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Office of the City Auditor

**Audit of the Stormwater Regulatory and Inspection  
Programs**

Report Date: October 22, 2021

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*"Promoting Accountability and Integrity in City Operations"*



**Office of the City Auditor**  
**Audit of the Stormwater Regulatory and Inspection Programs**

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## **Office of the City Auditor**

*"Promoting Accountability and Integrity in City Operations"*

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## Office of the City Auditor Transmittal Letter

Date: October 22, 2021  
To: Patrick A. Duhaney, City Manager  
Subject: Audit of the Stormwater Regulatory and Inspection Programs



I am pleased to present the report of our Audit of the Stormwater Regulatory and Inspection Programs. The purpose of this audit was to assess compliance with the City's MS4 Permit as it pertains to Stormwater Management Facility (SWMF) inspections. Findings considered to be of insignificant risk have been discussed with management. We completed our fieldwork on September 27, 2021.

The Office of the City Auditor reports to City Council through the Audit Committee and is organizationally independent of all other City Departments. This report is intended solely for the information and use of the Audit Committee, City Council, and appropriate City management. It is not intended to be, and should not be, used by anyone other than these specified parties. However, this report is a matter of public record and its distribution is not limited.

We would like to thank the management and staff of the Department of Public Works, for their cooperation and responsiveness to our requests and questions during our audit.

If you have any questions about this report, or any audit-related issue, I can be reached at 385-5872 or via email at [lremias@vbgov.com](mailto:lremias@vbgov.com).

Respectfully submitted,

Lyndon S. Remias, CPA, CIA  
City Auditor

Isr/rc

c: Mayor and City Council  
Audit Committee  
Ron Williams, Deputy City Manager  
L J Hansen, Director, Public Works  
Cheryl Cole, Engineer V, Public Works  
Melanie Coffey, Engineer V, Public Works



## Office of the City Auditor Table of Contents

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Transmittal Letter .....	i
Purpose .....	1
Scope and Objectives .....	1
Methodology.....	1
Standards .....	2
Background .....	3
Results .....	9
Conclusion.....	17
Acknowledgements.....	17
Management’s Response.....	Appendix A



## Office of the City Auditor Audit of the Stormwater Regulatory and Inspection Programs

### Purpose

The purpose of this audit was to assess compliance with the City's MS4 Permit as it pertains to stormwater management facility inspections. This audit was included in our FY 2021 Audit Plan.

### Scope and Objectives

The scope of the audit was the five-year permit period of July 1, 2016 through June 30, 2021.

The objectives of the audit were:

1. To determine whether the Stormwater Management Program is operating as intended and in accordance with the MS4 Permit program with regard to inspections of stormwater management facilities.
2. To determine whether management is performing monitoring controls to ensure inspections are being performed timely, accurately and in accordance with the MS4 Permit Program.
3. To determine whether privately-owned stormwater management facilities that failed inspection are repaired timely, and those that are not are sent to the Stormwater Management Regulatory for possible legal action.
4. To determine whether the responsible City departments of publicly owned and privately-owned/publicly maintained stormwater management facilities are notified of the results of failed inspections and maintenance and repairs are completed in a timely manner.
5. To evaluate the completeness, accuracy and reliability of the data captured in the Infor (Hansen) and new Cartegraph programs.

### Methodology

To accomplish our objectives, we performed the following:

- Interviewed management and staff of Stormwater Management Regulatory, Inspections and Environmental Spill Response and Technical Services and Asset Management.
- Attended ride along sessions with inspectors to observe how they perform and document SWMF inspections.
- Performed walkthrough of inspection supervisor responsibilities.
- Performed analysis and tests of data designed to determine the completeness, reliability, and reasonableness of the SWMF inspection results.
- Selected samples and performed additional data analysis and testing to ensure compliance with City procedures and the MS4 Permit policy.
- Made recommendations, as appropriate, to ensure compliance, improve processes, increase efficiency, and reduce the risk to the City.



## Office of the City Auditor **Audit of the Stormwater Regulatory and Inspection Programs**

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### **Standards**

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained during this audit provides a reasonable basis for our findings and conclusions based on our audit objectives.

The Office of the City Auditor reports to City Council through the Audit Committee and is organizationally independent of all City Departments. This report will be distributed to the City's Audit Committee, City Council, and appropriate management within the City of Virginia Beach. This report will also be made available to the public through the Office of the City Auditor's webpage.



## Office of the City Auditor Audit of the Stormwater Regulatory and Inspection Programs

### Background

Stormwater is rain, snow or even ice melt that doesn't soak into the ground. Instead, it flows from our roofs, over pavement, across bare soil and down the street. As stormwater flows, it picks up everything in its path - oil, litter, pesticides, leaves, animal waste, and more. All this stuff then flows, untreated, directly into the closest waterway. Larger items such as trash, leaves, and grass clippings – can clog the storm drains and contribute to localized flooding.

As more areas are developed with more impervious surfaces (e.g., roofs, roads, and sidewalks), less water is able to soak into the ground. The impervious surfaces increase the volume of stormwater. In developed environments, unmanaged stormwater can create two major issues: flooding and water pollution.

