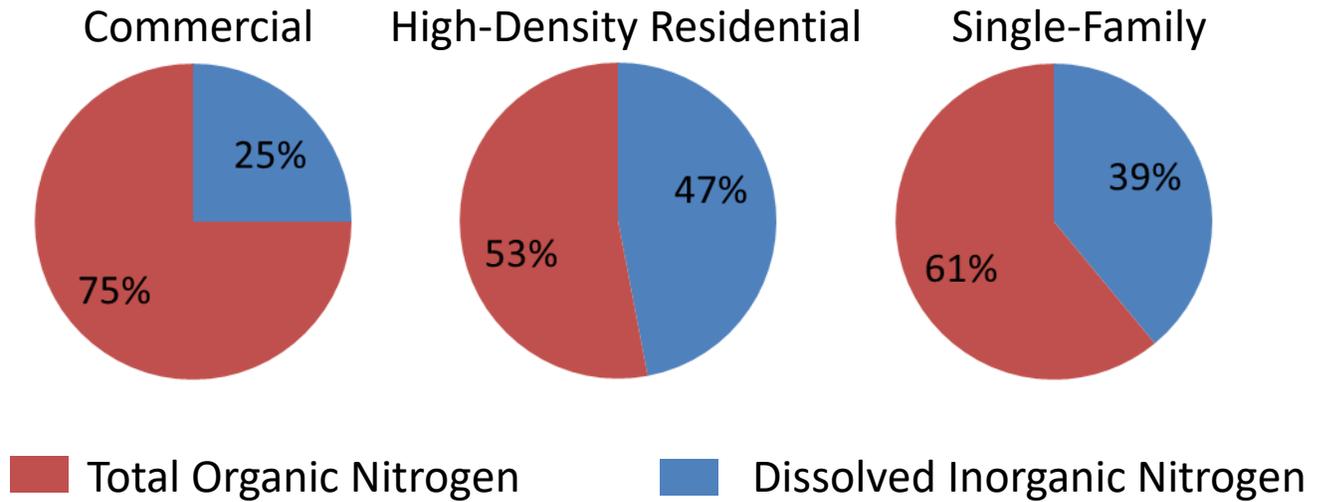


Figure 7. Relative percent of dissolved inorganic nitrogen (DIN) to total organic N for all samples collected.

TP and orthophosphate concentrations were also significantly different among all land uses, with higher concentrations observed for the single family residential land (Fig. 8). There were no significant differences among land use types for total annual loads for TP or orthophosphate (Fig. 9A & 9B). Similar to TN speciation, the majority of the phosphorus pool was made up of organic or particulate P (Fig. 10).

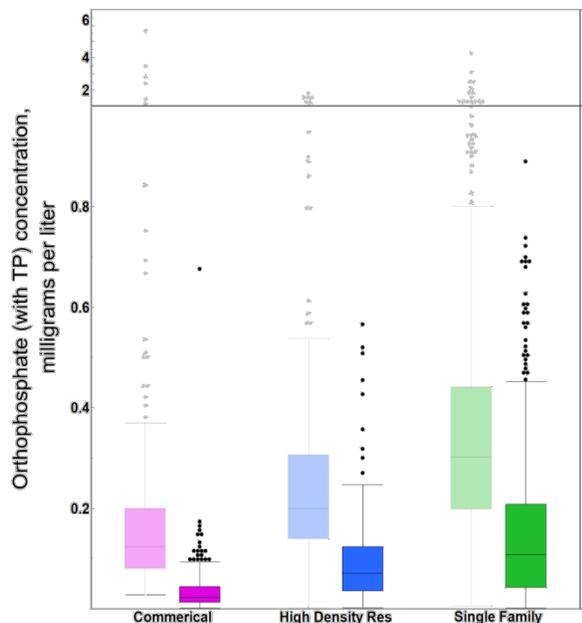


Figure 8. Box and whisker plots of concentrations (mg/L) for TP (left box) and orthophosphate (right box) for the three land use types for water years 2016 and 2017. Outliers (black dots) denote concentrations outside error bars from higher discharge events. Solid line denotes a break in the y-axis.

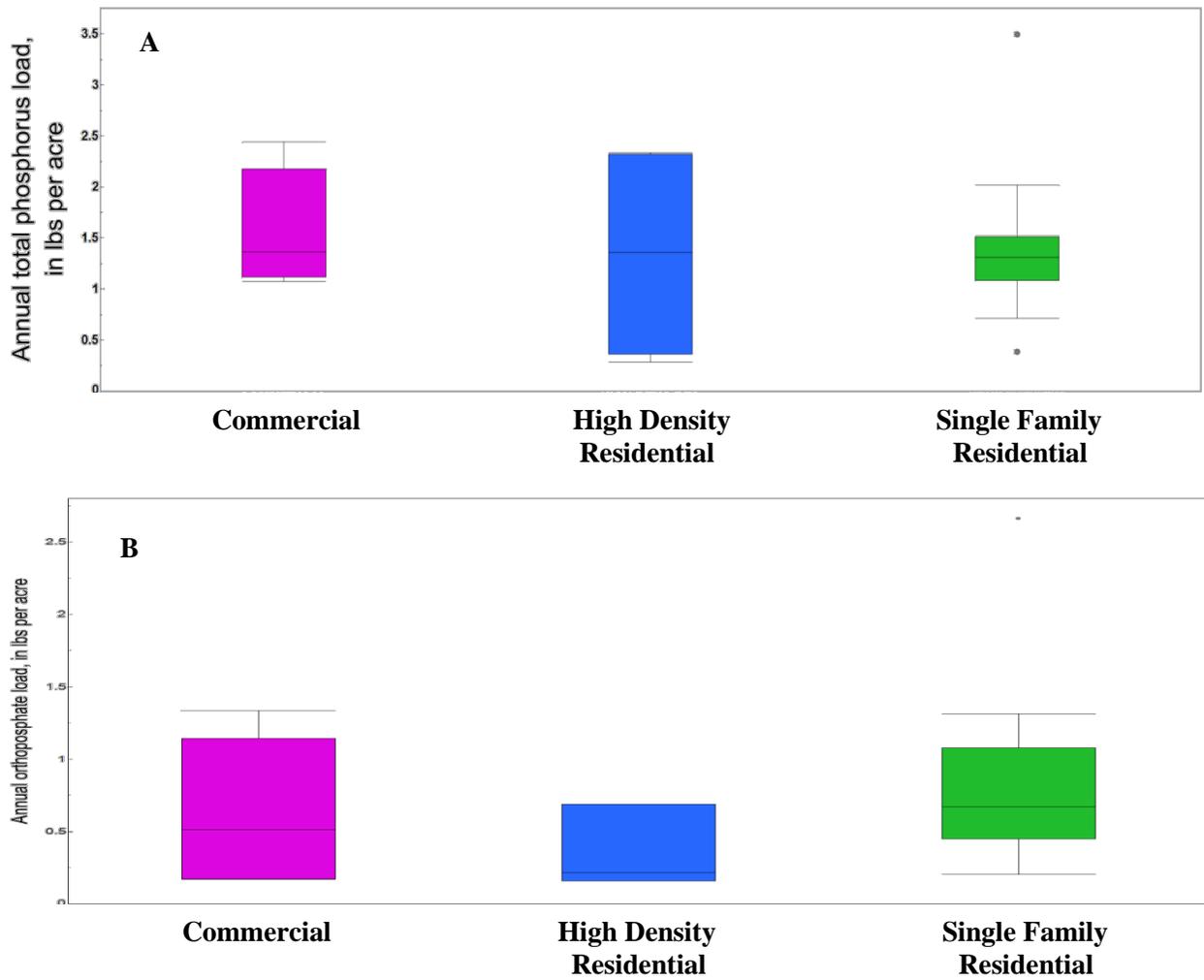


Figure 9. Box and whisker plots of annual total loads (lbs/acre) for TP (A) and orthophosphate (B) for the three land use types for water years 2016 and 2017. Median values are not statistically different.

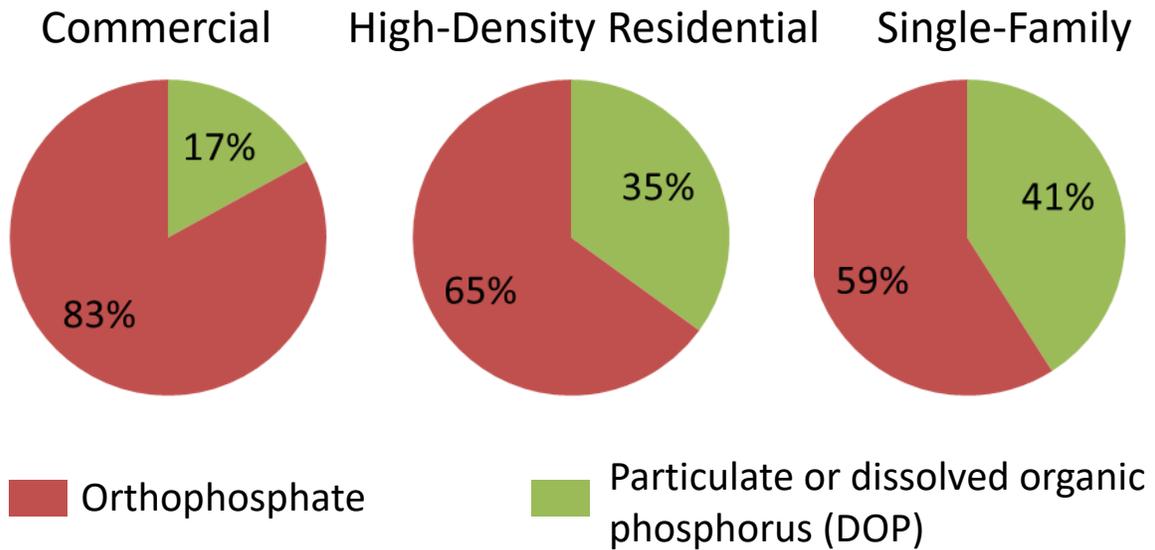


Figure 10. Relative percent of orthophosphate and dissolved organic phosphorus (DOP) for all samples collected.

TSS concentrations were significantly lower in commercial land uses compared to single-family land uses (Fig. 11) while annual TSS loads were not statistically different among land uses (Fig. 12). Outliers in all plots, denoted by black dots, are a result of higher discharge events occurring outside of the highest interquartile (> 75<sup>th</sup> percentile).

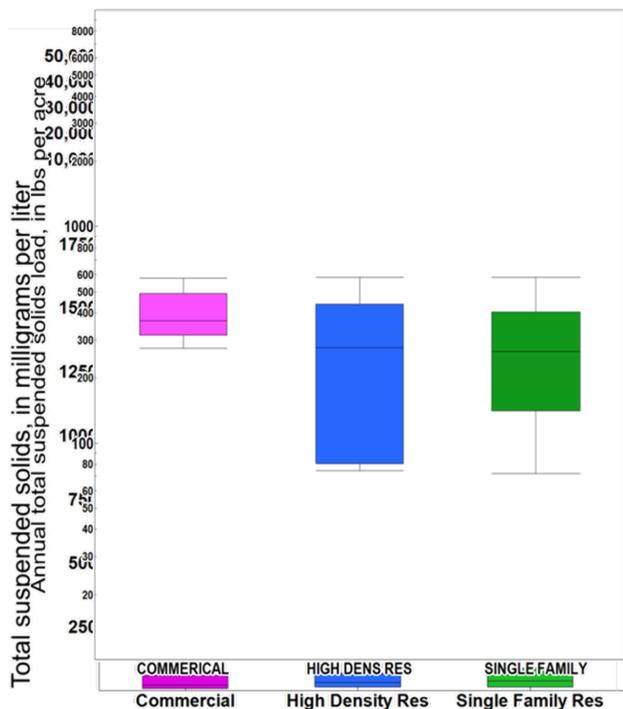


Figure 12. Box and whisker plots of annual total loads (lbs/acre) for TSS for the three land use types for water years 2016 and 2017. Median values are not statistically different.

... outside error bars from higher discharge events. Median values are significantly different between commercial and single-family residential land uses. Solid line denotes a break in the y-axis.

