PREPARED BY:

DISTRICT OF COLUMBIA

WATER AND SEWER AUTHORITY

5000 OVERLOOK AVENUE, SW

WASHINGTON DC 20032

PREPARED FOR:

1200 FIRST STREET, NE

5TH FLOOR

WASHINGTON, DC 20002

PROJECT: MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4) PERMIT OUTFALL REPAIR SCHEDULE AND REPORT

LOCATION: WASHINGTON, DC

DATE: JUNE 2013

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY
MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4) PERMIT
OUTFALL REPAIR SCHEDULE AND REPORT

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EXECUTIVE SUMMARY

In October 2011, the U.S. Environmental Protection Agency (EPA) Region 3 issued a National Pollutant Discharge Elimination System (NPDES) Permit for the District of Columbia Municipal Separate Storm Sewer System (MS4) (Appendix A) which, in part, requires the repair of MS4 outfalls contributing to water quality degradation via destruction of riparian and in-steam habitat located within the District's MS4 Permit Area. There are many outfalls in the District located on public and private properties and within national and district parks. These outfalls are often in overgrown and other difficult to access areas. Some outfalls are in disrepair for reasons including their original method of construction, vegetation growth, changing stream conditions, or simply due to age.

The District Department of the Environment (DDOE) is the District of Columbia's designated agency responsible for managing the MS4 Stormwater Management Program. DDOE requested the services of DC Water and Sewer Authority (DC Water) to undertake a project to implement the provisions of the NPDES permit associated with MS4 outfalls located within the District's MS4 Permit Area. Accordingly, DC Water undertook the MS4 outfall program to inspect and assess the condition of existing outfalls, and develop a repair schedule for those contributing to negative water quality.

Field inspections were performed on all known MS4 outfalls. The condition of each outfall's streambank, discharge pool and structure was assessed for its contribution to water quality degradation. A scoring system was developed and implemented to rate outfall streambank/pool erosion, structure defects and structure criticality. Outfalls were sorted based on highest to lowest total score. Through this scoring and sorting process, approximately 80 out of 673 total outfalls were identified as contributors to water quality degradation and evaluated for inclusion in the MS4 Outfall Repair Schedule. The outfall repairs were further ranked as being either "complete," "near- to mid-term" or "long-term" projects. Outfall projects noted as "complete" are those outfalls restored to good condition between issuance of the most recent permit renewal and the completion of this report. Outfall repair projects which can likely be combined with planned DC Water, District Department of Transportation (DDOT), or DDOE capital improvement projects were targeted for completion within a "near- to mid-term" timeframe. Outfall repair projects targeted for completion within a "long-term" timeframe are those outfalls requiring coordination with NPS, multiple jurisdictions or other third-party entities as well as those projects for which funding sources must be identified.

The Outfall Repair Schedule will be used by DDOE to coordinate the design and construction of the identified outfall repairs projects with an overall objective of

repairing all outfalls located within the District's MS4 Permit Area that are contributing to water quality degradation within 10 years of the EPA Region 3 approval date of this plan.

1.0 INTRODUCTION

1.1 PURPOSE

DC Water developed this report on the Municipal Separate Storm Sewer System (MS4) Outfall Program to determine the physical condition of outfalls and their immediate surroundings and to determine if the water quality of the related streams is being adversely impacted. The results of the inspection are used to prioritize necessary repair work and to establish an approximate timeframe for the repair or rehabilitation work in compliance with the requirements of Section 4.3.5.3 of Permit No. DC0000221—the District's MS4 Permit.

1.2 BACKGROUND

The District Department of the Environment (DDOE) is the District of Columbia's (the District) designated agency responsible for managing the MS4 Stormwater Management Program and all activities necessary to comply with the requirements of the MS4 Permit; specifically for those portions of the MS4 owned and operated by the District of Columbia and discharging to the portions of the Potomac River, Anacostia River, and Rock Creek within the District's MS4 Permit Area[1]. DDOE is responsible for all activities necessary to comply with the requirements of the District's MS4 Permit No. DC0000221 as issued to the District of Columbia government under the authority of the U.S. Environmental Protection Agency (EPA) Region 3 on January 22, 2012 (Effective Date).

DC Water provides wastewater collection and treatment for the District and nearby counties in both Virginia and Maryland. DC Water is one of seven District governments designated "Stormwater Agencies" listed under the District's Comprehensive Stormwater Management Act of 2008. As such, DC Water is responsible for complying with those elements of the MS4 Permit within DC Water's jurisdictional scope and authorities.

The initial outfall inventory referenced in this report came from a compilation of outfall inventory provided by DC Water and DDOE, and pulled from EPA REGION 3 permits. An inventory of MS4 outfalls was performed by DC Water in 2006. The 2006 inventory data included GPS

[1] Section 1.1 of the District's MS4 Permit defines "MS4 Permit Area" to cover all areas within the jurisdictional boundary of the District of Columbia served by, or otherwise contributing to discharges from, the Municipal Separate Storm Sewer System (MS4) owned or operated by the District of Columbia. This permit also covers all areas served by or contributing to discharges from MS4s owned or operated by other entities within the jurisdictional boundaries of the District of Columbia unless those areas have separate NPDES MS4 permit coverage or are specifically excluded herein from authorization under the District's stormwater program.

coordinates, site photos, physical attributes (size, materials, etc.), structure condition, flow depth, and visual and olfactory illicit discharge assessments. DDOE Stormwater Management Division also provided outfall inventory data from inspections performed in 2004. The EPA's database of District NPDES permits (http://www.epa.gov/reg3wapd/npdes/dcpermits.htm) was also utilized to cull combined sewer outfalls (CSOs) from the inventory. Data from these sources was merged into a single GIS inventory, hereafter referred to as the 2006 Outfall Survey Inventory, consisting of approximately 673 stormwater outfalls on public and private properties.