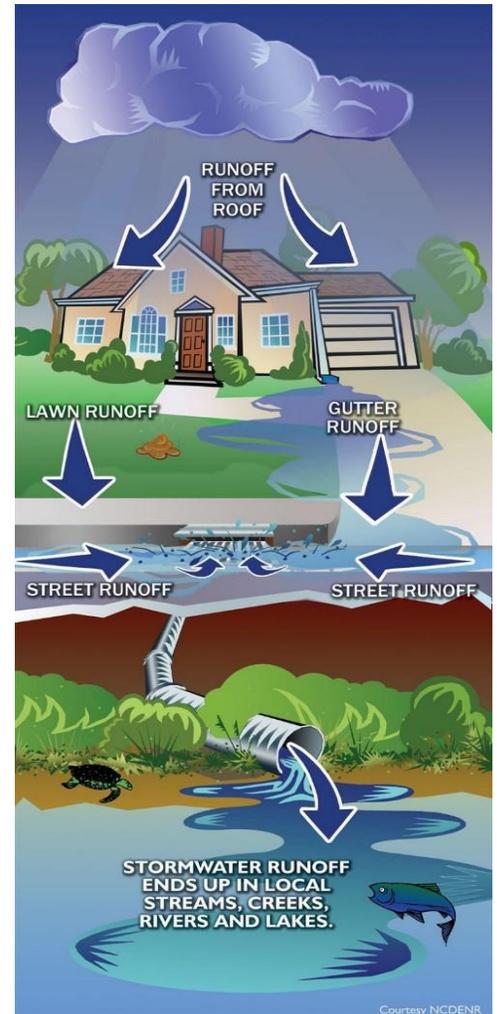
Stormwater management includes controlling flooding, reducing erosion, and improving water quality. This can be accomplished by implementing what are known as Best Management Practices (BMPs). BMPs are structural, vegetative, or managerial practices used to treat, prevent, or reduce water pollution. BMPs can be structural or non-structural.

Structural BMPs (i.e., stormwater management facilities or SMWFs) are designed to manage the quantity (peak flow rate) and quality of stormwater. They are built into the landscape to manage stormwater runoff from urban areas. Common stormwater BMPs include dry detention ponds (these are normally dry and fill up with runoff during rain events and then are dry again), wet ponds (these are normally wet, and the water level rises during rain events and then goes back down to the normal pond depth).

Non-Structural BMPs include the development and implementation of policies and procedures that serve to reduce the impacts of stormwater runoff. This can include ordinances that require tree and/or stream buffer preservation, as well as public education and outreach programs designed to teach citizens the importance of keeping household chemicals, solvents, paint, etc., under cover and away from stormwater.

The City's Stormwater Management Utility was established by City Council ordinance in 1993 to provide for the general welfare, health, and safety of the City and its residents. The City's stormwater management goals include:

- Promoting effective storm water drainage from developed areas to minimize flooding





## Office of the City Auditor

### Audit of the Stormwater Regulatory and Inspection Programs

- Maintaining and protecting the City's long-term investment in its network of storm drains and related infrastructure
- Improving the quality of the storm water discharged into the City's waterways
- Informing and educating residents on storm water issues

Virginia Beach has a unique topography, which requires development and maintenance of a system of manmade and natural components of a stormwater management infrastructure to both limit and manage the volume of stormwater to control flood events and to prevent degradation of the City's waterways through stormwater quality management. The elements of the stormwater management infrastructure provide benefit and service to properties through direct protection, control of flooding of critical components of the infrastructure, and protection of the City's natural environment.

The storm system collects mostly rainwater and is separate from the sanitary sewer system. Unlike the sanitary sewer, water in the municipal separate storm sewer system is not treated before it is discharged into a waterway.

The primary regulation that the City must adhere to is the Municipal Separate Storm Sewer System (MS4) stormwater permit, which is required for the City to be able to operate its stormwater system and to discharge stormwater to waters of the United States. The permit requires that the City establish an MS4 Program Plan with specific requirements to ensure compliance and issue an annual report.

The Virginia Department of Environmental Quality (DEQ) oversees MS4 permitting and requires the City to take steps to reduce the discharge of pollutants into natural waterways through the MS4. The City is regulated under a five-year stormwater permit (MS4 Permit) issued by (DEQ). This allows the City to discharge stormwater from its MS4 system directly into local waterways. The permit must be renewed every five years and is subject to audit by the EPA.

Under this permit, the City must implement a series of programs intended to reduce pollutants entering the MS4 and thereby protecting (and improving) the water quality in the City's waterways. These programs include:

- Constructing stormwater management projects that improve water quality.
- Implementing an erosion and sediment control program for construction sites.
- Implementing a stormwater management program to control runoff from development areas.
- Maintaining and operating City-owned facilities, roads, and parking lots to minimize polluted runoff.
- Controlling the storage and application of pesticides, herbicides, and fertilizer at City facilities and on City property to minimize polluted runoff.
- Locating and eliminating illicit discharges and improper disposal into the storm sewer system.
- Inspecting sanitary sewers to prevent leaks into the storm sewer system.