**Discussion**

While long term trends and loading rates cannot be established with only 2-3 years of data, annual discharges as well as nutrient concentration variability among land use types is evident. Generally, constituent concentrations were greatest at sites with single-family and high-density residential sites compared to commercial sites, in contrast, loading rates tended to be higher at commercial sites. Higher concentrations of nutrients from single family and high density residential land uses compared to commercial land uses suggests higher urban fertilizer usage per acre in those areas. However, other nutrient sources must be considered, as a P ban has been enacted in VA for urban fertilizer, and the bulk of TN in the samples was organic N. The presence of the high fraction of organic N is likely due to low flushing in some areas, resulting in accumulation of organic material. Conversely, TSS did not vary from site to site, and in comparisons to other monitoring programs across the state conducted by the USGS, TSS concentrations are much lower in the Coastal Plain. It is important to note that there are a wide range of concentrations for all constituents at all sites, related to the flashiness of these systems in response to storm events. Additionally, higher concentrations at higher density land uses may not translate into similarly high loads, because drainage acreage and the degree of imperviousness of the land dictate the volume of water delivered to the stormwater system (Schueler, 1994, Schueler, 2009).

A variety of factors will impact the amount of nutrients or sediments in urban runoff, including antecedent rain events, rain duration and total volumes, storm frequency, time of year, and of course land use (Brezonik & Stadelmann, 2002; Sonzogni et al., 1980). Over the first couple of years of the program, it was evident that several individual storms can account for a large amount of annual discharge, which could translate to high loads in a short time frame. As an example from 2016, three storms accounted for nearly 50% of the total annual flow, translating to 65% of the annual sediment load. In typical stream systems, and on average in this stormwater monitoring program, 90% of the time flow is equal to or less than 1 ft<sup>3</sup>/s. Flows greater than that only occur 10% of the time and are mostly related to larger storm events. Up to this point, data have been collected in relatively wet years, so comparisons across drier water years will yield different results. It is the goal of this monitoring program to factor in storm variability, base flow, and land use type over an extended period of time to establish demonstrable loading rates in the Coastal Plain. This will provide valuable data to a future

version of the Chesapeake Bay watershed model (Phase 7) and contribute to current calibrations of the Phase 6 model. Over the course of the next few years, localities will continue to collaborate with USGS and HRSD to collect data and evaluate loading rates over the long term.

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# ANNUAL REPORT

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**YORK COUNTY**

NEIL MORGAN  
THOMAS G. SHEPPERD JR.

**Report Documentation**

**TITLE:**

*askHRgreen.org Annual Report for Fiscal Year 2017-2018*

**REPORT DATE**

*September 2018*

**GRANT/SPONSORING AGENCY**

*Local Funds*

**ORGANIZATION NAME,  
ADDRESS AND TELEPHONE**

*Hampton Roads Planning  
District Commission  
723 Woodlake Drive  
Chesapeake, Virginia 23320  
(757) 420-8300  
www.hrpdcva.gov*

**AUTHORS:**

*Katie Cullipher  
Rebekah Eastep  
Elizabeth Vandell*

**ABSTRACT**

*The Hampton Roads Planning District Commission (HRPDC) is one of 21 Planning District Commissions in the Commonwealth of Virginia and is a regional organization representing the 17 local governments of the Hampton Roads area. This report provides an overview of the askHRgreen.org regional public outreach program and campaign results for fiscal year 2017-2018. It also provides an overview of the individual initiatives and results from each of the four askHRgreen.org environmental education subcommittees: Recycling and Beautification, Stormwater Education, Water Awareness, and Fats, Oils & Grease Education.*

**ACKNOWLEDGEMENTS**

*This report was prepared by the Hampton Roads Planning District Commission (HRPDC) staff in cooperation with the member localities. Preparation of this report was included in the HRPDC Unified Planning Work Program for Fiscal Year 2018, approved by the Commission in May 2017.*

Launched in 2011, askHRgreen.org is more than just a robust website; it is an award-winning comprehensive public outreach initiative. The program combines traditional and social media with grassroots outreach efforts to not only educate, but inspire residents of Hampton Roads to make changes that have a positive impact on the environment. askHRgreen.org is a regional solution that helps our localities meet the requirements of MS4 permits, groundwater withdrawal permits, and state consent orders to reduce sanitary sewer overflows. By combining local expertise and taking advantage of economies of scale, askHRgreen.org has become a pathway to compliance and a “one-stop shop” for citizens to find answers, resources, and inspiration for a cleaner, greener Hampton Roads. From earth-friendly landscaping ideas and pointers for keeping local waterways clean to recycling tips and simple steps to make local living easy on the environment, all you have to do is askHRgreen.org.

Financial support for askHRgreen.org is made possible by the following member localities and agencies: the cities of Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach and Williamsburg; the counties of Gloucester, Isle of Wight, James City, Southampton, Surry and York; the town of Smithfield and the Hampton Roads Sanitation District. Members of local staff and HRSD comprise four askHRgreen.org subcommittees who meet monthly to develop and implement the regional program.

**Recycling and Beautification Subcommittee** - A coalition of local government staff members from across Hampton Roads who are working together to share ideas and pool resources for various education programs tailored towards community beautification, litter prevention, and recycling education. This group has been working cooperatively since 1981.

**Fats, Oils, and Grease (FOG) Education Subcommittee** - A coalition of local government staff members working together with HRSD to protect wastewater infrastructure, reduce sanitary sewer overflows, and improve local water quality. The Subcommittee shares both technical resources and educational strategies to prevent improper disposal of fats, oils, and grease. This cooperative effort has been underway since 2007 when 13 of the region’s localities and HRSD entered into the Regional Special Order by Consent with

the Virginia Department of Environmental Quality.

**Water Awareness Subcommittee** - Regional public utilities staff members who work together to educate citizens about aging infrastructure, the value of tap water, and the importance of water conservation. This cooperative effort to promote the vital role water plays in the quality of life of Hampton Roads and the need to conserve it assists localities in meeting requirements of various locality goals as well as water supply and ground water permit education requirements.

**Stormwater Education Subcommittee** - A cooperative partnership of the region’s seventeen member cities and counties which has served as a formal adjunct to the required public information component of the Virginia Pollution Discharge Elimination System Permits (VPDES) for Phase I and Phase II Municipal Separate Storm Sewer Systems (MS4) since 1997. Local government staff members work together to share ideas and pool resources for various education programs tailored to stormwater pollution prevention.



Continued to follow the 2015-2020 askHRgreen.org marketing plan

Launched & continued to build a new, responsive website

Conducted 10 themed media campaigns for individual committees

Continued an active media relations program

Launched a new "Imagine A Day Without Water" campaign

Launched a new litter prevention "Team Up 2 Clean Up" campaign

Launched the Bay Star Business Program

Continued building and adding to the online media toolkit

Orchestrated an enhanced Search Engine Marketing campaign

Continued to administer regional grant programs

Enhanced our bi-monthly e-newsletters

Planned second Write As Rain multi-committee campaign; this one targets students

—2017-2018 By The Numbers—

**8,623 students impacted** by environmental education grants 

**55,735 visitors** to askHRgreen.org  
**93,589 page views** on askHRgreen.org 

 **2,708 households enrolled** in the regional Bay Star Homes program

  
**1,975**  
 Facebook

  
**1,684**  
 Twitter

  
**7,284**  
 eNewsletter  
 Subscribers

**35 pet waste stations installed**   
 impacting neighborhoods across the region

**\$19,071** in grant funding received

askHRgreen.org representation at **33 community events** 

## 2017-2018 ACTIVITY CALENDAR

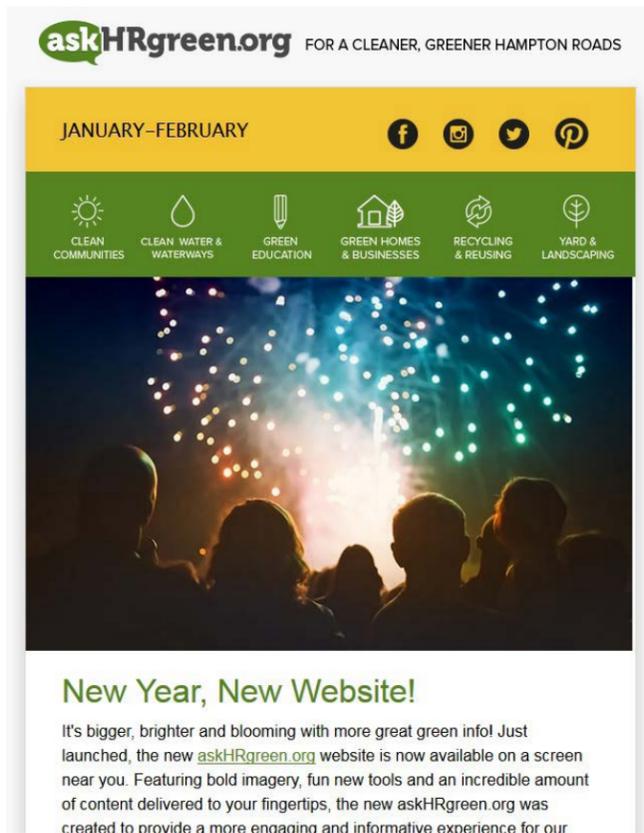
COMMITTEE	CAMPAIGN	MEDIA	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE
WATER AWARENESS	Imagine A Day	AT, R, O, S												
STORMWATER	Leaves / Pet Waste	R, O, S												
R&B	Recycle More, Trash Less	AT, R, O, S												
FOG	FOG Down the Drain	R, O, S												
FOG	What Not to Flush	AT, R, O, S												
WATER AWARENESS	Fix-A-Leak Week	AT, R, O, S												
R&B	Team Up 2 Clean Up	R, O, S												
STORMWATER	Lawncare / Work Smarter	AT, R, O, S												
WATER AWARENESS	Value of Water	AT, R, O, S												
FOG	What Do You Know	AT, O, S												
ALL	askHRgreen.org Newsletters	E												
ALL	Public Relations													
ALL	Search Engine Marketing													
ALL	askHRgreen.org Blog Articles													

 **13.4 million opportunities** to see or hear askHRgreen.org in the media

## A New askHRgreen.org

In December 2017, we launched a brand new, responsive website featuring bold imagery, helpful new tools, and an incredible amount of content delivered seamlessly on any device. The new askHRgreen.org was created to provide a more engaging and informative experience for our Hampton Roads communities. The way the site filters and delivers information truly allows users to “ask” HRgreen like never before. For instance, when users click on a topic like “clean water and waterways,” they will receive related information in a variety of forms – water-related blog posts, resources, toolkit materials, and even tips to share with friends on social media. Other enhancements include bookmarking, so users can return to visit pages of interest; a robust event calendar integrated with Google maps; and locality pages where residents can check for news, events, and resources available in their hometowns.

In FY18, the askHRgreen.org website had a higher percentage of new visitor traffic than in any other year and an increase in page views and time spent on the site over the previous fiscal year, proving that people are viewing more content and spending more time on the newly enhanced website. This is a trend that we hope continues in the coming year.



## WEBSITE VISITATION

	2017-18	2016-17	2015-16	2014-15	2013-14	2012-13	2011-12	TOTAL
Visits	55,735	58,113	52,530	58,279	55,505	32,697	27,424	340,283
Unique Visitors	45,661	46,282	42,539	46,994	43,547	25,092	19,920	270,035
Pageviews	93,589	92,681	93,177	103,228	116,818	72,270	67,047	638,810
Pages per Visit	1.68	1.59	1.77	1.77	2.10	2.21	2.42	
Average Visit Duration	1:27	1:12	1:32	1:26	1:48	2:10	2:19	
Bounce Rate	77.31%	79.07%	74.92%	74.80%	64.37%	61.27%	61.24%	
% New Visits	81.48%	79.62%	80.44%	79.87%	77.74%	75.50%	70.78%	
Mobile Devices	30,205	30,626	20,783	22,655	18,694	5,100	2,916	130,979
Desktop Devices	25,530	27,487	31,747	35,624	36,811	27,597	24,508	209,304

## Search Engine Marketing

The askHRgreen.org Search Engine Marketing (SEM) program employs Google pay-per-click advertising to increase traffic to the askHRgreen.org website. By bidding on select keywords and phrases, our ads direct search traffic to relevant content on the askHRgreen.org website. In FY18, we changed our SEM vendor from The Virginian-Pilot to WTKR and to date, we have seen a 70 percent increase in clicks compared to FY17. The website redesign also contributed to this performance increase. To view the SEM report from WTKR (Dec-June 2018), please see appendix A.