The MS4 Outfall Program does not include outfalls which are covered by NPDES permits held by other agencies such as National Park Service and universities. This MS4 Outfall Program also excludes outfalls that convey water from non-public properties such as businesses, embassies and other private property.

1.3 REGULATORY REQUIREMENTS

Section 3.2 of the *Draft* NPDES Permit required the District to update its outfall inventory. During Public Review of the *Draft* Permit a comment was made that the 2006 Outfall Survey had essentially accomplished the outfall inventory yet many of these outfalls remained in severe disrepair, thus contributing to sediment loading. EPA REGION 3 agreed that this was a serious concern, and thus modified Provision 4.3.5 for Storm Drain System Operation and Management and Solids and Floatables Reduction of the final permit to require the District to undertake the following action:

> 4.3.5.3 Within 18 months of the effective date of this permit, and consistent with the 2006 Outfall Survey, the permittee shall complete, public notice and submit to EPA for review and approval an outfall repair schedule to ensure that approximately 10% of all outfalls needing repair are repaired annually, with the overall objective of having all outfalls in good repair by 2022. This schedule may be combined with the catch basin maintenance study outlined in 4.3.5.1. The repair schedule shall be fully implemented upon EPA approval.

Shortly after issuing the above Permit, EPA REGION 3 issued clarifications to Provision 4.3.5.3 in a letter received by DDOE on November 4, 2011 (Appendix B). EPA's clarified their expectations for the MS4 outfall provision to include the following:

1. The District has 18 months from October 7, 2011, for completing and public-noticing a repair and assessment schedule for all verified MS4 outfalls to surface waters.

2. Though the District may include any type of repairs needed in this schedule, the repairs subject to EPA scrutiny and for which permit compliance will be assessed will be those disrepairs or malfunctions contributing to water quality degradation and/or hampering water quality improvements. The District may define "good repair" or use any other metric believed to adequately characterize outfall condition relevant to water quality.

3. Development of the schedule can include consideration of affordability and prioritizing repairs most needed for water quality improvement. The District may propose different interim and final deadlines than those included in the permit, so long as it supports those deadlines with information about their appropriateness.

4. EPA clarifies the following permit requirement: "The repair schedule shall be fully implemented upon EPA approval," means that the District shall *begin* implementation of the schedule when EPA grants approval.

The NPDES Permit Effective Date for completion of Provision 4.3.5.3 was initially set by EPA REGION 3 as October 7, 2011. However, subsequent EPA REGION 3 letters (see Appendix B) revised the Effective Date to January 22, 2012. Thus the revised date for completion of the permit requirement for providing an MS4 Outfall Repair Schedule is July 15, 2013.

As the permittee, DDOE is responsible for coordinating the outfall repair schedule upon EPA REGION 3 approval.

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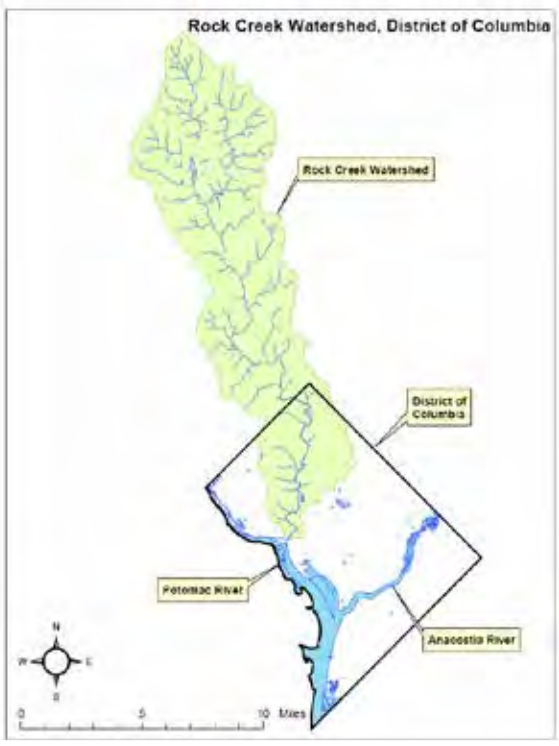
2.0 OUTFALL INSPECTION PROGRAM

2.1 INITIAL OUTFALL INVENTORY

This program covered all outfalls located within the jurisdictional boundary of the District of Columbia unless they are covered by a separate MS4 permit or are specifically excluded from the District's stormwater program. Inspections were also performed under this program for those outfalls whose flow originates from the District regardless of the outfall's physical location. For instance, a few outfalls have flow which originates in DC but are physically located in Maryland just outside DC's jurisdictional boundary—these outfalls are not District MS4 outfalls. In contrast, some outfalls which are physically located within the District have flow which originates in Maryland—these outfalls are District MS4 outfalls. Some outfalls within DC's jurisdictional boundaries are located on private land within the District, such as the Catholic University, and have flow which originates from District properties—these outfalls are also considered District MS4 outfalls.

It is also important to note that some watersheds originate outside of DC's jurisdictional boundaries. For instance, a significant portion of the Rock Creek watershed is located within Maryland as shown in Figure 2-0. As such, the streambanks and outfalls along Rock Creek are significantly impacted by stormwater runoff originating from outside of the District's jurisdictionally boundary.

Figure 2-0, Rock Creek Watershed



Courtesy of DC DOH Environmental Health Administration – 2004 Water Quality Division: EPA Rock Creek Bacteria Report

The 2006 Outfall Survey Inventory consisted of 673 outfalls as shown in Figure 2-1 below. This figure shows the relative location of the outfalls in respect to National Park Service properties, District and State of Maryland jurisdictional lines, Potomac River, Anacostia River and Rock Creek.