## Office of the City Auditor **Audit of the Stormwater Regulatory and Inspection Programs**

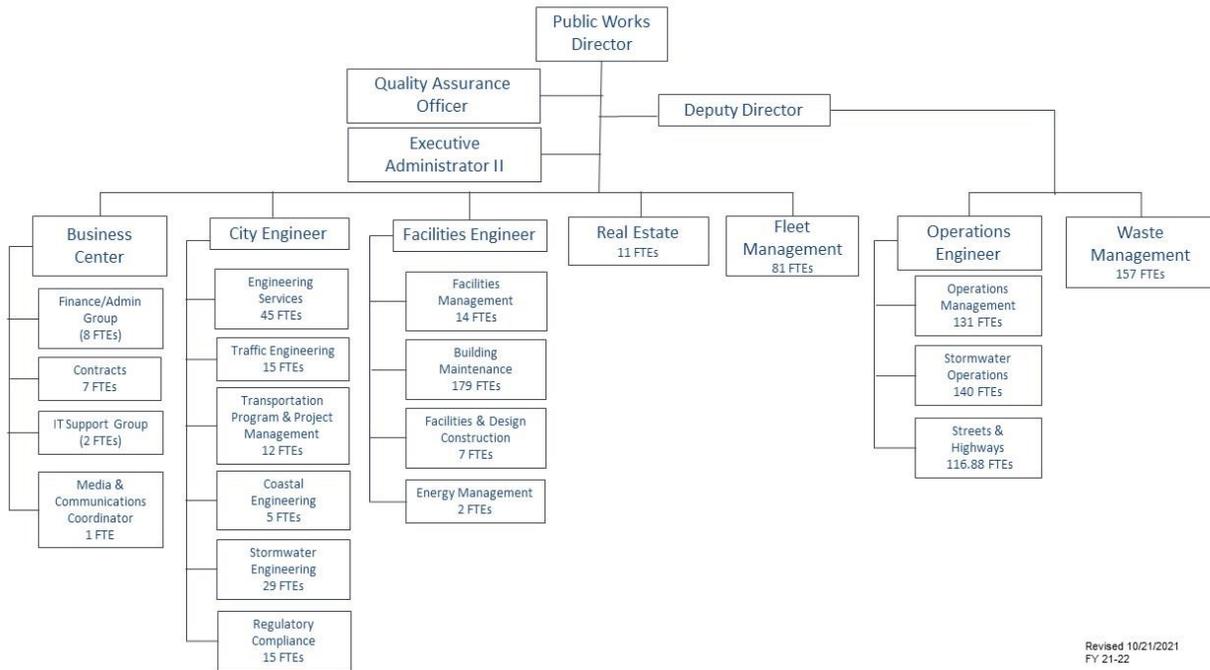
- Developing and implementing a program to reduce floatable trash in waterways.
- Implementing programs to prohibit the disposal of used motor vehicle fluids, household hazardous waste, sanitary sewage, grass clippings, leaf litter, and animal wastes into the storm sewers.
- Coordinating with the Fire Department and other City departments to prevent, contain, and respond to spills that may discharge pollutants into the storm sewer system.
- Identifying polluted stormwater discharges from industrial and high-risk facilities.
- Inspecting, operating, and maintaining the storm sewer system and all City-owned and City-maintained stormwater management facilities. City-owned and City-maintained stormwater management facilities are inspected annually.
- Implementing a program to ensure that privately-owned stormwater management facilities are maintained and inspected at least once every MS4 Permit cycle.
- Mapping the storm sewer system including each outfall and the area draining to the storm sewer system.
- Controlling polluted stormwater runoff from all City-owned properties with good housekeeping and pollution prevention measures.
- Developing and implementing a public education plan to minimize pollutants in stormwater runoff.
- Conducting stormwater training for municipal employees.
- Coordinating with the Virginia Department of Transportation (VDOT) where the City's storm sewer is interconnected with VDOT's storm sewer.
- Monitoring stormwater quality.
- Developing and implementing action plans to reduce pollutants and excess nutrients from entering the Chesapeake Bay and other waterbodies with TMDLs.

In Virginia Beach, the primary responsibilities for stormwater management and ensuring compliance with the MS4 permit reside within the City's Department of Public Works (Public Works). The department provides total life cycle management of the public infrastructure and key essential services.



# Office of the City Auditor

## Audit of the Stormwater Regulatory and Inspection Programs



Revised 10/21/2021  
FY 21-22

Within Public Works, stormwater management responsibilities are distributed between the Operations and Engineering Divisions. The Engineering Division houses Stormwater Regulatory Compliance and Stormwater Engineering. The Environmental Inspections and Spill Response Bureau resides within the Operations Division. Operations is also responsible for maintaining the City’s stormwater infrastructure.

This audit primarily focused on the following two requirements under MS4 Permit as they relate to stormwater management facilities (or structural BMPs):

- Inspecting, operating, and maintaining the storm sewer system and all City-owned and City-maintained stormwater management facilities. City-owned and City-maintained stormwater management facilities are inspected annually.
- Implementing a program to ensure that privately-owned stormwater management facilities are maintained and inspected at least once every MS4 Permit cycle.

These requirements are managed by the Environmental Inspections and Spill Response Bureau and Stormwater Regulatory Compliance.

### **Environmental Inspections and Spill Response**

Currently, Environmental Inspections and Spill Response (Inspections) includes one (1) Inspection Supervisor and seven (7) full-time Inspectors. Their responsibilities include, but are not limited to, annual inspections of all City-owned and privately-owned / City-maintained BMPs as well as inspections of privately owned SWMFs at least once every five-year MS4 Permit cycle.