[askHRgreen.org - Dispose Medication Safely](#)  
askHRgreen.org  
Learn The Proper Way To Dispose Of Medication & Keep It Out Of Our Water.

[askHRgreen.org - Fat, Oil & Grease Disposal](#)  
askHRgreen.org  
Avoid Drain Clogs & Learn How To Dispose Of Fats, Oils, & Greases Properly.

[askHRgreen.org - Recycling Old Electronics](#)  
askHRgreen.org  
Think Before You Toss. Recycle Your Old Electronics. Find Out Where!

[askHRgreen.org - Fertilizing Tips For Your Lawn](#)  
askHRgreen.org  
Be Sure To Test Your Soil First. Follow These Easy Steps Today!

[askHRgreen.org - Tap Water Facts](#)  
askHRgreen.org  
Drink Tap Water in Hampton Roads With A High Level Of Confidence!

## SEARCH ENGINE MARKETING

VENDOR Pilot Online (Jul. - Dec. 2017), WTKR (Dec. 2017 - Jun. 2018)

CONTENT Ads and keywords for all committees + askHRgreen.org

DURATION 12 months / July 2017 - June 2018

IMPRESSIONS FY 17-18 169,140 FY 16-17 107,920 +57%

CLICKS FY 17-18 7,330 FY 16-17 4,226 +73%

## Community Outreach

### Events

Each year, askHRgreen.org receives numerous invitations to participate in community events. This is a vital touchpoint with residents in Hampton Roads. While some events are environmentally focused, many are attended by the general public and provide an important opportunity to share information with those outside the “green community.” Whether at an employee eco fair or a multi-day countywide fair, locality representatives have an opportunity to distribute outreach materials and promotional items provided by each askHRgreen.org subcommittee. In FY18, more than 170,000 event attendees may have seen askHRgreen.org at an event or received information and materials from local volunteers. In addition, over 360 people signed up to receive our news and information during these outreach events in FY18.

2017-2018 Regional Events			Estimated Attendance
8/19	Green Run Community Day	Virginia Beach	50
9/7	EcoFest at Greer Environmental Center	Virginia Beach	200
9/10	Newport News Go Green Expo	Newport News	1,500
9/14 - 9/17	Isle of Wight County Fair	IOW	28,000
9/17	RIVERFest 2017	Virginia Beach	1,400
9/30	James RiverFest	James City County	200
10/16	Bay Star Homes Fall Workshop	Newport News	15
10/17	Bay Star Homes Fall Workshop	Chesapeake	7
10/5 - 10/8	Peanut Festival	Suffolk	100,000
10/7	Norfolk Arbor Day Festival	Norfolk	Unavailable
10/7	Lynnhaven River NOW Fall Festival	Virginia Beach	Unavailable
10/19	CNU Farmers Market	Newport News	100
10/21 - 10/22	Bark in the Park	Chesapeake	5,100
10/24 -	Newport News Shipbuilding	Newport News	1,850
1/15 - 1/18	Home Gardener Day & MAHSC	Virginia Beach	1,500
1/26 - 1/28	Virginia Flower & Garden Expo	Virginia Beach	7,400
3/1-3/2	Virginia Green Travel Conference	Virginia Beach	170
3/3 - 3/4	Hampton Roads Home Show	Hampton	5,600
3/24	Community Association Day	Virginia Beach	Unavailable
3/24 - 3/25	Daffodil Festival	Gloucester	1,500
3/25	Hoffler Creek Spring Festival	Portsmouth	300
4/5	CNU Farmers Market	Newport News	50
4/14 - 4/15	Mid-Atlantic Home & Outdoor Living Show	Virginia Beach	Unavailable
4/21	Virginia Living Museum Earth Day Festival	Newport News	1,395
4/23	NASA Earth Day Fair	Hampton	100
4/28	Community Empowerment Fair	Newport News	150
5/9	Public Service Week & Drinking Water	Virginia Beach	500
5/24	Sensible Seafood FEST	Virginia Beach	525
5/31	Virginia Beach Public Works Annual Picnic	Virginia Beach	442
6/2	Celebrate the Park	Newport News	324
6/5	Anheuser Busch Eco Event	Williamsburg	300
6/5	CMA CGM Environmental Fair	Norfolk	unavailable
6/30	Olden Days	Smithfield	12,000

### Bay Star Homes

The Bay Star Homes program recognizes residents who pledge to avoid behaviors that are harmful to local waterways and encourages private property owners to implement voluntary stormwater management practices such as rain barrels, rain gardens, and downspout disconnects. Residents are also encouraged to incorporate more environmentally-friendly choices into their daily routines. In FY18, there were 287 new Bay Star Homes added across the region, bringing the program total to just over 2,700 households.

#### Bay Star Homes Registrants (as of June 30, 2018)

City/County	Number
Chesapeake	107
Franklin	11
Gloucester	17
Hampton	66
Isle of Wight	9
James City	6
Newport News	157
Norfolk	1942
Poquoson	12
Portsmouth	28
Smithfield	8
Southampton	1
Suffolk	110
Surry	2
Virginia Beach	175
Williamsburg	5
York	52
<b>Total</b>	<b>2,708</b>

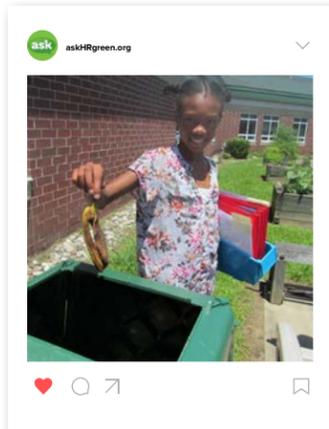
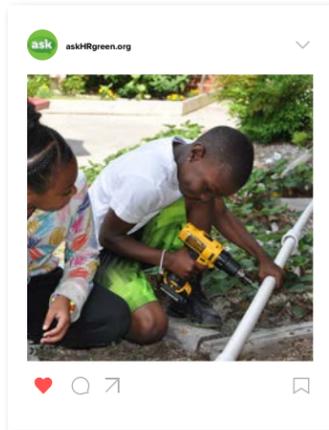
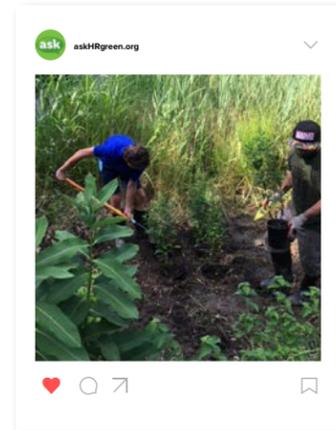


## Sudent Outreach

### Environmental Education Mini Grant Program

At askHRgreen.org, we've learned that even a small amount of grant money can help spark an idea that encourages people to make an impact in our region. askHRgreen.org offers environmental education mini grants of up to \$500 to provide funding for environmentally-themed projects for students. All Hampton Roads teachers (K-12), youth leaders, or organizations working with youth are eligible to apply.

In FY18, \$7,758 in grant funding was awarded to support 19 school projects in and out of the classroom. These projects reached over 8,600 students across Hampton Roads and included learning gardens, school recycling programs, composting, rain barrels, and more.



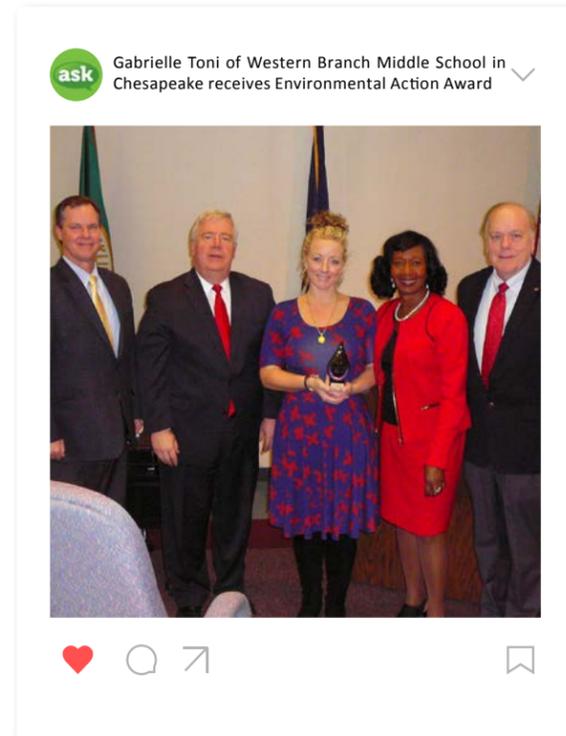
Project	# Students	Project Description	School/Organization	City/County	Grant
Calcott Eagles Recycle	550	This project funded large and small recycling bins to place throughout Mary Calcott Elementary School.	Mary Calcott Elementary School	Norfolk	\$500.00
Clean Water, Healthy Refreshment	575	Students compared bottled water with tap water in a health and physical education class hydration unit, following a water cycle unit in core classrooms. Reusable water bottles were ordered with the project for the students to keep and use in the future.	Newtown Elementary School	Virginia Beach	\$500.00
Composting Captains	79	A self-contained composting system was purchased to help students witness the process of recycling in the form of composting and how plants change through the life cycle.	Oakland Elementary School	Suffolk	\$500.00
Drip Drip Drop	50	Students installed rain barrels to collect rain water from the school's roof to use in seven raised garden beds.	Covenant Christian School	Williamsburg	\$170.00
Effects of Erosion and Seasonal Changes on Nature	40	Students used kits to create a watershed/river system and demonstrated how water flows in their stream.	Newtown Elementary School	Virginia Beach	\$400.00
Effects of Erosion on Water Quality	300	Students used kits to create a watershed/river system and demonstrated how water flows in their stream.	Greenbrier Middle School	Chesapeake	\$500.00
Enviroscape Program	1,000	Grant funds were used to purchase an Enviroscape for presentations to Virginia Beach and Chesapeake students on environmental education.	Virginia Dare Soil and Water Conservation District	Virginia Beach	\$500.00
Hydration Station Leads to Healthy Minds and a Healthy Environment	750	A water station retrofit was installed on the middle school side of Spratley Gifted Center.	Spratley Gifted Center	Hampton	\$500.00
Hydration Station Reduces Waste	700	Four water station retrofits were installed on the elementary side at Spratley Gifted Center.	Spratley Gifted Center	Hampton	\$500.00
The Importance of Native Plants to Pollinators	18	This project added to and expanded the variety of native/pollinator plants at the VBMS pollinator garden. Plants such as turtlehead and milkweed also served as caterpillar food plants.	Virginia Beach Middle School	Virginia Beach	\$350.00
KMES Kinder Garden	60	This project began a children's garden with native plants, flowers, vegetables, and pollinators to encourage learning through discovery.	Kempsville Meadows Elementary School	Virginia Beach	\$500.00
Mission Green Planet	1	As part of a larger project, a high school student used grant funds to plant 200 saplings at two Virginia Beach elementary schools.	Kellam High School	Virginia Beach	\$360.00
Rain Water Tower	75	Students built a wooden water tower in the school courtyard to conserve water and establish a self-watering garden and green nursery.	Crittenden Middle School	Newport News	\$500.00
Recycle Mania	1,200	Recycle Mania gave each class room at JYMS a standard blue recycling bin to promote recycling throughout the school year.	John Yeates Middle School	Suffolk	\$500.00
Rising Phoenix	30	Grant funds were used to purchase bins for recycling and materials to collect recyclables from the bins.	Maury High School	Norfolk	\$500.00
School-Wide Recycling	920	Grant funds enabled the continuation of a recycling program while the school developed a way to sustain the program into future years.	Northern Shores Elementary School	Suffolk	\$250.00
Waste Not, Want Not	700	A compost bin was purchased to increase composting of waste from school gardens and the office coffeemaker.	Greenbrier Intermediate School	Chesapeake	\$175.00
We ALL Need Water	660	Students will create an ocean-friendly garden within their existing Learning Garden.	Strawbridge Elementary School	Virginia Beach	\$500.00
Whole School Recycling Program	915	Grant funds will go towards the purchase of recycling bins for classrooms at the school.	Grafton Middle School	Yorktown	\$355.00
<b>8,623</b>					<b>\$7,758.55</b>

## Environmental Action Awards

In March 2018, askHRgreen.org recognized two local schools and educators for their commitment to environmental stewardship and leadership. Michelle Effatt, former science teacher at Cradock Middle School in Portsmouth, and Gabrielle Toni, art teacher at Western Branch Middle School in Chesapeake, each received the Environmental Action Award.