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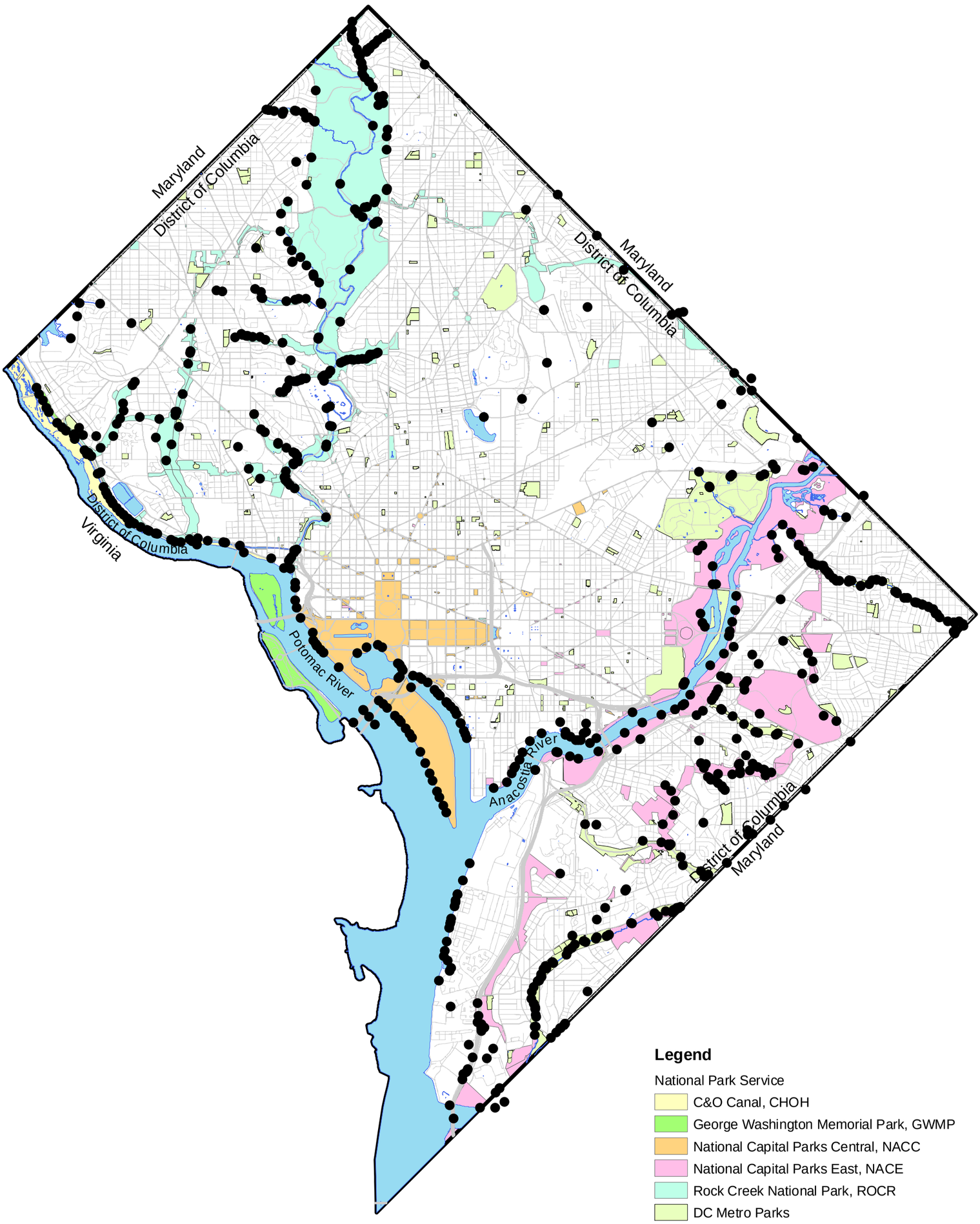

SPM
5000 Overlook Avenue, SW
Washington, DC 20032
Phone (202) 787-4090
Fax (202) 787-2112

Figure 2-1
INITIAL OUTFALL INVENTORY
MS4 Outfall Program Report

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS
CHESTER ENGINEERS

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2.1.1 OUTFALL INSPECTION METHODOLOGY

The list of general information, physical attributes, and condition assessment data to be collected for each outfall was developed based on engineering experience and MS4 Permit requirements goals. An effort was made to minimize the collection of superfluous data for improved efficiency in performing the inspections. An outfall inspection form was created to visually illustrate and organize the collected data into logical groupings.

Figure 2-2, MS4 Outfall Inspection Form (Field Version)

The inspection form was pilot tested and revised several times for effectiveness and ease of use. The field version of the MS4 Outfall Inspection Form is shown in Figure 2-2 and the final version is included in Appendix C. After pilot testing, the inspection form was converted into a touchscreen electronic tablet data collector (Acer Icona Tab A100). The outfall data was collected in the tablet and downloaded into Microsoft Office Access.

2.1.2 INSPECTION EQUIPMENT

The following equipment and supplies were utilized for the outfall inspections:

- Personal protection equipment (PPE): Safety vest, sturdy boots and safety glasses
- GIS maps and navigation device such as cell phone and/or hand-held GPS
- Tablet data collector with protective sleeve and lanyard
- Inclinometer for measuring streambank slopes
- Camera with spare batteries, memory card, and lanyard
- Clipboard with paper inspection forms; waterproof pen
- Marker board with lanyard and markers
- Carpenter's rule (folding measuring stick), or tape measure
- Waders, thigh and knee types
- Bush Hooks: long handle and short handle
- Machete w/sheath

2.1.3 OUTFALL INFORMATION

The MS4 Outfall Inspection Form was developed to collect information pertinent to the MS4 Outfall Program goal and to develop a comprehensive GIS stormwater database. The following summarizes the outfall information data and reason for its collection:

- GIS Outfall and Photo ID Numbers were obtained from the 2006 Outfall Survey Inventory GIS data. Each outfall was assigned a unique number with an "F-<number>" naming convention. This same naming convention was followed during this inspection as well. Any non-inventoried outfalls discovered during the course of the inspection were inspected and assigned the number of the nearest adjacent outfall followed by an "a", "b", or "c", etc. as needed to differentiate these outfalls for addition to the inventory database.
- Inspector Name and Agency were recorded for each outfall inspection.
- The Date and Time of day were recorded for each outfall inspection.
- GPS Latitude and GPS Longitude coordinate data was collected using a hand-held Global Positioning System (GPS) device and World Geodetic System (WGS 84). The device calculated GPS locations to within five to ten meters. The outfall GPS location data was dependent on the physical location of the inspector in relation to the outfall.
- Watershed Name and Receiving Stream data was entered into the database for each outfall to the second order stream name level, as determined from USGS maps, DC Water GIS maps, and DDOE data.
- Base Stream Flow was recorded if observed in the field. Base stream flow can be highly variable due to recent rainfall events and ground water levels. No relation to recent rainfall events was recorded.
- The Property Type and Facility Name at the outfall location, if easily obtainable, were recorded for each outfall.
- The road name the outfall was Accessed From was recorded for ease of future inspections.
- The Outfall Bank Location was recorded as "Left", "Right" or "Head" looking downstream in accordance with convention. This information is important to orient the viewer of the outfalls as to the direction of stream flow. An outfall noted as "Head" indicates that it is

For ease of sorting photos and inspections alpha-numerically, the 2006 Outfall Survey Inventory outfall names were revised to include leading zeros before the single and double digit outfall names (i.e. "F-1" is now "F-001").

the head of a stream.

- The Distance from Outfall to Downstream Receiving Stream was recorded to assist potential cost estimating efforts.
- Channel Bank Slope was collected for some outfalls using an inclinometer. The channel bank slope data collection requirement was added to the inspection after inspection form had been established and thus some outfalls did not have the slope data collected in the field. For these outfalls this data was obtained from calculating the channel slope from USGS topography maps.

2.1.4 PHYSICAL ATTRIBUTES

The physical attributes for each outfall were collected in the field and included pipe material, shape and dimensions, number of pipes and end structure type. A description of the discharge pool physical attributes was also noted. Although included on the inspection form, no pipe invert elevations were collected during the inspections due to insufficient GPS accuracy for recording vertical data.

2.1.5 CONDITION ASSESSMENT

A visual assessment of the pipe, end structure, and discharge pool water quality was recorded in the field. Significant structural, streambank and discharge pool defects were photo documented. Additional photos documented the discharge pool if a water quality issue was observed.

Pool water quality field observations included oils; foam/suds; illicit discharge; sewage; turbid (cloudy); color—red, brown, orange, green, or gray; odor—gas, sewage, H2S, rancid; trash—light, medium, heavy; and other observations.

2.1.6 STRUCTURE AND STREAMBANK/POOL DEFECT ASSESSMENT

Each outfall structure, streambank and discharge pool was rated in the field by the field inspection team to give a preliminary ranking to the severity of observed defects. The field rating was subsequently reviewed and adjusted during post-inspection quality assurance activities. A discussion of streambank/discharge pool and structure scoring system criteria is provided in Section 3.1.

2.1.7 CRITICALITY ASSESSMENT

Each outfall was rated in the field by the field inspection team to give a preliminary ranking to the criticality of an outfall. The field rating for criticality was also checked during post-inspection

quality assurance activities. A discussion of criticality scoring system criteria is provided in Section 3.1.

2.2 PHOTO DOCUMENTATION

2.2.1 DOCUMENTATION PROCEDURES

Each inspected outfall was photo documented by taking a picture of the face of the outfall and a view looking downstream from the outfall. Significant streambank/pool and structural defects were photo documented. The photos for each outfall are linked into the inspection data.

2.2.2 NAMING AND FILE STORAGE

Multiple photos were taken at each of the inspected outfalls. All photos are stored by outfall number in a single file folder for ease of retrieval and viewing. A unique photo name for each outfall photo was automatically generated by the tablet data collector using the following naming convention: <Outfall Number>_<YearMonthDay>_<HourMinute>_<Second>.jpg.

2.3 OUTFALL INSPECTIONS

2.3.1 INSPECTION METHODOLOGY

Figure 2-3, Typical Outfall Location Map

An efficient methodology was developed for planning and coordinating the outfall inspection field work. Each outfall was located and mapped using aerial topography maps created from DC Water GIS data (see Figure 2-3). (DC Water outfall GIS data generally consists of the 2006 Outfall Inventory.) Outfall inspections were grouped according to physical location, access coordination requirements and generally assumed completion of approximately 50-60 inspections per week.

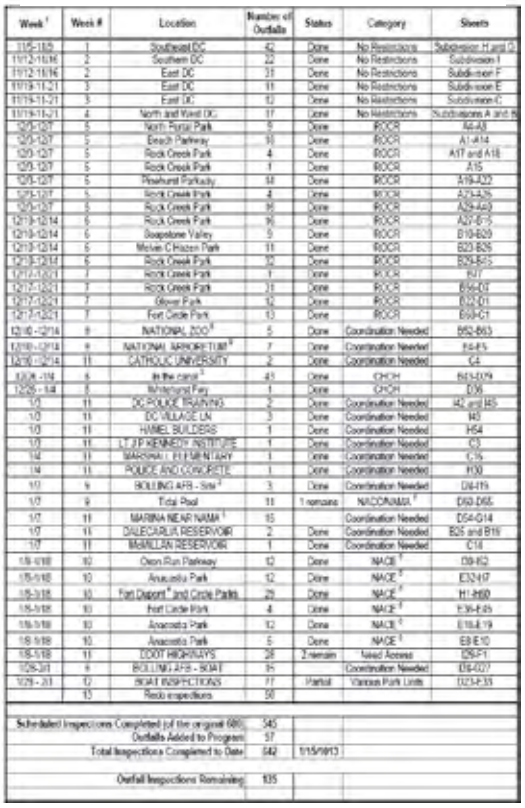
Pre-inspection research took place in the office prior to initiating each week's inspection group. The inspection team input the GIS points provided in the 2006 Outfall Survey inventory into Google Earth Pro (Google Earth). Based on the Tentative Inspection Schedule (see Figure 2-4 and Appendix D), driving directions to the planned weekly inspection location were developed to minimize logistical problems. Google Earth created the driving directions between two scheduled GIS points to the nearest street. Outfalls were grouped together to minimize driving. Outfall

locations were evaluated to make sure there was available parking, the most effective route and/or required special access permission. Plans were adjusted as needed.