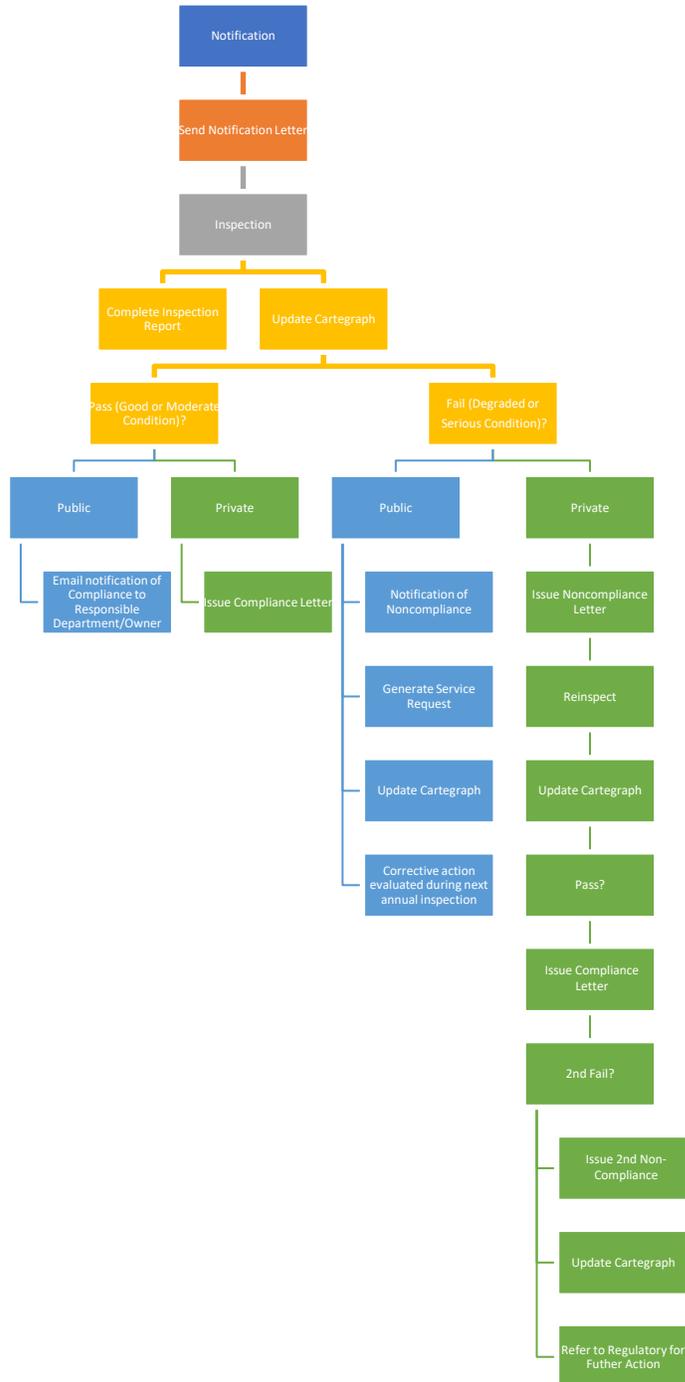


# Office of the City Auditor

## Audit of the Stormwater Regulatory and Inspection Programs

As of June 30, 2021, there were 744 City-owned and 859 privately-owned / City-maintained SWMFs that are inspected annually. There are also 1,257 privately-owned SWMFs. The inspectors also perform inspections of all newly built SWMFs called “as-builts” before they go into the MS4 permit inspection cycle. The inspection process is depicted in Exhibit 1, below.

Exhibit 1. SWMF Inspection Process





## Office of the City Auditor Audit of the Stormwater Regulatory and Inspection Programs

**NOTE:** Publicly-owned and Privately-owned/City-maintained SWMFs are not subject to Regulatory action.

In addition to performing inspections, inspectors are also responsible for responding to spills, reviewing BMP plans under design, performing acceptance inspections on new BMPs added to the system, preparing detailed inspection reports, researching historical inspection data to fulfill information requests, attending the permit mandated training to maintain their certifications, and various other tasks.

### **Stormwater Regulatory Compliance**

Stormwater Regulatory Compliance (Regulatory) is primarily responsible for ensuring the City's compliance with the MS4 Permit which includes initiating regulatory action against owners of private SWMFs that fail inspection and have not made the needed repairs. They are also responsible for the development, implementation, management and/or oversight of the other MS4 Permit programs.

When a privately-owned SWMF fails and the owner has not taken corrective action to restore the SWMF to full functionality, Inspections forwards the information to the Regulatory Unit for further action. Upon receipt of a referral, Regulatory logs the information and schedules a regulatory inspection. The regulatory inspector assesses the condition of the SWMF, and if it is still in a failed status, they contact the owner of record. If the owner of record does not make the repairs needed in a timely manner, the case is forwarded to the City Attorney for legal action which may include fines.

The City's stormwater management activities are funded by both the General Fund and the Stormwater Management Utility. The FY 2021 Stormwater Management Operations and Maintenance budget was \$60,819,773. In addition, the City's Capital Improvement Program (CIP) for Stormwater for FY 2021 included \$62,790,313 for stormwater projects. The CIP projects include improvements to address water quality, flood control, and infrastructure operations and maintenance. Capital projects are major expenditures for renewal and replacement of existing infrastructure or for construction of new infrastructure. The total combined budget for FY 2021 was \$123,610,086.

In January 2021, Public Works implemented Cartegraph, a new operations management application. Cartegraph is a cloud-based, strategic operations management application used for asset management, infrastructure maintenance, work scheduling, resource management and reporting. Cartegraph replaced the Infor system (Hansen) and provides the Inspections and management a more powerful, user-friendly system to help manage the MS4 permit and inspections.



## Results

### **Finding 1: Completeness and Accuracy of Inspection and SWMF Asset Data can be Enhanced**

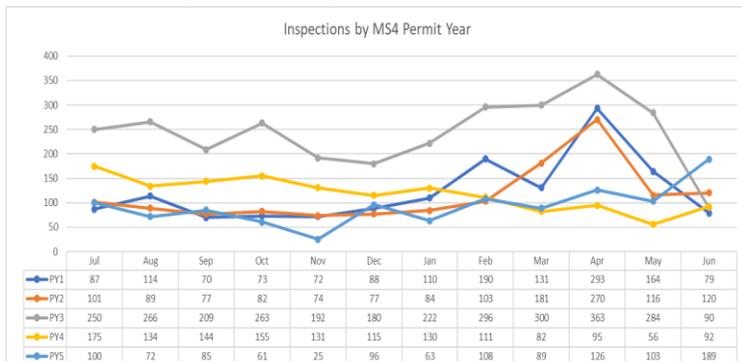
We performed analysis and tests designed to determine the completeness and accuracy of the Stormwater Maintenance Facility (SWMF) inspection and asset data maintained within Cartegraph<sup>1</sup>. Cartegraph is a cloud-based, strategic operations management application used for asset management, infrastructure maintenance, work scheduling, resource management and reporting.

The Department of Public Works oversees a comprehensive program to control potential stormwater pollution that can flow directly into our local waterways from the City's municipal separate storm sewer system (MS4). The City is regulated under a stormwater permit issued by the Virginia Department of Environmental Quality which allows the City to discharge stormwater from its MS4 system directly into local waterways.