The askHRgreen.org Environmental Action Award was developed to recognize individuals who inspire youth (K-12) to have a positive impact on the environment by taking action in their schools or communities. The winning projects had previously received funding through the askHRgreen.org mini grant program and were selected as outstanding by a panel of local askHRgreen.org representatives from the HRPDC's 17 member jurisdictions and HRSD. The Cradock Middle School and Western Branch Middle School projects were among 13 projects under consideration for the award, all of which were funded by askHRgreen.org in FY17.

Cradock Middle School was recognized for Ms. Effatt's leadership of a community clean-up project. At Western Branch Middle School, Ms. Toni brought her art students together with a handful of technology students for an upcycling project to bring new life to some tired, old park benches. In addition to the award, each school received a check for \$100.00 to be spent to further their project or to launch a new environmental initiative.



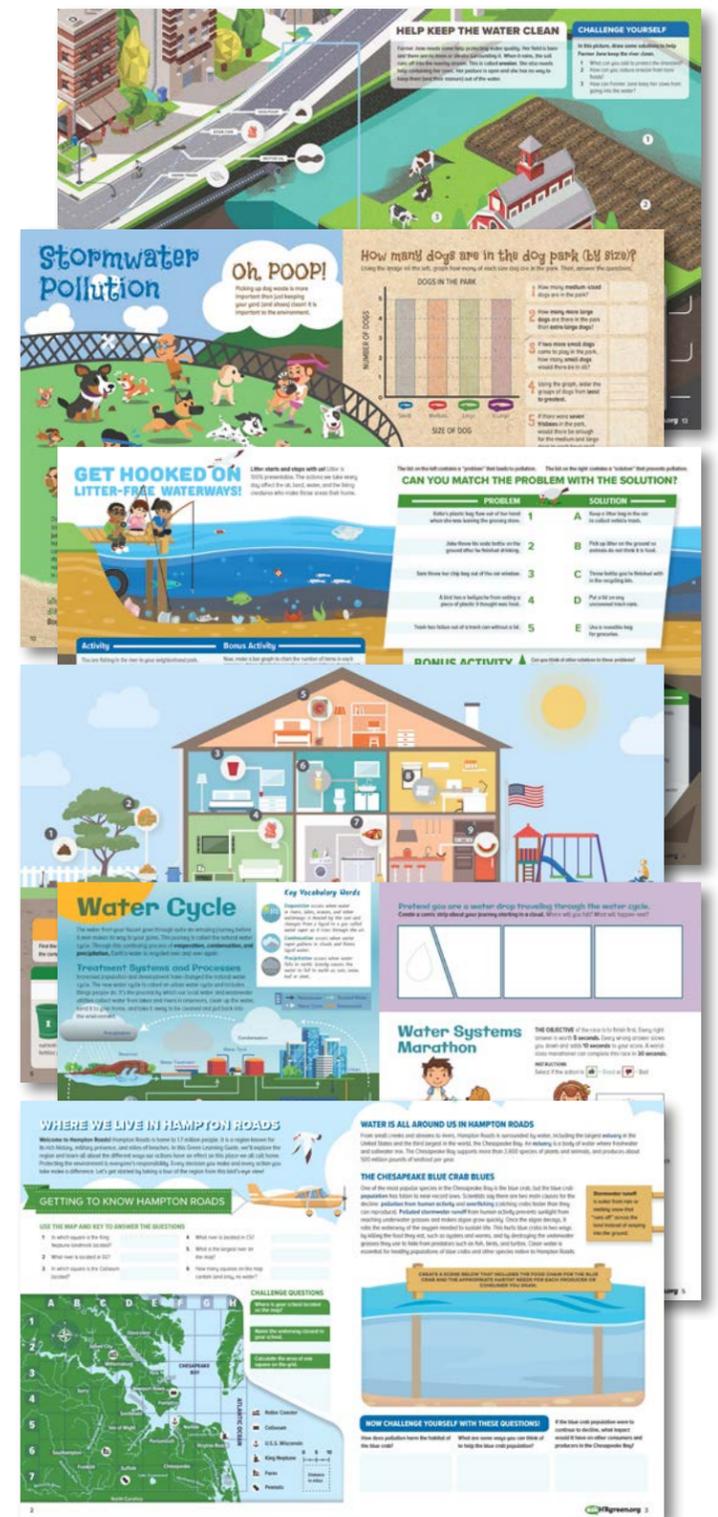
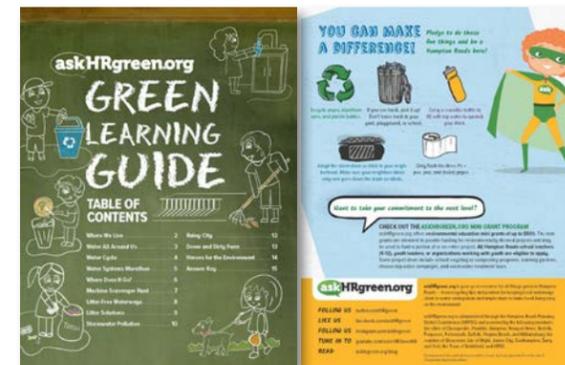
## Green Learning Guide

With a grant from the Chesapeake Bay Restoration Fund, and support from local cities and counties, askHRgreen.org developed a Green Learning Guide for third grade students in FY18. A sixth-grade Green Learning Guide was first published by askHRgreen.org in 2012, but this third-grade version will be brand new for the 2018-19 school year.

Designed to meet Virginia SOL standards, the Green Learning Guides make it easy for teachers to bring the environment into the classroom in a way that directly relates to critical science, math, and English skills. The free guides showcase educational content in a fun, interactive format with colorful maps, bold graphics, and creative activities to connect students to our Hampton Roads environment.

The sixth-grade Green Learning Guide was warmly embraced by area educators, many of whom incorporated the guide into their lesson plans. One teacher in Chesapeake relayed how helpful the publication was to her students because "the real life examples put the ideas in a different perspective." Another simply said she was thankful to have the valuable information for her students.

Both editions of the Green Learning Guide and accompanying teacher's guides are available for download on the askHRgreen.org website. We hope to provide printed copies of the third-grade edition to students across the region during the 2018-19 school year.



## Business Outreach

### Bay Star Business Program

In June 2018, the Stormwater Education Subcommittee launched the Bay Star Business Program, an extension of the successful Bay Star Homes initiative. This free, pledge-based program is designed to recognize Hampton Roads companies that are committed to protecting water quality in the region. Business owners can easily sign up online at [askHRgreen.org/BayStarBusiness](http://askHRgreen.org/BayStarBusiness) and select a minimum of five out of 15 suggested practices such as conserving water, keeping outdoor areas litter-free, maintaining (repairing/washing) company vehicles under cover, or organizing a community cleanup event. Most action items are no- or low-cost solutions to help business run more efficiently. In return for their pledges, a business receives a welcome packet in the mail that includes tips and information from [askHRgreen.org](http://askHRgreen.org) and the city or county in which they operate and Bay Star Business window clings to display in their office or on company vehicles. They also receive recognition on the [askHRgreen.org](http://askHRgreen.org) website for their participation in the program. Anheuser Busch was the first company to sign up as a Bay Star Business in FY18, and we are looking forward to growing the program with local businesses in the year ahead.



**WORKING TOGETHER FOR CLEAN, HEALTHY WATERWAYS**

**BAY STAR Business Partner**

[askHRgreen.org/BayStarBusiness](http://askHRgreen.org/BayStarBusiness)

Improve your business. Improve your community. Improve our waterways.

**Be a Bay Star Business!**

Small changes make BIG waves. The Bay Star Business Program encourages local businesses to implement easy changes that can have a major impact on our waterways.

Joining is easy. Go to [askHRgreen.org/BayStarBusiness](http://askHRgreen.org/BayStarBusiness) to register and simply pledge to put five environmentally-friendly practices into action. Select actions that fit your business model. Examples include...

- Conserve water
- Conserve energy
- Keep outdoor areas litter-free
- Host a clean-up event
- Start recycling
- Implement green landscaping practices
- ...and more!

As a Bay Star Business partner, you'll be listed on the [askHRgreen.org](http://askHRgreen.org) website and will receive a free window decal to proudly display your commitment to clean waterways.

**BAY STAR Business Partner**

Working together for clean, healthy waterways

[askHRgreen.org/BayStarBusiness](http://askHRgreen.org/BayStarBusiness)

beautification  
recycling  
conservation  
litter-free  
protect  
get involved

### Team Up 2 Clean Up

The cost that litter imposes on communities and businesses is substantial. That is why the Recycling & Beautification Subcommittee launched the Team Up 2 Clean Up campaign in early spring 2018 to make it easier for residents and businesses alike to get involved with litter prevention and cleanup initiatives. This new initiative offers an online toolkit where everyone from schools and civic leagues to businesses and neighbors on the block can download free posters, brochures, presentations, and other resources to educate their peers/employees about litter. There are resources available to empower businesses to organize their own cleanups and also a comprehensive listing of existing regional cleanups and community beautification projects to help connect people with their local cleanup coordinators. Some of the information included in the Team Up 2 Clean Up toolkit is specifically tailored for businesses and outlines best practices like:

- Engaging and training employees by asking for their input and incorporating litter prevention strategies into regular tasks.
- Providing convenient trash, ash, and recycling receptacles at transition points to give customers a proper disposal option.
- Keeping waste containers covered at all times to prevent spills.

The Team Up 2 Clean Up campaign offers a new way that we can all work together to combat litter in Hampton Roads.



### Fats, Oils, and Grease (FOG) Commercial Training and Certification Program

The FOG training and certification program is designed to educate local food service workers and grease haulers on how to prevent sanitary sewer backups caused by improper handling and disposal of fats, oils, and grease. FOG certification requirements vary by locality, and the free certification program is available to anyone through the [HRFOG.com](http://HRFOG.com) website.

Various updates and enhancements were made to [HRFOG.com](http://HRFOG.com) during FY18. The changes improved the user experience but also made it easier for administrators to clean up and manage data. Users can now access the certification tests directly from their profile page.



Administrators can provide certificates for users at any time and better manage records for local food service establishments. Another important upgrade was the creation of email notifications that prompt users to recertify in advance of their certification expiration date.

### Events

Each year, [askHRgreen.org](http://askHRgreen.org) participates in a variety of corporate and industry events across the region. In FY18, those outreach events included those hosted by organizations such as Newport News Shipbuilding, Anheuser Busch, CMA CGM, and NASA. We also attended and sponsored the Mid-Atlantic Horticulture Association Short Course in January. That multi-day course is produced by the Virginia Horticultural Foundation and is a nationally-recognized annual training for horticulture professionals.



## FY2017-2018 Campaign Initiatives

### Residential Recycling Practices

The Recycling & Beautification Subcommittee’s focus on residential recycling was two-fold in FY18. Residents were encouraged to 1) use curbside and drop-off recycling services and 2) increase the quality of recycling collected at curbside by reducing contamination.

**Paid Media.** A two-week media campaign ran from November 6 to November 19. The campaign was scheduled to coincide with America Recycles Day on November 15. The campaign utilized the “Recycle More, Trash Less” creative developed several years ago but had the added benefit of accompanying video produced in FY17. The campaign included radio, digital display ads and retargeting, native content ads, social media, and advanced TV. Throughout the year, specific recycling messages were included in our Google SEM campaign, driving traffic to the askHRgreen.org website from relevant keyword searches. Recycling is consistently the best performing topic for SEM.



**Outreach Materials.** In order to keep outreach materials as relevant as possible, the Committee updated the askHRgreen.org residential recycling rack card and poster to incorporate the addition of cartons which are now accepted through some local recycling programs.



**Public Relations.** Public relations support succeeded in promoting the residential recycling message through a variety of media channels including print (Coastal Virginia Magazine, The Virginian-Pilot), news releases (topics included Christmas tree recycling and America Recycles Day), interviews with local radio and TV shows, and multiple articles in the askHRgreen.org newsletter and blog.

**Social Media.** We engaged with the community via Facebook, Twitter, and Instagram. Outreach included sharing recycling news and trending stories, answering recycling questions, and promoting local recycling collection events.