To prevent delay due to access coordination, those outfalls with no access restrictions were grouped and scheduled for inspection first. Thereafter, the inspection team performed inspections for the remaining outfalls in general accordance with the tentative inspection schedule.

At the end of each week, collected outfall data was downloaded and saved to the DC Water server. After cursory review of the weekly completed inspections, the tentative inspection schedule was updated for careful coordination of remaining outfall inspections with their proper entities.

Figure 2-4, Tentative Inspection Schedule



Week[1]	Week #	Location	Number of Outfalls	Status	Category	Sheets
11/5-11/9	1	Southeast DC	42	Done	No Restrictions	Subdivision H and G
11/12-11/16	2	Southern DC	22	Done	No Restrictions	Subdivision I
11/12-11/16	2	East DC	31	Done	No Restrictions	Subdivision F
11/19-11-21	3	East DC	11	Done	No Restrictions	Subdivision E
11/19-11-21	3	East DC	13	Done	No Restrictions	Subdivision C
11/19-11-21	4	North and West DC	17	Done	No Restrictions	Subdivisions A and B
12/3-12/7	5	North Portal Park	5	Done	ROCR	A2-A3
12/3-12/7	5	Beach Parkway	10	Done	ROCR	A1-A14
12/3-12/7	5	Rock Creek Park	4	Done	ROCR	A17 and A18
12/3-12/7	5	Rock Creek Park	1	Done	ROCR	A15
12/3-12/7	5	Pinehurst Parkway	18	Done	ROCR	A19-A23
12/3-12/7	5	Rock Creek Park	4	Done	ROCR	A24-A27
12/3-12/7	5	Rock Creek Park	16	Done	ROCR	A28-A43
12/13-12/14	6	Rock Creek Park	16	Done	ROCR	A27-B15
12/13-12/14	6	Soapstone Valley	5	Done	ROCR	B16-B20
12/13-12/14	6	Melvin C Hazen Park	11	Done	ROCR	B23-B26
12/13-12/14	6	Rock Creek Park	12	Done	ROCR	B29-B35
12/17-12/21	7	Rock Creek Park	1	Done	ROCR	B37
12/17-12/21	7	Rock Creek Park	11	Done	ROCR	B56-C6
12/17-12/21	7	Glover Park	12	Done	ROCR	B22-D1
12/17-12/21	7	Fort Circle Park	13	Done	ROCR	B59-C7
12/16 - 12/16	8	NATIONAL ZOO[1]	5	Done	Coordination Needed	B62-B63
12/16 - 12/18	8	NATIONAL ARBORETUM[1]	7	Done	Coordination Needed	H4-H5
12/16 - 12/18	11	CATHOLIC UNIVERSITY	2	Done	Coordination Needed	G4
12/9 - 1/4	9	In the river[1]	41	Done	CHOH	BENSON
12/9 - 1/4	9	Whitehurst Fwy	1	Done	CHOH	D36
1/3	11	DC FOUNDERS/WARING	2	Done	Coordination Needed	H2 and H5
1/3	11	DC VILLAGE LN	3	Done	Coordination Needed	H3
1/3	11	HAMEL BUILDERS	1	Done	Coordination Needed	H54
1/3	11	J.F.K. KENNEDY INSTITUTE	1	Done	Coordination Needed	C5
1/2	11	MARSHALL ELEMENTARY	1	Done	Coordination Needed	C15
1/4	11	POLICE AND CONCRETE	1	Done	Coordination Needed	H30
1/7	9	BOLLING AFB - Site[1]	3	Done	Coordination Needed	D6-H6
1/7	9	Total Pool	11	1 remains	NACC/NAMA[1]	D60-D65
1/7	11	MARINA NEAR NAMA[1]	16		Coordination Needed	D54-G14
1/7	11	DALECARLIA RESERVOIR	2	Done	Coordination Needed	B25 and B19
1/7	11	McMILLAN RESERVOIR	1	Done	Coordination Needed	C16
1/8-1/10	10	Oxon Run Parkway	12	Done	NACE[1]	D9-H2
1/8-1/10	10	Anacostia Park	12	Done	NACE[1]	E32-H7
1/8-1/10	10	Fort Dupont[1] and Circle Parks	29	Done	NACE[1]	H1-H60
1/8-1/10	10	Fort Circle Park	4	Done	NACE[1]	F36-F39
1/8-1/10	10	Anacostia Park	12	Done	NACE[1]	E10-E19
1/8-1/10	10	Anacostia Park	5	Done	NACE[1]	E8-E10
1/8-1/10	11	DDOT HIGHWAYS	28	2 remain	Need Access	D5-F1
1/28-2/1	9	BOLLING AFB - BOAT	15		Coordination Needed	D6-G27
1/29 - 2/1	12	BOAT INSPECTIONS	77	Partial	Various Park Units	D23-F33
	13	Redo inspections	58			
		Scheduled Inspections Completed (of the original 680)	545			
		Outfalls Added to Program	57			
		Total Inspections Completed to Date	642	1/15/1913		
		Outfall Inspections Remaining	135			