Under this permit, the City must implement a series of programs intended to reduce pollutants entering the MS4 and thereby protecting (and improving) the water quality in the City's waterways including a program to ensure that both public and privately-owned stormwater management facilities are maintained and inspected regularly.

The City performs inspections of public and private SWMFs in accordance with the requirements of the City's MS4 permit and the established MS4 Program Plan. The City's has procedures<sup>2</sup> to ensure that the required maintenance is completed for privately maintained SWMFs. The process includes a series of inspections and notifications to property owners to perform maintenance followed by legal action, if necessary. Staff perform follow-up investigations and notifications to work towards resolution of maintenance issues. Exhibit 2, depicts inspections performed by permit year.

**Exhibit 2. Inspections by Permit Year**



SOURCE: Combined Infor (Hansen) and Cartegraph extracts of SWMF inspections completed during the five-year MS4 permit period.

<sup>1</sup> Public Works implemented Cartegraph in January 2021. Prior to Cartegraph, Public Works used Infor (Hansen) to schedule and track SWMF inspections.

<sup>2</sup> See Appendix D: Stormwater Management Facility Inspection and Maintenance Guidance of the City's [MS4 Program Plan](#)



## Office of the City Auditor

### Audit of the Stormwater Regulatory and Inspection Programs

We reviewed data related to the 8,297 inspections completed during the five-year permit period ended June 30, 2021. Table 1, below, provides the results of our tests of data completeness.

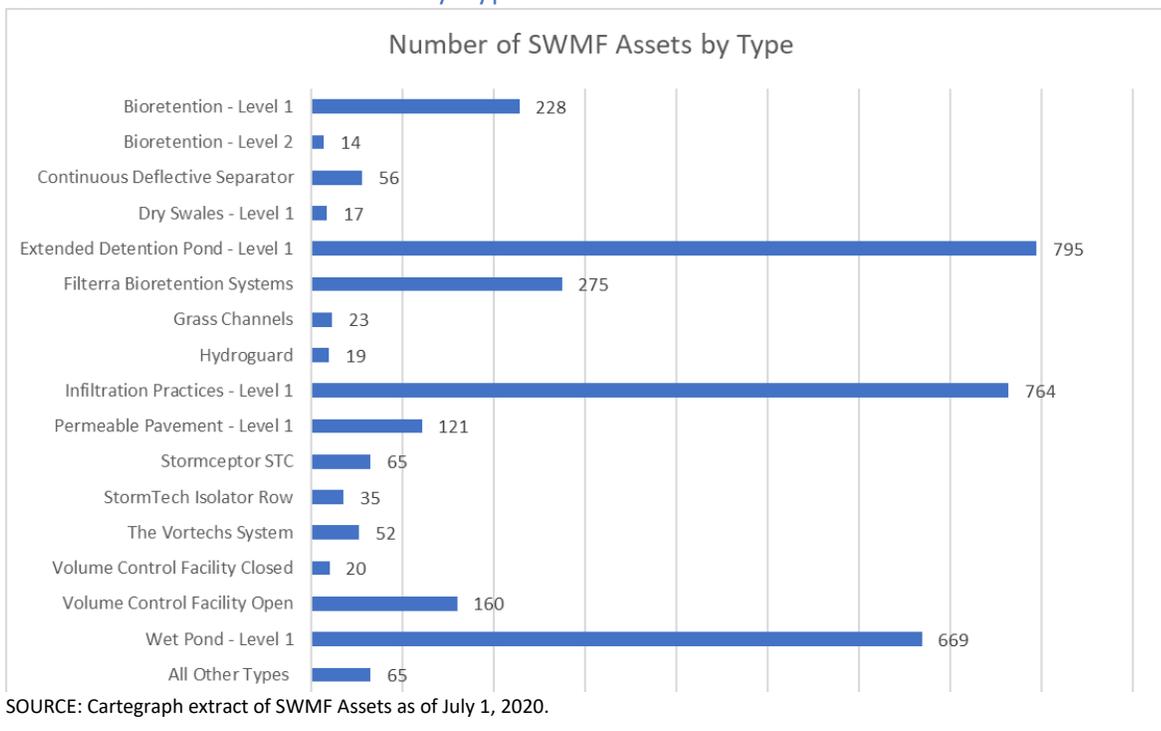
Table 1. Schedule of Completeness Exceptions: Inspection Data

Exception Type: Inspection Data	Infor (Hansen)	Cartegraph	Number of Related Assets
Assignment=Blank	120	-	120
Employee=Blank	120	-	120
Task ID= Blank	-	-	-
Activity=Blank	-	-	-
Asset ID=Blank	5	-	5
Asset Description=Blank	5	-	5
Asset Type=Blank	32	-	28
Ownership=Blank	8	-	6
Latest Results=Blank	83	48	127

Missing inspection data impacts monitoring and reporting capabilities and the City’s ability to ensure compliance with the MS4 permit requirements.

We reviewed data related to the 3,378 active SWMF asset (including as-builts) records in Cartegraph as of June 30, 2021. Exhibit 3, shows the number of the assets by type.

Exhibit 3. Number of SWMFs by Type





## Office of the City Auditor

### Audit of the Stormwater Regulatory and Inspection Programs

The results of our tests of completeness of the asset data are depicted in Table 2, below.

Table 2. Schedule of Completeness Exceptions: Asset Data

Exception Type	Number of Assets
Acceptance Date=Blank (not As-Built Asset)	3
Asset Description=Blank	39
Location Description=Blank	358
Owner Address=Blank	679
Owner Name=Blank	262
Watershed=Blank	117
Watershed Number=Blank	394

The City maintains its stormwater infrastructure and SWMF asset inventory in a GIS database. Asset data within Cartegraph is derived from the GIS database. Assets are added, removed and/or updated continuously based on as-built and record drawings, information from surveys associated with infrastructure construction projects, stormwater master plans, inspection results, and MS4 outfall updates.