**Virginia Litter Prevention & Recycling Competitive Grant.** We received a \$5,971 grant from the Virginia Department of Environmental Quality to enhance our recycling education program in FY18. We used the grant funds to target both the general public and schools with new outreach materials. Many localities reported needing an engaging way to share recycling information with students. To tackle this, we created an interactive “Where Does It Go” magnet game and designed recycling tattoos as a fun giveaway prize. For the general public, we printed rack cards and refrigerator magnets highlighting the most common items that should go in recycling bins. We also purchased poster stands, giving localities the ability to bring recycling messages to citizens in unexpected places and increase general awareness about the do’s and don’ts of recycling.

### Litter Prevention

In FY18, we launched an exciting new litter prevention campaign branded “Team Up 2 Clean Up.” The campaign uses a patriotic theme and poses the question “America the Beautiful?” Residents and businesses are encouraged to recognize litter as a problem and then take action by organizing litter cleanups or practicing litter prevention strategies. The campaign includes a toolkit of resources available for use by locality members, businesses, and the general public. The Recycling & Beautification Subcommittee also promoted litter prevention and the Team Up 2 Cleanup campaign in the following ways:



**Paid Media.** A two-week media campaign ran from March 19 to April 1, strategically scheduled to align with the start of Keep America Beautiful’s Great American Cleanup. The campaign included radio, digital display ads

and retargeting, native content ads, and social media. Throughout the year, specific litter prevention messages were included in our Google SEM campaign, driving traffic to the askHRgreen.org website from relevant keyword searches.

**Outreach Materials.** The Team Up 2 Clean Up campaign included the creation of a publicly available toolkit of outreach materials. Toolkit materials include logos, residential rack cards and posters, business rack cards and posters, and a presentation. The rack cards were printed for distribution by Subcommittee members and at regional events.



**Public Relations.** Public relations was an important part of the Team Up 2 Clean Up campaign launch. The added exposure came from features in various media channels including print (Coastal Virginia Magazine, The Virginian-Pilot, Inside Business, Coastal Virginia BIZ magazine), a news release, interviews with local radio and TV shows, and articles in the askHRgreen.org newsletter and blog.

**Social Media.** We engaged with the community via Facebook, Twitter, and Instagram. Outreach topics included the negative impacts of litter and promoting local cleanup events like Great American Cleanup and Clean the Bay Day.

**Cigarette Litter Prevention Grant.** Keep Virginia Beautiful awarded a “30 in Thirty” grant of \$2,000 to the Recycling & Beautification Subcommittee to implement a cigarette litter prevention project in seven participating localities: Hampton, Newport News, Norfolk, Portsmouth, Suffolk, York County, and Virginia Beach. Through the grant, 26 new cigarette ash receptacles were installed in Hampton Roads. The grant also funded banners and lawn signs to help with outreach.



## Fats, Oils & Grease (FOG) Disposal & What Not To Flush

**Paid Media.** The FOG Subcommittee had three comprehensive media campaigns that ran for a total of four weeks in FY18. In addition, throughout the year, specific FOG and “what not to flush” messages were included in our Google SEM campaign, driving traffic to the askHRgreen.org website from relevant keyword searches.

- The first campaign ran during the Thanksgiving holiday (November 20 to November 26) on radio, digital display ads and retargeting, native content ads, and social media and carried a message of keeping FOG and food scraps out of the sink.
- The second campaign ran during the week leading up to the Super Bowl (January 29 to February 4) and included radio, digital display ads and retargeting, native content ads, social media, and advanced TV. The campaign was a pickup of the classic horror movie themed ad used in past years.
- The final campaign featured the newly created “What Do You Know About Flushing?” video in a paid media campaign combining digital display ads and retargeting, native content ads, social media, and advanced TV. The two-week campaign ran from May 28 to June 10. The video component of the campaign features residents answering questions about whether different personal care products like wipes and cotton swabs are safe to flush down the toilet.



**Outreach Materials.** The FOG residential rack card was refreshed with a new look to match the new website branding. In addition, a variety of promotional items were purchased including sink strainers, grease can lids, sponges, washcloths, and more.

**GOOD TO DO**

### NEVER DISPOSE OF FATS, OILS AND GREASE DOWN THE DRAIN.

Keep your drains clog-free and healthy by practicing the following good-to-do methods:

**CAN THE GREASE**  
 1 Pour used cooking grease into an empty, heat-safe container, such as a soup can, and 2 store it in the freezer. Once solidified, 3 toss the can into the garbage.

**SCRAPE THE PLATE**  
 Wipe all pots, pans, dishes and cooking utensils with a paper towel prior to washing to absorb the grease.

**CATCH THE SCRAPS**  
 Eliminate using the garbage disposal. Catch food scraps in your sink with a basket or strainer and toss them into the trash.

**RECYCLE**  
 Large quantities of used cooking oil can be recycled through your local household hazardous waste program.

FOR A CLEANER, GREENER HAMPTON ROADS

askHRgreen.org | askHRgreen.org | askHRgreen

**Public Relations.** Public relations supported public education and outreach through a variety of media channels including news releases, interviews with local radio and TV shows, and multiple articles in the askHRgreen.org newsletter and blog.

**Social Media.** We engaged with the community via Facebook, Twitter, and Instagram. Outreach topics included the negative impacts of improper grease disposal, fatbergs, proper medication disposal, and the importance of infrastructure.

## Technical Standards for the Sizing of Grease Control Devices

In FY18, the FOG Education Subcommittee convened a technical panel to review and propose updates to the Regional Technical Standards for the Sizing of Grease Control Devices. After a thorough review and comment process, proposed revisions included updating drainage fixture unit (DFU) values per the 2012 Virginia Plumbing Code, modifying DFU values for floor drains, and changing from NAICS designations to low/medium/high grease production categories. The revised technical sizing standards were approved by the regional Directors of Utilities Committee at their September 2017 meeting.

## Communicating the Value of Water

**Paid Media.** A two-week media campaign ran from October 9 to 15 to coincide with the national “Imagine a Day Without Water” initiative. The campaign included radio, digital display ads, native content ads, social media, and advanced TV. In addition, throughout the year, specific messages about the value of water were included in our Google SEM campaign, driving traffic to the askHRgreen.org website from relevant keyword searches.

**Outreach Materials.** The Water Awareness Subcommittee updated the Value of Water rack card to better align with the updated branding of askHRgreen.org. With the redesign came the opportunity to update content as

well and the Subcommittee worked together to update the cost of household services including the daily cost of household water usage.

**Public Relations.** Public relations was an important part of communicating the value of water in FY18. As part of the Imagine a Day Without Water campaign, we composed an op-ed which was published in both the Daily Press and The Virginian-Pilot. It was also published in the Chesapeake Clipper. Additional exposure came from features on various media channels, including interviews with local radio and TV shows and articles in the askHRgreen.org newsletter and blog.

**Social Media.** We engaged with the community via Facebook, Twitter, and Instagram. Sharing video content was an important part of Facebook content for the value of water message, especially the “What Do You Know” three-part series featuring interviews with citizens answering questions about how much water they use in a day, the average cost of a gallon of tap water, and the vital role water plays in our daily lives. Other topics in our social media outreach included the safety of tap water, choosing tap over bottled water, and water scarcity in developing countries. As part of the national Imagine a Day Without Water campaign, we also conducted an organic Facebook and Instagram campaign with daily posts starting on October 8 and culminating on October 12.



## Water Conservation

**Paid Media.** In promotion of Fix-a-Leak Week, a nationwide campaign from EPA, a one-week media campaign ran from March 12 to 18. The campaign included radio, digital display ads, native content ads, social media, and advanced TV. Throughout the year, specific water conservation messages were included in our Google SEM campaign, driving traffic to the askHRgreen.org website from relevant keyword searches.

**Outreach Materials.** The Water Awareness Subcommittee distributed numerous promotional items aimed at helping residents conserve water. Items included rain gauges, shower timers, dye tabs, black-eyed Susan seed packets, hose nozzles, and seed bookmarks. In addition to these promotional materials, the Subcommittee began production on a new video in 2018 that tests citizens’ knowledge about wasteful toilet leaks and how to fix them. The final video will debut in FY19 highlighting how many gallons of water a leaky toilet will waste and the simple DIY ways to find and fix leaks around the house.

**Public Relations.** Conservation messages were featured in various media channels including print, interviews with local radio and TV shows, and articles in the askHRgreen.org newsletter and blog.

**Social Media.** We engaged with the community via Facebook, Twitter, and Instagram. Outreach topics included promoting rain barrels, drought tolerant and native plants, fixing leaks, and winterizing the home to prevent burst pipes.

## Water Infrastructure

**Paid Media.** Throughout the year, specific infrastructure messages were included in our Google SEM campaign, driving traffic to the askHRgreen.org website from relevant keyword searches. In addition, a week-long media campaign ran from May 7 to 13. This campaign complimented the national Drinking Water Week campaign from the American Water Works Association. The campaign included radio, digital display ads, native content ads, social media, and advanced TV.

**Public Relations.** The importance of water infrastructure was included in various public relations activities including print (Daily Press, The Virginian-Pilot), interviews with local radio and TV shows, and articles in the askHRgreen.org newsletter and blog.

**Social Media.** We engaged with the community via Facebook, Twitter, and Instagram. Sharing video content was an important part of the Facebook strategy for the infrastructure message, especially the “What Do You Know” three-part series.

## Leaves and Yard Debris

**Paid Media.** Throughout the year, specific yard waste/leaf disposal ad copy was included in our Google SEM campaign, driving traffic to the askHRgreen.org website from relevant keyword searches. In the fall, a week-long media campaign ran from October 23 to November 5. The campaign included radio, digital display and retargeting ads, native content ads on WTKR.com, and social media.



## GOOD TO KNOW

IF SOMEONE OFFERS YOU A GLASS OF WATER...

# TAKE IT

JUST DON'T TAKE IT FOR GRANTED.



- Protects our health
- Allows our economy to thrive
- Provides the quality of life we all enjoy

AND FOR SOMETHING SO ESSENTIAL, IT'S AMAZINGLY INEXPENSIVE. Most households pay less than \$3.00 a day for all the tap water they use. Compared to cell phone service or cable TV, that could be the world's greatest bargain.

Economy Cable TV & Internet Package .....	about \$152/month
Family Cell Phone Plan w/Data Package .....	about \$210/month
Daily Small Vanilla Skim Latte .....	about \$97/month

So just remember what a great thing it is to have  
**SAFE, CLEAN—AND AFFORDABLE—TAP WATER**  
 available 24/7/365.

**Outreach Materials.** The Stormwater Education Subcommittee maintains a comprehensive library of brochures and rack cards with stormwater pollution prevention information. Proper leaf and yard debris disposal tips are included in several printed pieces that are handed out to residents and businesses alike. The “Only Rain Down the Drain” slogan was even included on the 5,000 message pens printed for distribution at local events. In addition to these promotional materials, the Subcommittee began production on a new video in 2018 that features local residents weighing in on what can (and can’t) safely go down the storm drain. The final video will launch in FY19 highlighting “good to know” information (“only rain down the drain”) and “good to do” behaviors like keeping leaves and grass clippings out of storm drains, testing before fertilizing, picking up after pets, and car washing tips.

**Public Relations.** The leaf and yard debris disposal message was promoted via news release, print articles (i.e. The Virginian-Pilot and Chesapeake Clipper), interviews with local radio and TV shows, and features in the askHRgreen.org newsletter and blog.



**Social Media.** We engaged with the community via Facebook, Twitter, and Instagram. Outreach included sharing local news and relevant stories, answering questions, and promoting proper leaf and yard waste disposal options.