2.3.2 SPECIAL COORDINATION REQUIREMENTS

2.3.2.1 Coordination of National Park Service Inspections

National Park Service (NPS) properties are divided by the NPS into six parks for organizational purposes. DC Water sent a formal letter to the NPS park superintendent of each park prior to inspections (See sample access notification letter in Appendix E). Four of the six parks have known outfalls located within the District of Columbia. Each park access required use of the "Blanket" Permit (Appendix E) and notification prior to outfall inspections. These entities are as follows:

- National Mall and Monuments (NACC/NAMA)
- Chesapeake & Ohio Canal National Historical Park (CHOH)
- Rock Creek Park (ROCR)
- National Capital Parks East (NACE)
- George Washington Memorial Parkway (GWMP) – No known MS4 outfalls.
- President's Park (PRPA) – No known MS4 outfalls.

Both NACC/NAMA and CHOH required letter/email correspondence citing the dates of the

anticipated scheduled inspection and a brief description of what the inspection team was planning to do on their park properties. ROCR and NACE required pre-inspection meetings with DC Water and inspection team staff to discuss their park specific requirements. A ROCR park ranger accompanied the field team for inspection of the outfalls within Rock Creek Park. The NPS Permits Specialist for NACE's Oxon Run Park provided on-site field guidance to minimize disturbance to Oxon Run Park's unique sweetbay magnolia bog during inspections.

Performance of the outfall inspections on National Park Properties included the following minimum requirements:

- Provide 5-day advance notification prior to working on NPS properties and telephone notification the day of the inspections.
- Place the NPS Blanket Permit (Appendix E) and a copy of any authorizing emails on the inspection vehicle dash while in the field.
- Vehicles must be parked in legal, publically available parking spaces on NACC/NAMA properties. Vehicles must be parked in a legal, paved space within NACE properties. Within other NPS properties parking on grass is generally allowed during dry weather conditions.
- Request NPS permission before cutting any vegetation to gain access to or enhance photo documentation of outfalls.
- Copy NPS on any reports of illicit discharges found during the outfall inspections.
- Dial 911 to report any problems at the park for dispatch of the NPS Police to the site.

Table 2-1 below gives the National Park Service contact information used for access permission and notification in performance of the outfall inspections.

Table 2-1 Contact Information for National Park Service Properties

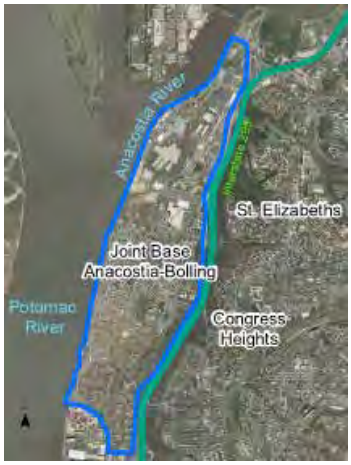
Name	Title	NPS Entity	Email	Phone Number
Kevin Barry, Fort Dupont and Fort Circle Parks	Park Ranger	NACE	kevin_f_barry@nps.gov	202-426-7723 Ext.103
Jim Rosenstock, Anacostia and Oxon Run Parks	Park Ranger, Resource Management	NACE	james_rosenstock@nps.gov	202-690-5161
Tara Morrison	Superintendent	ROCR	Tara_Morrison@nps.gov	202-895-6000
Joe Kish	Natural Resource Specialist	ROCR	Joe_Kish@nps.gov	202-895-6079

Bill Yeaman	Natural Resource Specialist	ROCR	Bill_Yeaman@nps.gov	202-895-6000
Alice McLarty	Parks Permit Coordinator	NACC/NAMA	alice_mclarty@nps.gov	202-248-4686
Leigh Zahm	Parks Permit Coordinator	CHOH	leigh_zahm@nps.gov	301-745-3337

2.3.2.2 Coordination of Other Restricted-Access Properties

Outfalls located on other restricted-access properties (see Table 2-2 below) were coordinated through pre-inspection email and telephone communications. Generally all that was necessary for these inspections was to explain what the inspection team would be doing on the property and the date the inspection would be performed. Bolling Air Force Base (BAFB) required a pre-inspection security check consisting of the submittal of the field supervisor and field inspector's social security number (SSN), date of birth (DOB), citizenship/residency status, company name, and title prior to granting approval to enter the BAFB property. Some unanticipated access and coordination issues were resolved in the field. Access approval was granted after a show of credentials and a brief explanation of the outfall program to the property owner's representative.

Bolling Air Force Base



Other restricted-access outfalls, such as those located on DC's Dalecarlia and McMillan drinking water reservoir properties, were found to be inaccessible due to perimeter fencing. These outfalls were coordinated for access and re-scheduled for inspection.

Table 2-2 Contact Information for Other Restricted-Access Properties

Name/Title	Entity	Email or Address	Phone Number
Brian Alexander, Director of Energy and Utility Management	Catholic University	ALEXANDB@cua.edu	202-319-5123
Jason Bullinger	BAFB	jason.bullinger@navy.mil	202-767-8617
Ramon Jordan	National Arboretum	ramon.jordan@ars.usda.gov	202-245-4539
Marc Muller	National Zoo	mullerm@si.edu	202-633-4410
Leo J. Nolan	Dalecarlia Reservoir	Leo.J.Nolan@usace.army.mil	202-764-2414
Mel Tesema	McMillan Reservoir	Mel.M.Tesema@usace.army.mil	202-762-0169
Jeremy Heckler, Dockmaster	Gangplank Marina 600 Water St, SW Washington, D.C. 20024	GPDockOffice@comcast.net	202-554-5000

Name/Title	Entity	Email or Address	Phone Number
---	Washington DC Police-Training	4665 Blue Plains Dr SW	202-645-0055
---	Chaney Enterprises Concrete Plant	3 DC Village Lane	---
Ramon Venero, Administration and Facilities	Lt. JP Kennedy Institute of Catholic Charities	801 Buchanan St NE	202-529-7600
---	Naval Observatory	geoff.chester@navy.mil 3450 Massachusetts Ave NW	202-762-1467

2.3.2.3 Coordination of Inspections by Boat

Due to the difficulty of access by foot, a series of outfalls located along the Anacostia and Potomac Rivers are best inspected using a boat or other watercraft. However, special precautions were needed when performing boat inspections on the Navy Yard and Bolling Air Force Base (BAFB) shorelines. The BAFB had shoreline restrictions. After coordination with the BAFB security office, three outfalls on the base were inspected on-foot and the remainder by boat. Although the Navy Yard has no MS4 outfalls, their shoreline was also restricted.