Missing and/or incomplete asset data impacts the City’s ability to properly track and maintain assets, schedule, and perform inspections, as well as ensure accurate reporting.

**Recommendations:**

To enhance the completeness and accuracy of information related to SWMF inspections, management should:

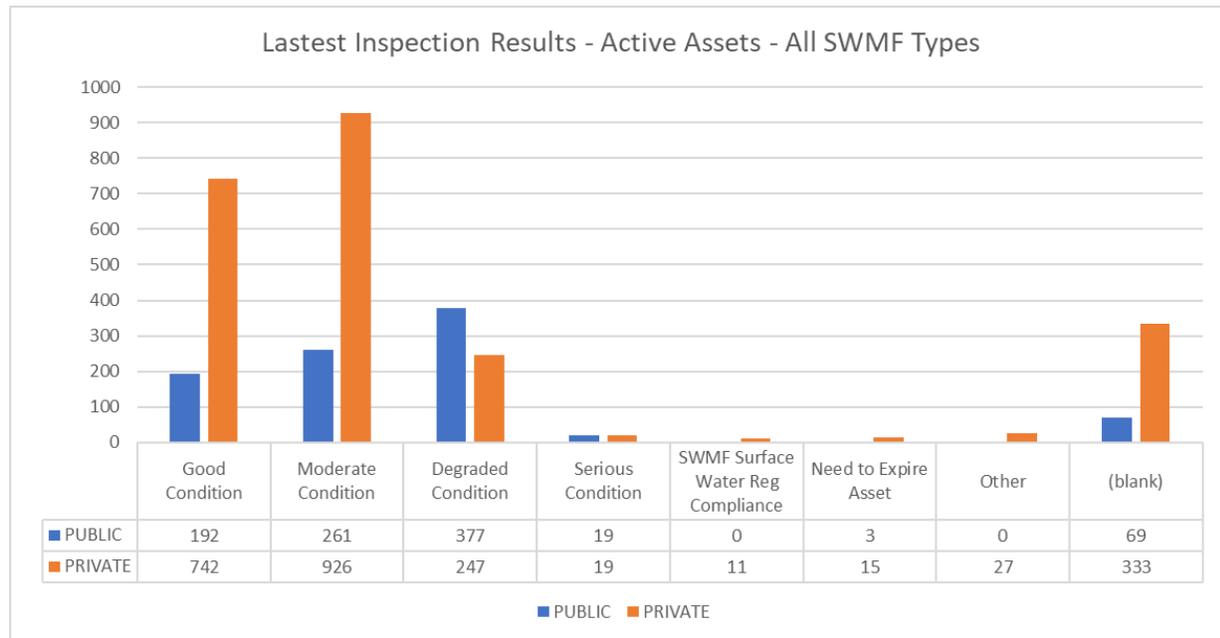
- 1.0.** Explore system and field configuration options to require data input and/or tests of data validity.
- 1.1.** Design and develop exception-based reports and/or queries to identify potential data omissions and/or entry errors.
- 1.2.** Include data accuracy and completeness of key data fields in the inspection review process.



**Finding 2: BMP Inspection Procedures can be Enhanced**

According to the MS4 Permit and City processes 100% of BMPs that are City-owned or privately-owned but maintained by the City will be inspected annually. In addition, privately-owned BMPs are to be inspected once every MS4 Permit Year (PY) or 20% per year. Exhibit 4, below, is a summary of the latest results for active assets included in the data extract.

Exhibit 4. Latest Inspection Results – Active Assets



SOURCE: Combined Infor (Hansen) and Cartegraph extracts of SWMF inspections completed during the five-year MS4 permit period.

We selected a sample of SWMFs with failed inspections based on the latest inspections results and reviewed for the following:

- Inspection reports are available in Infor (Hansen) or Cartegraph as required.
- Privately-owned re-inspections and/or follow-up inspections are scheduled and completed in a timely manner.
- Privately-owned SWMFs are repaired or sent to the Regulatory Unit for further action.

Tables 3 and 4, below, provide a summary of the population and sample sizes selected and the exceptions noted, respectively.



**Office of the City Auditor**  
**Audit of the Stormwater Regulatory and Inspection Programs**

Table 3. Summary of Population and Sample Size

Latest Inspection Result	Serious Condition	Degraded Condition	Regulatory*
Population	38	624	11
Ownership Public/Private	19/19	377/247	0/11
Audit Sample Size	38	30	11
Sample Type	100%	Randomly Selected	100%

\*Regulatory=Stormwater Management Facility Surface Water Regulatory Compliance

Table 4. Summary of Exceptions

Latest Inspection Result	Serious Condition	Degraded Condition	Regulatory*	Total Exceptions
Inspection Report not Attached	5	1	0	6
Reinspection not Scheduled	8	4	0	12
Not Sent to Regulatory	7	2	9	18

\*Regulatory=Stormwater Management Facility Surface Water Regulatory Compliance

We also noted that there were six SWMFs assets (5 private and 1 public) in the Cartegraph asset inventory where we did not see any evidence that these assets were inspected during the five-year MS4 permit cycle. Implementing the following recommendations will help ensure all assets are properly inspected.