## Pet Waste

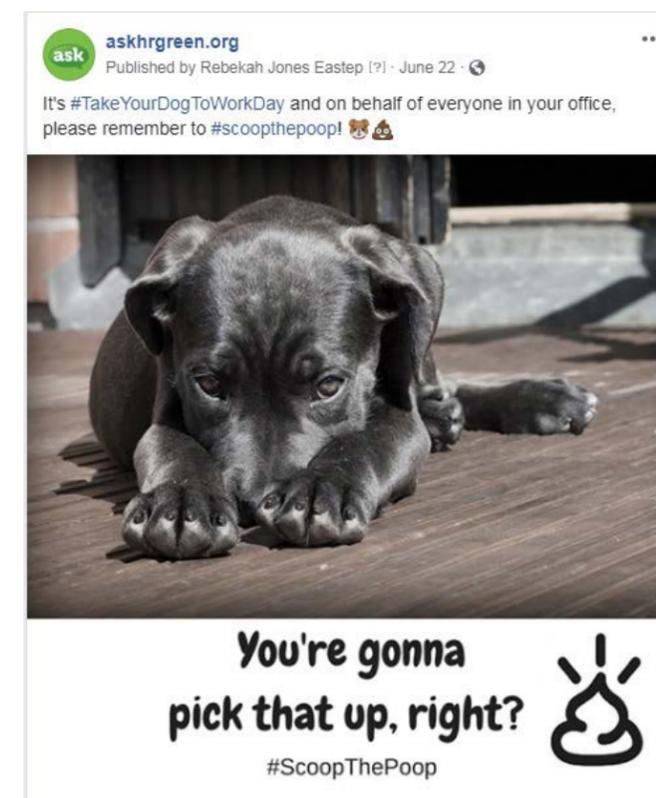
**Paid Media.** Throughout the year, pet waste disposal ad copy was included in our Google Search Engine Marketing campaign, driving traffic to the askHRgreen.org website from relevant keyword searches. The “scoop the poop” message was also included in the “fall leaves” media campaign that ran from October 23 to November 5.

**Outreach Materials.** In FY18 we printed 10,000 “scoop the poop” rack cards and 5,000 bumper stickers to hand out to the public at various events to encourage this desired behavior. In addition to the printed collateral, we purchased 5,000 dog waste bag holders for distribution.



**Public Relations.** The “scoop the poop” message was promoted via news release, print articles (i.e. The Virginian-Pilot and Chesapeake Clipper), interviews with local radio and TV shows, and features in the askHRgreen.org newsletter and blog.

**Social Media.** Social media is an important tool for sharing the “scoop the poop” message, and we utilized Facebook, Twitter, and Instagram in our outreach efforts.



**Grant Programs.** The askHRgreen Pet Waste Station Grant Program, which began in 2013, continued to thrive in FY18. Geared toward neighborhood associations, community groups, and property management companies, the regional program gives citizens an opportunity to apply for a free pet waste station to install and maintain in their neighborhoods. The approved applicants are responsible for installing the station, emptying the trash regularly, and replacing the bags as needed. The neighborhood is also tasked with promoting to residents the impact pet waste has on local water quality. Since the launch of the

program, 290 pet waste stations have been awarded and installed across the region. Of those, 35 were awarded and installed during FY18.

New Pet Waste Stations in FY18	
Chesapeake	2
Hampton	4
Isle of Wight	4
James City County	4
Newport News	4
Norfolk	3
Poquoson	1
Suffolk	6
Virginia Beach	5
Williamsburg	2
	<b>35</b>



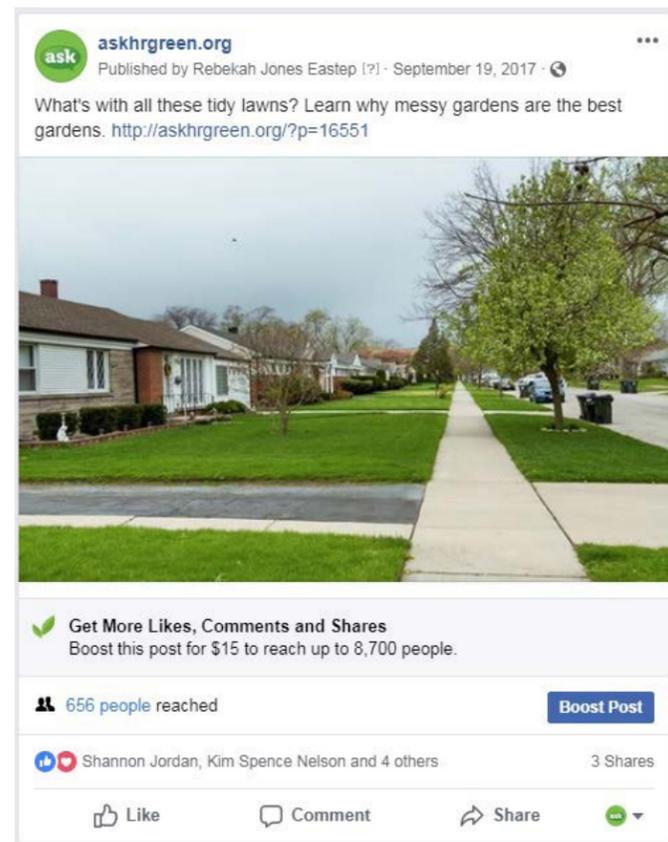
## Lawn Care and Fertilizer

**Paid Media.** Throughout the year, lawn care, native plants, fertilizing, and soil testing ad copy was included in our Google SEM campaign, driving traffic to the askHRgreen.org website from relevant keyword searches. In the spring, a “work smarter, not harder” lawn care media campaign ran for two weeks from April 16 through April 30. The campaign included radio, digital display and retargeting ads, native content ads on WTKR.com, advanced TV (streaming) video ads, and social media.

**Outreach Materials.** In FY18, a brochure, discussing fertilizing best practices and proper soil testing was handed out along with soil test kits provided in partnership with local cooperative extension agencies at events across the region. We also purchased 4,000 black-eyed Susan seed packets for distribution at regional events. The seed packets contained a message about the important benefits of native plants.

**Public Relations.** Fertilizer and lawn care best management practices were common themes promoted throughout the year via print articles (The Chesapeake Clipper), an interview with a local radio station, and features in the askHRgreen.org newsletter and blog.

**Social Media.** Social media is an important tool for sharing all of our eco-friendly messages, including fertilizing and lawn care tips, and we utilized Facebook, Twitter, and Instagram in our outreach efforts.



## Chesapeake Bay Restoration Fund Grant

In FY18, we received \$11,100 in grant funding for a comprehensive bay education and outreach program. The funds were split between four initiatives with the goal of improving water quality through engaging residents in the Chesapeake Bay watershed. The first initiative supported by the grant was the expansion of Bay Star Homes to include residential workshops on native plants and fall landscaping/tree planting tips. We hosted one workshop in Newport News and one in Chesapeake with the support of local master gardeners and master naturalists as well as local staff. Secondly, grant funds

were used to help create the Bay Star Business program for commercial and industrial entities. Another initiative supported by grant funds was the continuation of the regional pet waste station grant program. A portion of the grant funds also went towards the development of the Green Learning Guide created for third grade students to learn about the importance of clean waterways and pollution prevention while meeting Virginia Standards of Learning (SOL) requirements. Finally, the remaining grant funds were allocated towards stormwater-related projects through the askHrGreen.org environmental education mini grant program



## PUBLIC RELATIONS

Media Outreach

34 Editorial Placements

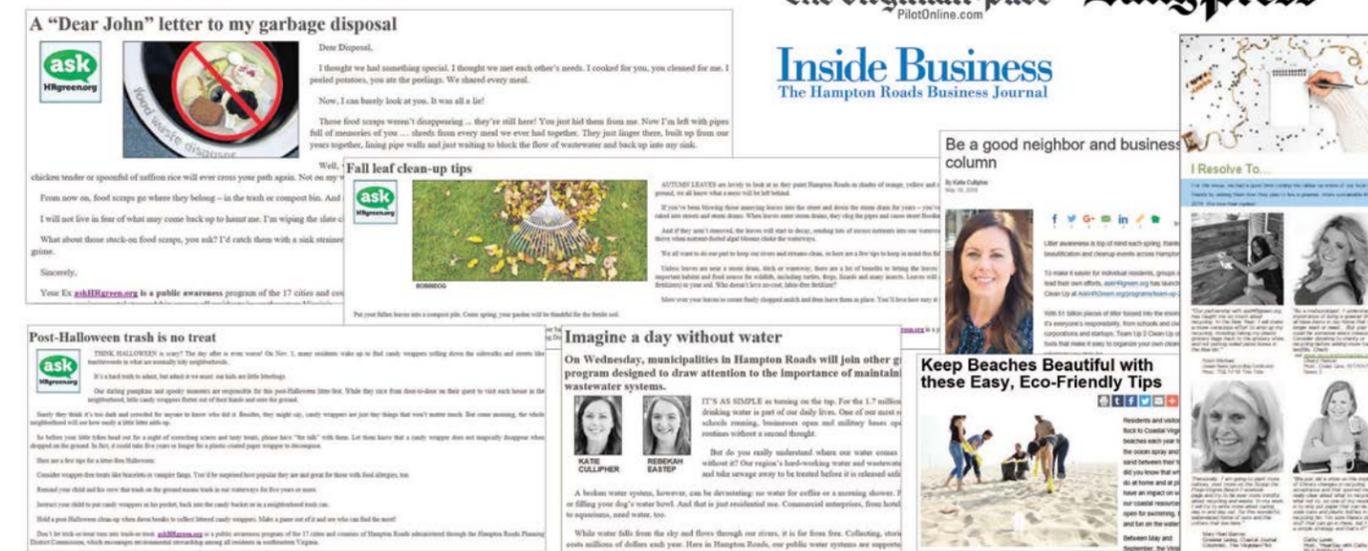
8 News Releases distributed

6 eNewsletters issued

7,284 Subscribers



## Media Coverage



2017-2018 askHRgreen.org Public Relations Value

Date	Media Outlet	Topic	Length	Circ./ Imp	PR Value
Aug-Sept 2017	Coastal Virginia BIZ Magazine	Grants for Green, Chesapeake Bay Foundation/KVB	1/8 page	15,000	\$1,050.00
Saturday, Aug. 19, 2017	The Virginian-Pilot - Home - Mary Reid Barrow	Storm drain dos and donts	871 words/20 col inches	131,175	\$8,280.00
Sept-Oct. 2017	Coastal Virginia Magazine	Kids Puzzler	1 page	35,000	\$13,290.00
Sunday, Sept. 3, 2017	The Clipper	"Save money and go green this school year"	295 words/10 col inches	31,967	\$1,050.00
Sunday, Sept. 17, 2017	The Clipper	"Know the right plays for an eco-friendly game day"	284 words/9.5 col inches	31,967	\$997.50
Sunday, Sept. 24, 2017	The Clipper	"Time for fall planting!"	315 words/10.5 col inches	31,967	\$1,102.50
Sunday, Oct. 1, 2017	The Clipper	"A "Dear John" letter to my garbage disposal"	300 words/10 col inches	31,967	\$1,050.00
Saturday, Oct. 7, 2017	Daily Press	Imagine a day without water	645 words/21.5 col inches	80,970	\$1,920.00
Sunday, Oct. 6, 2017	The Clipper	"Imagine a day without water"	346 words/11.5 col inches	31,967	\$1,207.50
Sunday, Oct. 8, 2017	The Virginian-Pilot	"Imagine a day without water"	612 words/20.5 col inches	131,175	\$11,254.50
Sunday, Oct. 15, 2017	The Clipper	"Fall leaf clean-up tips"	330 words/3.5 col inches	31,967	\$367.50
Sunday, Oct. 22, 2017	The Clipper	"Mark Your Calendars for National Prescription Drug Take-Back Day"	305 words/10 col inches	31,967	\$1,050.00
Sunday, Oct. 29, 2017	The Clipper	"Post-Halloween trash is no treat"	330 words/3.5 col inches	31,967	\$367.50
Nov-Dec 2017	Coastal Virginia Magazine	Mini-grants program	1/8 page	35,000	\$2,340.00
Nov-Dec 2017	Coastal Virginia Magazine	Where does it all go? Recycling infographic	1 page	35,000	\$13,290.00
Sunday, Nov. 5, 2017	The Clipper	"America Recycles Day is Nov. 15, but Beach efforts are year-round"	182 words/6 col inches	31,967	\$630.00
Sunday, Nov. 12, 2017	The Clipper	"Make this a clog-free holiday season"	350 words/11.5 inches	31,967	\$1,207.50
Friday, Nov. 17, 2017	The Virginian-Pilot - Blog - Mary Reid Barrow	Tips for trash and recycling	735 words/24.5 col. inches	131,175	\$10,143.00
Sunday, Nov. 19, 2017	The Clipper	"Water" you thankful for?"	320 words/10.5 col inches	31,967	\$1,102.50
Saturday, Nov. 25, 2017	Suffolk News-Herald	Become a Bay Star homes	290 words/9.5 col Inches	10,431	\$848.25
Sunday, Nov. 26, 2017	The Clipper	"Helpful hints to reduce holiday waste"	390 words/13 col inches	31,967	\$1,365.00
Sunday, Dec. 3, 2017	The Clipper	"Dreamin' of a green Christmas"	375 words/12.5 col inches	31,967	\$1,312.50
March-April 2018	Coastal Virginia Magazine	Team Up 2 Clean Up boosts community effort to pick up litter	1/3 page	35,000	\$6,630
Thursday, March 22, 2018	Chesapeake Public Schools Website	Art Teacher Wins Environmental Action Award	N/A	5,000	\$375.00
Friday, March 23, 2018	Portsmouth Next Door Neighbor App	Portsmouth Educator Recognized with Environmental Action Award	NA	5,000	\$375.00
April-May 2018	Coastal Virginia BIZ Magazine	Team Up 2 Clean Up	1/4 page	15,000	\$2,640.00
Sunday, April 01, 2018	The Clipper	"Fertilizing the cheap and easy way"	268 words/9 inches	31,967	\$945.00
Monday, April 16, 2018	WTKR-TV Coast Live	Team Up 2 Clean Up	4:40 seconds	28,000	\$2,250.00
Wednesday, May 2, 2018	WNIS-AM Tony Macrini Show	Lawn care tips	3:00 minutes	39,600	\$2,250.00
May-June 2018	Coastal Virginia Magazine	Keep it Beachy Clean	1/2 page	35,000	\$4,017.00
Week of May 16, 2018	Inside Business Experts Column, by Katie Cullipher	Be a Good Neighbor and Business, Team Up 2 Clean Up	1/2 page	9,000	\$5,940.00
Sunday, June 03, 2018	WCTV-TV Chesapeake	Bay Star Business	1:20 minues	1,500	\$600.00
Saturday, June 20, 2018	WVEC-TV Coastal Connections	Team Up 2 Clean Up + Bay Star Business	5:00 minutes	15,000	\$1,125.00
				<b>1,240,564</b>	<b>\$102,372.75</b>