A trial boat inspection was performed using DC Water's designated combined sewer outfall (CSO) boat. This boat is owned and operated by DC Water. Several problems prevented effective completion of the boat inspections, including:

- Work Hours Issue - Due to the location of the DC Water marina and no wake zones, inspections for the river outfalls took 45 to 60 minutes to reach by boat. This issue, coupled with union restrictions on work hours of the boat driver, was a limiting circumstance.
- Curved-Hull - A curved hull which sits deep in the water is not intended for boating in shallow silty waters. This type of boat could not get close enough to the shoreline to locate the outfalls or allow outfall data collection and taking of photos.
- Flat-Bottomed Hull – Inspection of outfalls along shallow muddy stream headwater and river shorelines require a flat-bottomed Jon boat.

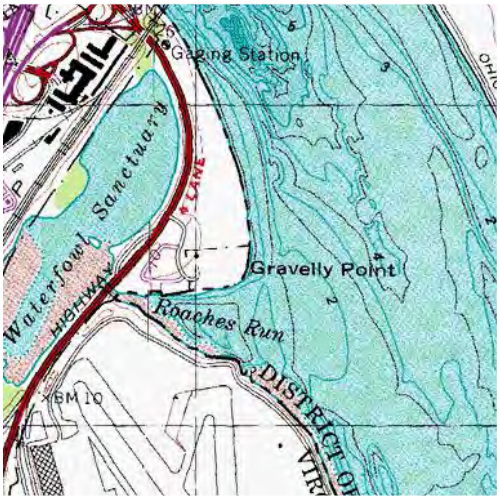
Based on lessons-learned from the above trial boat inspections, the boat inspection plan was revised. The revised plan included:

- Development and implementation of a Health and Safety Plan for boating operations. Confirmation of proper safety equipment is provided for boat safety.
- Confirmation of a boat license for the designated boat driver and training on operation of

the boat.

- Utilization of a 14-foot Jon boat with a gas motor (Mercury Marine 9.9 HP) for moving from outfall to outfall, a trolling motor for moving safely into the shallow waters and two oars. The boat was capable of safely carrying two or three people. Using multiple inspection team members on board allows use of the team's collective knowledge and resources to resolve inspection issues as they may arise during inspections.
- Utilization of multiple marinas for launching and storing the boat gave more flexibility in the inspection starting point(s) and saved time mobilizing to the inspection sites, refueling the boat, and taking restroom/lunch breaks. Pre-inspection mapping of the outfalls to be inspected by boat and their inspection order from any of the three marinas also resulted in efficiencies.
- Schedule and plan for boat inspections based on tide levels. The difference between high tide and low tide is about three feet. A number of outfalls are completely submerged at high tide and cannot be found. At low tide the boat cannot get close enough for inspection and measurements. Tide charts were used to select boat inspection days at a noon time low tide to enable the submerged outfalls to be located.
- Boat inspections beginning as early in the day as possible and continued for an 8-hour day on the water, for efficiency of labor, as is practical due the season and weather.
    - Weather (temperature, precipitation, wind speed and gusts) was checked frequently throughout the week and day to ensure safety of the inspection team.
    - Cold temperature dictated the required clothing and if the work day needed to be shortened.
    - The inspection team did not go out when rain or snow was predicted.
    - The inspection team used caution when winds were at around 15 miles per hour (mph) or greater and did not go out when winds were at 20 mph or greater.
- Use of public marinas:
    - Gravelly Point Park Boat Ramp (located in Arlington, Virginia just north of Ronald Reagan Washington National Airport) – This boat ramp was easy to use and provided a good central location to access all of the outfalls on the Potomac and Anacostia Rivers.

Gravely Point Park



- Anacostia Park Boat Ramp – This boat ramp was full of tree limbs and debris making it difficult to enter/exit the water—especially at low tide.
- Gangplank Marina – Proof of boat insurance is required prior to using this marina. This marina was not used.
- BAFB Boat Launch – Special permission and a fee are required to use it. This launch was not used.

For security, the Jon boat owned by the consultant was stored at Blue Plains Advanced Wastewater Treatment Plant overnight and on weekends between boat inspections.

2.3.3 COMPLETED OUTFALL INSPECTIONS

The outfall inspection team performed a site visit to each of the 673 outfall sites identified in the initial inventory. If presence of an outfall was not evident at a site, some effort was made to look for the outfall in the same general vicinity focusing mainly on areas where outfalls were likely to be (i.e. next to streams or near catch basins). The outfall could typically be found within 100 feet of the location of the mapped location, but occasionally no outfall was found at the GIS location. The site visits confirmed approximately 33 percent of the initial inventory as likely to have been misidentified as outfalls. Some of the misidentified outfall sites were found to be stormwater inlets or catch basins; however at a few sites no stormwater system of any type was found. If a stormwater inlet or catch basin was found, an effort was made to trace the system to its discharge point to find the outlet.