**Recommendation:**

To ensure inspections are performed in accordance with specified policies, we recommend the following:

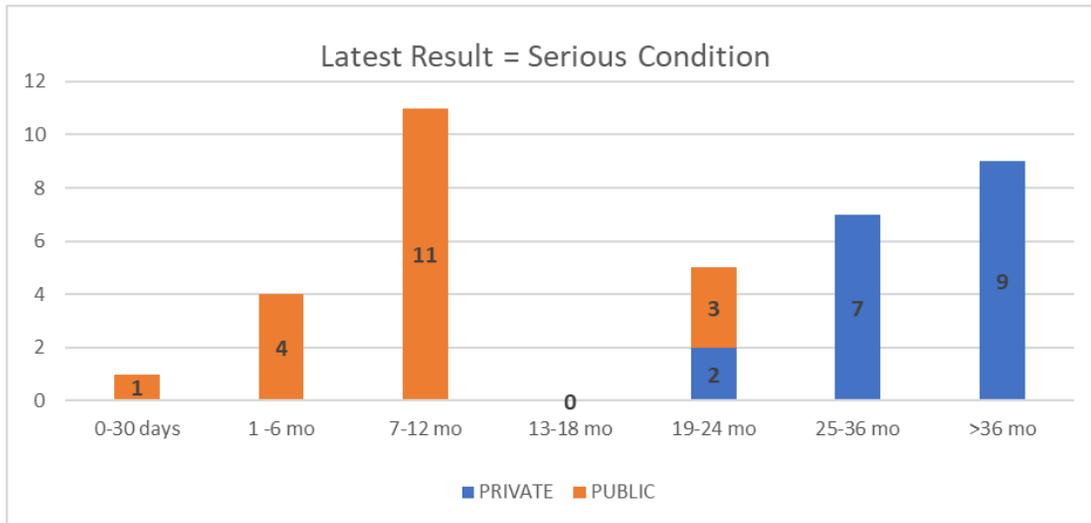
- 2.0** Develop a formal inspection review process to be performed by the Inspection Supervisor. This should, at a minimum, require a percentage of inspections to be reviewed for completeness on a regular basis. This should also include developing and reviewing exception reports, Cartegraph dashboard reports, and other Quality Control procedures to ensure:
- All assets that require an inspection are inspected in accordance to required timeframes.
  - All data and forms including the inspection reports are included in Cartegraph.
  - Inspection and Re-Inspections are accurately scheduled and completed in a timely manner.
  - SWMFs in a failed status are repaired timely and do not simply get rescheduled for the next inspection cycle. The process should include creating work orders for the newly created maintenance team.
  - All open work orders are properly tracked until corrective action is taken.



**Finding 3: Corrective Action for BMP Assets with a Serious or Degraded Inspection Condition are not Performed Timely**

Exhibit 5, below is the aging status of latest BMP inspection results as of June 30, 2021. For the 35 assets with a result of **Serious Condition** (immediate need for repair or replacement) the length of time they have been in this status is shown below:

Exhibit 5. Serious Condition



There are:

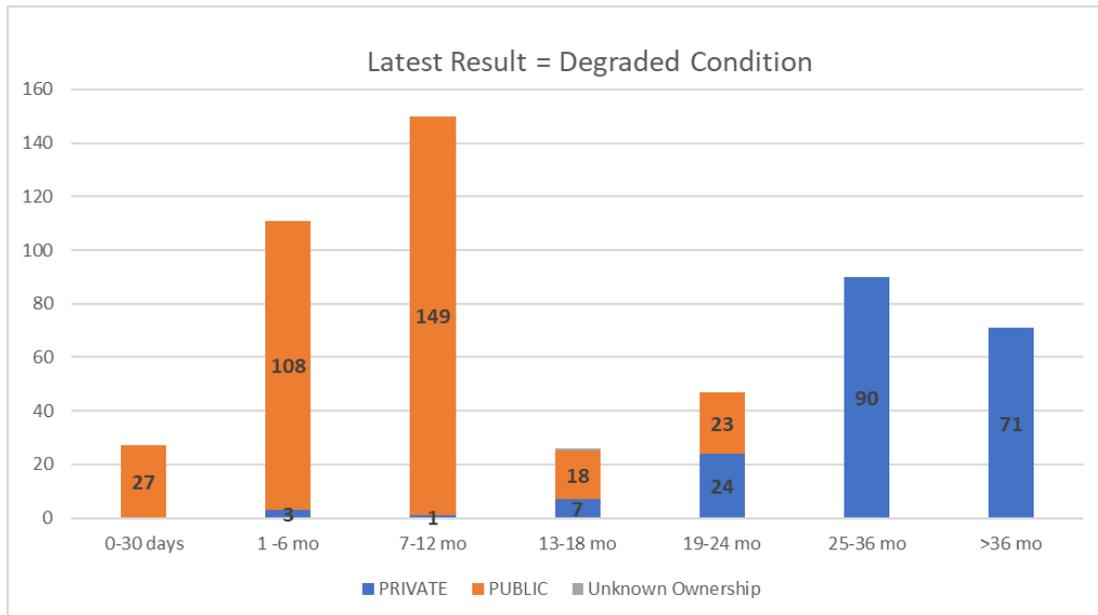
- 21 assets in serious condition for over 12 months.
- 16 of the 21 assets have been in serious condition for over 24 months. These assets are under review to determine appropriate follow up action.
- Of the 19 public assets, the required maintenance and/or repairs have been scheduled for eight.



## Office of the City Auditor Audit of the Stormwater Regulatory and Inspection Programs

The aging status of latest BMP inspection results as of June 30, 2021 for the 522 assets with an inspection result of **Degraded Condition** (poorly maintained; routine maintenance recommended, and repairs needed) is shown below in Exhibit 6:

Exhibit 6. Degraded Conditions



There are:

- 234 assets in degraded condition for over 12 months.
- 161 assets have been in a degraded condition for over 24 months.

**Note:** To address the backlog and ensure continued compliance with the MS4 permit, a dedicated Stormwater facilities maintenance crew was approved in the FY 2022 Operating Budget. At the time of our audit, the maintenance crew, and the necessary equipment to perform the work was being assembled and work was just getting underway. So far, approximately 50% of the degraded public SWMFs that are the responsibility of Public Works have maintenance scheduled or planned.