# PUBLIC RELATIONS RESULTS

Total circulation or audience **1,240,564**

Total articles and interviews **34**

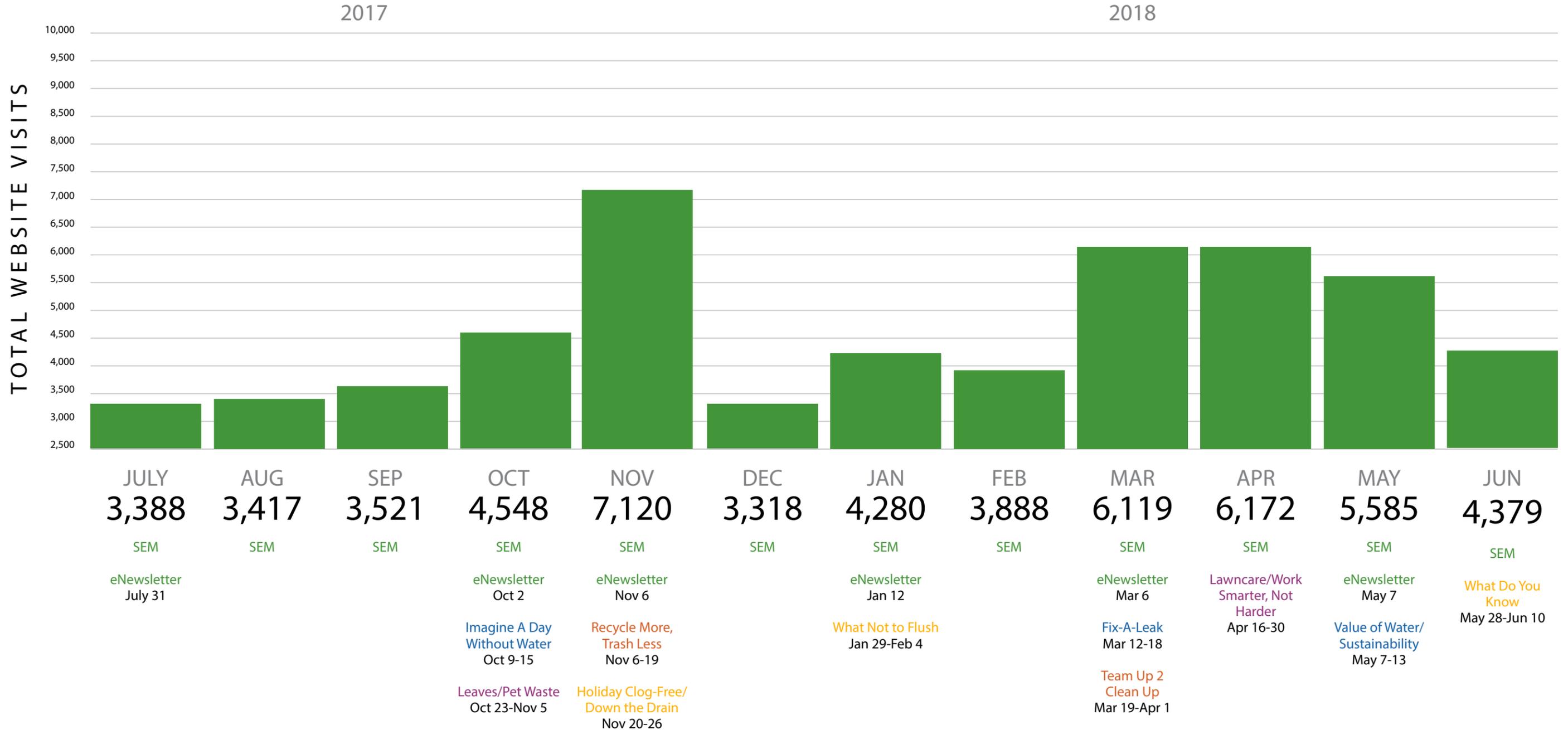
Total budget **\$12,043**

Total publicity value **\$102,373**

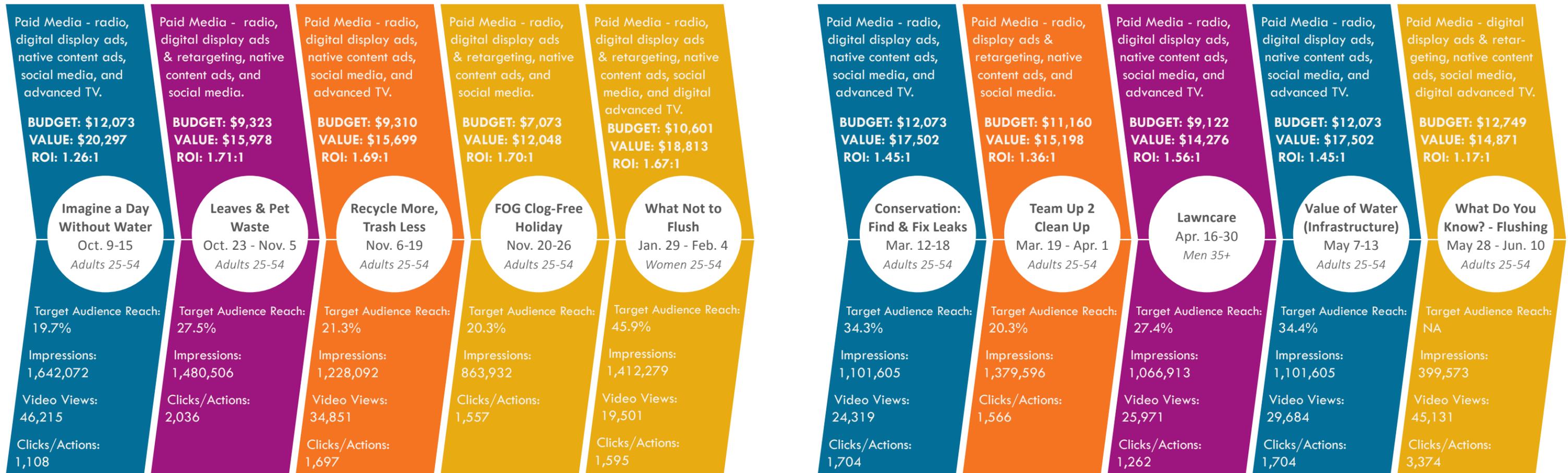
Return on Investment (ROI) **8.5:1**

—2017-2018 Promotions

# PROMOTIONS + WEBSITE VISITATION



## 2017-2018 Promotional Campaign Results



■ Water Awareness Subcommittee  
■ Stormwater Education Subcommittee  
■ Recycling and Beautification Subcommittee  
■ Fats, Oils and Grease Education Subcommittee

# COMBINED MEDIA RESULTS

PAID ADVERTISING WEEKS	52 consecutive
TOTAL ADVERTISING IMPRESSIONS	13,400,234
TOTAL VIDEO VIEWS	225,672
TOTAL CLICKS	24,501
TOTAL CAMPAIGN BUDGET	\$158,000
TOTAL MEDIA EXPOSURE VALUE	\$306,000
COST PER THOUSAND IMPRESSIONS	\$11.81
RETURN ON INVESTMENT (ROI)	1.93:1

askhrgreen.org  
Published by Katie Rider Cullipher [?] · November 17, 2017

Thanks to Mary Reid Barrow for sharing some of our most important tips for being green in Hampton Roads this fall! 🍂🌿

PILOTONLINE.COM  
**Can you put yogurt cups in the recycling bin? Tips for trash and recycling**

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · March 29

Clean the Bay Day is June 2nd. Find the cleanup location near you and get involved to prevent litter from entering our waterways! #TeamUp2CleanUp #CleanTheBayDay

CBF.ORG  
**Clean the Bay Day Locations**  
The Chesapeake Bay Foundation is saving the Bay through education, advocacy, litigation, and restoration.

Get More Likes, Comments and Shares  
Boost this post for \$15 to reach up to 6,100 people.

1,117 people reached

Keep Norfolk Beautiful, Angela Wagerman and Dave Lauthers 13 Shares

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · August 21, 2017

Happy Eclipse Day! While you're outside looking up, be sure to look down too and pick up any trash you find lying around. #SolarEclipse2017 #LitterFree

Get More Likes, Comments and Shares  
Boost this post for \$15 to reach up to 6,100 people.

2,172 people reached

David N Carol Chubb, Christene Pyne Mitchell and 12 others 4 Shares

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · February 20

Sick of junk mail? Of course you are! Here are 10 ways to lighten the load.

RICHMOND.COM  
**How to stop junk mail and save trees — and your sanity**  
Here are several steps you can take to drastically cut down on it.

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · March 22

"How long plastic may remain in the ocean is a big unknown, but unless we begin to remove it, some would say it may remain there forever." YOU can make a difference and help keep our oceans trash free. Find a spring cleanup near you at askHRgreen.org #TeamUp2CleanUp #GreatAmericanCleanup

USATODAY.COM  
**World's largest collection of ocean garbage is now twice the size of Texas**

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · October 8, 2017

This week we're promoting the "Imagine a Day Without Water" campaign to raise awareness about the underground water and wastewater infrastructure we depend on everyday for public water services. Comment below and tell us what you'd miss most on a day without water and you could win an askHRgreen water conservation goodie bag! <http://askhrgreen.org/daywithoutwater2017/>

**Imagine a Day Without Water**  
October 12, 2017

#ValueWater

Get More Likes, Comments and Shares  
Boost this post for \$15 to reach up to 6,100 people.

2,480 people reached

Ecocycling, Terry Legg and 15 others 13 Comments 13 Shares

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · September 19, 2017

What's with all these tidy lawns? Learn why messy gardens are the best gardens. <http://askhrgreen.org/?p=16551>

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · January 24

How different would your day be if you could only use 50 liters of water? #Valueofwater

BBC.COM  
**'My wife doesn't shower any more'**  
The BBC's Mohammed Allie is one of millions of people trying to stave off...

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · August 3, 2017

It's not just a ditch. <http://askhrgreen.org/?p=16505>

10/16/2012

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · October 20, 2017

The "fatberg" has made its way from London to Baltimore. Don't let it happen in Hampton Roads! #CanTheGrease #NoWipesInThePipes

WASHINGTONPOST.COM  
**This 20-foot congealed 'fatberg' that clogged a Maryland sewer has been removed**

Get More Likes, Comments and Shares  
Boost this post for \$15 to reach up to 6,100 people.