### **Recommendations:**

To ensure assets in serious or degraded condition are corrected in a proper and timely manner, we recommend the following:

- 3.0** Review each BMP asset currently in a serious or degraded condition and determine the corrective action that needs to be taken (i.e., send to Regulatory Unit for action, correction of data entry errors, initiate work orders to correct, etc.).
- 3.1** Add a conditions field to the inspection area to track the status of failed assets (i.e., Corrective Action Needed, Work Order Scheduled, Sent to Regulatory, Corrective Action Taken).



## Office of the City Auditor

### Audit of the Stormwater Regulatory and Inspection Programs

- 3.2** Design and develop dashboard gadgets to identify and monitor SWMF assets in degraded or serious condition and track scheduled corrective action(s).
- 3.3** Quarterly reconcile referred SWMF assets in Cartegraph to the Referrals Received List maintained by Regulatory to ensure the status of all assets are properly accounted for.



## Office of the City Auditor

# Audit of the Stormwater Regulatory and Inspection Programs

### **Conclusion**

Overall, we determined that the Stormwater Regulatory and Inspection Programs, except where noted, are operating effectively and in accordance with policies set forth by the City.

### **Acknowledgements**

We would like to thank the Department of Public Works for their cooperation and responsiveness to our requests, questions, recommendations, and suggestions during the audit. We would also like to recognize the efforts and due diligence of staff to expediently address the issues noted herein.



# City of Virginia Beach

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October 20, 2021

Mr. Lyndon S. Remias, CPA, CIA  
City Auditor

RE: Public Works Response to - Audit of the Stormwater Regulatory and Inspections Programs, dated October 4, 2021

Dear Mr. Remias:

Thank you for the opportunity to respond to the referenced report. After a review of its content, we've found it to be a detailed and well researched summary of the status of the Stormwater Management Program inspections as viewed through historical database information. Further, the eight improvement recommendations offered by your office are practical and readily implementable, giving us constructive steps to improve the quality of our data in the future.

Inspections staff has begun working with the Asset Management team on the recommendations to fully implement them as soon as possible. Additionally, the Inspection team has been working through the identified historical data issues to address any missing inspections, needed Regulatory referrals, etc. As of the date of this letter the specific status of each recommended action is as follows:

- 1.0. Explore system and field configuration options to require data input and/or tests of data validity**
  - Asset Management team modified the new Cartegraph database to require a mandatory data entry into key fields before the record can be closed;  
COMPLETED
- 1.1. Design and develop exception-based reports and/or queries to identify potential data omissions and/or entry errors**
  - Asset Management team developed dashboards that show records where fields are blank along with inspection completion data; these are being used by the new Inspection Supervisor as part of his QA/QC process; Dashboards & QA/QC workflow – COMPLETED

**1.2. Include data accuracy and completeness of key data fields in the inspection review process**

- New Inspection Supervisor is doing QA/QC processes utilizing the new dashboards created in Cartegraph in tandem with a regular schedule of inspection report reviews; Data accuracy and completeness is now required before report can be completed; COMPLETED

**2.0 Develop a formal inspection review process to be performed by the Inspection Supervisor.**

- New process is now being utilized by the Inspection Supervisor and Inspections Coordinator. All items listed in the audit recommendations are incorporated; COMPLETED & ONGOING:
  - Timely inspections – monitored monthly through dashboards
  - Inspection documentation in Cartegraph – verified monthly through QA/QC process
  - Proper scheduling of initial and re-inspections – verified through dashboard as well as an annual review of upcoming planned inspections
  - Work Orders created for failed BMPs that are to be addressed by the new maintenance crew - this process has begun and is done on an ongoing basis
  - Open Work Order tracked to completion – will be monitored by Stormwater Maintenance Engineer and Inspections Coordinator utilizing Cartegraph dashboard gadget

**3.0 Review each BMP asset currently in a serious or degraded condition and determine the corrective action that needs to be taken (i.e., send to Regulatory Unit for action, correction of data entry errors, initiate work orders to correct, etc.).**

- Process is currently underway by the Inspections team; field work is underway but coordination on Cartegraph records issues still to be done; completion within 30 days

**3.1 Add a conditions field to the inspection area to track the status of failed assets (i.e., Corrective Action Needed, Work Order Scheduled, Sent to Regulatory, Corrective Action Taken).**

- Asset Management team added an OCI (Overall Condition Index) on each asset that will recalculate overnight and a dashboard gadget to view the data. This will make it easy to view SWMF conditions; QA/QC monitoring monthly; COMPLETED

**3.2 Design and develop dashboard reports to identify and monitor SWMF assets in degraded or serious condition and track scheduled corrective action(s).**

- Asset Management team has developed the dashboard gadgets for this data; will be monitored monthly; COMPLETED

**3.3 Quarterly reconcile referred SWMF assets in Cartegraph to the Referrals Received List maintained by Regulatory to ensure the status of all assets are properly accounted for.**

- Recommendation for referrals to be sent to the Inspection Coordinator from the Inspection Supervisor; Inspection Coordinator to refer to Regulatory; process has been reinforced with new staff and quarterly requirement added - ONGOING

These improvements are timely as we're still in the process of implementing and expanding our use of the new Cartegraph work management system within the Inspections group. By incorporating the changes offered in the recommendations, the inspection process will be a more reliable capture of data and a more solid workflow process in place to minimize future errors. Overall, the accountability of this program will be greatly enhanced. We appreciate the time that you and your staff have dedicated to helping us with this effort.

Respectfully,



Phillip J. Koetter, PE  
Operations Engineer

PJK/cac

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LJ Hansen, Public Works Director  
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