1,606 people reached

Heather Barlow, Helen Webb Kuhns and 3 others 7 Shares

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · November 10, 2017

"It's pretty gross, but we want to show people what the impact is from tossing garbage down the drain" #NoWipesInThePipes

REVIEWJOURNAL.COM  
**As usage of flushable wipes rises, so do sewer-cleanup costs**  
That's because items like Cottonelle's FreshCare flushable cleansing...

askhrgreen.org  
Published by Rebekah Jones Eastep [?] · September 15, 2017

By now you've probably heard about the #fatberg, right? So gross! Make sure you know what not to flush to prevent a monster clog right here in Hampton Roads. #whatnottoflush #nowipesinthepipes

**DO NOT FLUSH THESE ITEMS**

- PAPER TOWELS
- DIAPERS
- HYGIENE PRODUCTS
- OTHER TRASH
- ANY WIPES (EVEN THE 'FLUSHABLE' ONES)

PLEASE FLUSH RESPONSIBLY » ONLY YOUR "PERSONAL BUSINESS"  
LEARN ABOUT THE DAMAGE THESE ITEMS CAN DO TO PIPES AT [askHRgreen.org/pipes](http://askHRgreen.org/pipes)

Get More Likes, Comments and Shares  
Boost this post for \$15 to reach up to 6,100 people.

2,912 people reached

## Glossary of Terms

### added value

Earned but unpaid advertising value.

### ad group

In Search Engine Marketing (SEM), an ad group contains one or more ads which target a shared set of keywords.

### average position

A ranking system that determines where your search engine marketing ad will display on a web search results page (i.e. top of page v. bottom of page).

### bounce rate

The percentage of visitors who enter the site and “bounce” (leave the site) rather than continue viewing other pages within the same site.

### click through rate (CTR)

A way of measuring online advertising. The CTR of an advertisement is defined as the number of clicks on an ad divided by its impressions, expressed as a percentage.

### cost-per-click (CPC)

The cost associated with a person clicking on a display ad in search engine marketing.

### exposure value

The combination of advertising cost, added value, and public relations value.

### frequency

The number of times an individual (among the target audience) is exposed to the message.

### impressions

The number of times an advertisement or public relations placement can be seen or heard by an audience.

### public relations value

The equivalent advertising cost of a public relations article, interview, internet placement, etc. times three. Because a public relations placement has a higher value with an audience than advertising, it is assigned a higher value.

### reach

The number or percentage of people within the target audience who are exposed to an advertising message at least once over a specific period of time.

### search engine marketing (SEM)

The process of attracting traffic to a website from search engine results pages on a pay-per-click basis.

### search engine marketing (SEO)

The process of improving the quality of a website so that it appears higher in natural (“organic”) search results.

### unique visitors (users)

The number of people who visit a website within a specific period of time. If they visit more than one time within the period, their initial visit as well as their subsequent visits are counted as sessions. A user may have one session or multiple sessions.

## Appendix A

Search Engine & Online Marketing Results - WTKR

Jan. - Jun. 2018

Campaign overview: Since December of 2017, we have worked to achieve your goal of educating the market and creating awareness on a variety of environmental topics by driving people who live in Hampton Roads to your website. We have focused on a variety of different topics each month, while still trying to maintain the overall brand awareness and keeping the focus on all of your initiatives. Here is how your campaign has performed from Dec - June:

#### Dec 2017:

For the month of Dec (starting Dec 20, 2017), we delivered a total of **33,775 impressions** to adults in the Hampton Roads market, and those impressions drove the following activity:

- We drove a total of **399 clicks** to your website, which is **27%** of your total site traffic, only behind google organic searches in that 12 day period.
- 8 of your top 25 pages visited in that same time period were a direct result of wtkr's efforts (the number one source of traffic to pages).
- Knowing that recycling is one of your biggest initiatives, 4 of the top 5 keyword groups for that period in December were recycling related, generating **259 clicks** to the site, accounting for **65% of all site traffic** from the search campaign (339 clicks).

#### Jan 2018:

For the month of January, we delivered a total of **138,035 impressions** to adults in the Hampton Roads market using PPC, Facebook, Video, Content ads and Targeted display. Our additional initiative this month was What Not To Flush. Those impressions drove the following activity:

- We drove a total of **1,292 clicks** to your website, which is **26%** of your total site traffic, only behind google organic searches.
- **625 clicks** were from the PPC campaign and **667 clicks** were from Facebook for What Not To Flush.
- The 2 most visited pages in January, only behind your home page, were related to What Not To Flush with **862 clicks**.
- The top keyword groups for January were recycling related, generating **358 clicks** to the site, accounting for **57% of all site traffic** from the search campaign (625 clicks).
- The WNTF campaign spanned into Feb for a campaign total of:
  - **144,979 impressions**
  - **1595 total clicks**
  - **Video was watched 81,013 times**

#### Feb 2018:

For the month of February, we delivered a total of **70,650 impressions** to adults in the Hampton Roads market, and those impressions drove the following activity:

- We drove a total of **1,120 clicks** to your website, which is **29%** of your total site traffic, only behind google organic searches.
- **826 clicks** were from the PPC campaign and **294 clicks** were from Facebook for What Not To Flush.

- Even though the WNTF campaign only ran through Feb 3<sup>rd</sup>, it was still the number 2 set of pages viewed for the month, only behind your home page. The WNTF pages were viewed **399 times**.
- The top keyword groups for February were recycling related, generating **492 clicks** to the site, accounting for **60% of all site traffic** from the search campaign (826 clicks).

#### March 2018:

For the month of March, we delivered a total of **404,484 impressions** to adults in the Hampton Roads market using PPC, Facebook, Video, Content ads and Targeted display. Our 2 additional initiatives this month were Fix A Leak & Team Up To Clean Up. Those impressions drove the following activity:

- We drove a total of **2,494 clicks** to your website, which is **41%** of your total site traffic and the number 1 source of traffic ahead of google organic searches.
- **1,054 clicks** were from the PPC campaign, and **1440 clicks** were from the result of the 2 campaigns we were also running.
- The top keyword groups for March were recycling related, generating **530 clicks** to the site, accounting for **50% of all site traffic** from the search campaign (1,054 clicks).
- The 3 most visited pages in March were:
  1. Fix a leak **1,064 views**
  2. Homepage **974 views**
  3. Team up to clean up **713 views**
- Fix a leak campaign stats:
  - **171,305 total impressions**
  - **1,704 total clicks**
  - **Video was watched 42,903 times**
- Team up 2 Clean up stats:
  - **212,786 total impressions**
  - **1,566 total clicks**

#### April 2018:

For the month of April, we delivered a total of **186,242 impressions** to adults in the Hampton Roads market using PPC, Facebook, Video, Content ads and Targeted display. Our additional initiative this month was Lawncare. Those impressions drove the following activity:

- We drove a total of **1,843 clicks** to your website, which is **30%** of your total site traffic and the number 2 source of traffic only behind google organic searches.
- **1,120 clicks** were from the PPC campaign, and **723 clicks** were from the result of the Lawncare campaign we were also running.
- The top keyword groups for April were recycling related, generating **524 clicks** to the site, accounting for **47% of all site traffic** from the search campaign (1,120 clicks).

- The number 2 page visited in April, only behind the home page, was your lawncare page
- Lawncare campaign stats:
  - 166,713 total impressions
  - 1,262 total clicks
  - Video was watched 30,728 times

#### May 2018:

For the month of May, we delivered a total of **258,887 impressions** to adults in the Hampton Roads market using PPC, Facebook, Video, Content ads and Targeted display. Our additional initiative this month was Water Awareness. Those impressions drove the following activity:

- We drove a total of **2,113 clicks** to your website, which is **38%** of your total site traffic and the number 1 source of traffic, even above google organic searches.
- **1,036 clicks** were from the PPC campaign, and **1,077 clicks** were from the result of the Water Awareness campaign we were also running.
- The top keyword groups were recycling related, generating **495 clicks** to the site, accounting for **48% of all site traffic** from the search campaign (1,036 clicks).
- The number 2 page visited in May, only behind the home page, was your Water awareness page.
- Water Awareness campaign stats:
  - 238,573 total impressions
  - 1,272 total clicks
  - Video was watched 35,020 times

#### June 2018:

For the month of June, we delivered a total of **418,805 impressions** to adults in the Hampton Roads market using PPC, Facebook, Video, Content ads and Targeted display. Our additional initiative this month was What Do You Know. Those impressions drove the following activity:

- We drove a total of **1,813 clicks** to your website, which is **41%** of your total site traffic and the number 1 source of traffic, even above google organic searches.
- **935 clicks** were from the PPC campaign, and **878 clicks** were from the result of the What Do You Know campaign we were also running.
- The top keyword groups for June were recycling related, generating **517 clicks** to the site, accounting for **56% of all site traffic** from the search campaign (935 clicks).
- The number 1 page visited in June, even above the home page, was your What Do You Know page. **17%** of your total site traffic visited pages for this WDYK campaign.
- What Do You Know campaign stats:
  - 399,573 total impressions
  - 3,374 total clicks
  - Video was watched 160,216 times

## Fiscal Year 2016-2017 Results

Campaign Name	Ad Group	Impressions	Clicks	CTR	Avg. CPC	Avg. Daily Search
						Impr. Share
Ask HRGreen - Paid Search	Electronics Disposal	15756	1215	7.71%	\$1.29	39.08%
Ask HRGreen - Paid Search	Reduce Reuse Recycle	17940	754	4.20%	\$1.71	15.84%
Ask HRGreen - Paid Search	TMDL	15880	662	4.17%	\$1.50	9.67%
Ask HRGreen - Paid Search	Native Plants	14493	435	3.00%	\$1.40	13.12%
Ask HRGreen - Paid Search	Recycling At Home	12712	388	3.05%	\$1.60	12.12%
Ask HRGreen - Paid Search	Medication Diposal	3589	360	10.03%	\$1.00	42.66%
Ask HRGreen - Paid Search	askHRgreen General	2894	352	12.16%	\$0.67	12.35%
Ask HRGreen - Paid Search	Battery Disposal	19464	313	1.61%	\$1.23	44.82%
Ask HRGreen - Paid Search	Great American Cleanup	5634	253	4.49%	\$1.31	26.04%
Ask HRGreen - Paid Search	Tap Water	10374	214	2.06%	\$1.73	6.65%
Ask HRGreen - Paid Search	Fertilizer Tips	5787	168	2.90%	\$1.35	13.04%
Ask HRGreen - Paid Search	Plastic Bag Recycling	2472	167	6.76%	\$1.20	22.55%
Ask HRGreen - Paid Search	Rain Barrels	4326	115	2.66%	\$1.21	26.98%
Ask HRGreen - Paid Search	Soil Testing	2603	104	4.00%	\$1.38	28.15%
Ask HRGreen - Paid Search	Lawn Care	5809	99	1.70%	\$1.68	6.27%
Ask HRGreen - Paid Search	Water Conservation	1284	80	6.23%	\$1.29	24.52%
Ask HRGreen - Paid Search	Rain Garden	1460	49	3.36%	\$0.92	26.13%
Ask HRGreen - Paid Search	Stormwater	1066	47	4.41%	\$1.51	9.09%
Ask HRGreen - Paid Search	Fats Oil Grease Disposal	3504	44	1.26%	\$2.29	12.45%
Ask HRGreen - Paid Search	Team Up 2 Clean Up	826	43	5.21%	\$1.42	10.64%
Ask HRGreen - Paid Search	Yard Waste Disposal	1867	41	2.20%	\$1.94	9.65%
Ask HRGreen - Paid Search	Pet Waste	2235	32	1.43%	\$1.54	11.94%
Ask HRGreen - Paid Search	Find/Fix Leaks	1602	27	1.69%	\$1.79	6.06%
Ask HRGreen - Paid Search	Food Disposal	2552	24	0.94%	\$1.90	6.52%
Ask HRGreen - Paid Search	Recycling At School	390	16	4.10%	\$1.40	26.49%
Ask HRGreen - Paid Search	Environmental Education	417	14	3.36%	\$1.51	12.52%
Ask HRGreen - Paid Search	Pet Waste Station Grant Program	246	7	2.85%	\$1.41	12.40%
Ask HRGreen - Paid Search	Bay Star Homes	8	1	12.50%	\$0.42	15.49%
Ask HRGreen - Paid Search	Bay Star Business	3	1	33.33%	\$1.14	18.06%
Ask HRGreen - Paid Search	Green Learning	21	0	0.00%		8.16%
		<b>157214</b>	<b>6025</b>	<b>3.83%</b>	<b>\$1.38</b>	<b>17.98%</b>