While performing inspections on the initial inventory outfalls, additional unmapped outfalls were found, inspected and added to the outfall inventory database. In addition, the NPS ranger who accompanied the inspection team during the Rock Creek Park outfall inspections had written records of all outfalls located in Rock Creek Park from a 1984 O'Brien and Gere study [report name is unknown]. A total of 139 additional outfalls were found and added to this 2013 MS4 Outfall Inventory.

Table 2-3 shows the total number of outfalls in the original inventory as well as those removed from and added to the inventory to yield the new 2013 inventory.

Table 2-3, 2013 MS4 Outfall Inventory

Inventory Source	Number of Outfalls
2006 Outfall Survey Inventory	673
Outfalls Removed (Not-an-Outfall or Unable-to-Locate)	(225)
Outfalls Added	139
Total 2013 MS4 Outfall Inventory	587

2.3.4 OUTFALL INVENTORY QUALITY ASSURANCE AND CONTROL

To ensure data collection and photo documentation were performed uniformly by multiple field personnel, all Outfall Project Summary Forms were reviewed for completeness as part of the process. This review included confirming the acceptability of photos, measurements, and observations. Information that could not be readily verified in the field was added to the database at a later time within the office. Corrective actions included the modification of outfall names, changes to the ratings based on review of photos, or requests for additional photos or inspection details to better define repairs to problem outfalls.

Downloading the data from the Outfall Inspection Form into a Microsoft Access Database file facilitated efficient data management. In the database, data could easily be sorted, filtered, searched, and modified. This allowed the inspectors and reviewers to easily organize, view, and correct inspection content.

2.3.5 GIS MAPPING CORRECTIONS

As noted in Section 2.1.3, the GPS locations for outfalls did not provide survey grade accuracy. Before uploading the data to the GIS, outfall locations were refined within GIS based on outfall photos, aerial photos and stream locations. Misidentified outfalls noted as “Not an Outfall” and “Unable to Locate” were flagged and tracked for recommendation to DC Water and DDOE to be changed to catch basins, other features, or removed from the active stormwater GIS as appropriate. After outfall location corrections, outfall data was uploaded into DC Water’s GIS and the existing stormwater pipes were snapped to the correct and refined outfall locations. The connection of the existing stormwater pipes to the new outfall locations was performed directly within DC Water’s GIS system. Figure 2-6 below shows the corrected GIS map for the final outfall inventory.

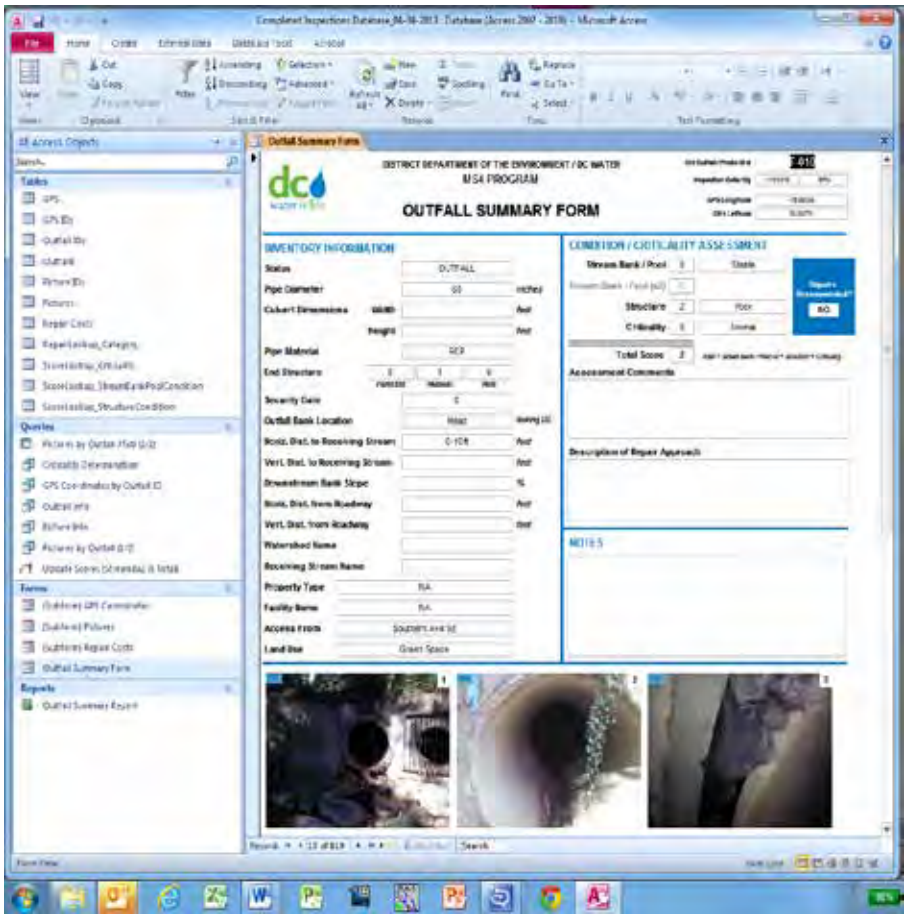
2.3.6 DATA MANAGEMENT

The completed and corrected outfall inventory is stored in Microsoft Access. Access is a database management system that allows integration of the database with a graphical user interface and software-development tools. Microsoft Access enables the outfall data to be turned into a document capable of being outputted to a printer or computer screen. Within Access an outfall summary table was created allowing queries based on “Outfall Name” and other criteria such as “Receiving Stream” or “Total Score”. In addition, edits to outfalls can be made within the outfall summary table. The outfall summary table links each individual outfall photo to the appropriate Outfall Summary Report. Outfall Summary Reports are printed to PDF for reporting

purposes.

Copies of the outfall database with embedded tables, forms and reports and the outfall photos were provided to DC Water and DDOE for their records.

Figure 2-5, Microsoft Access Outfall Summary Table



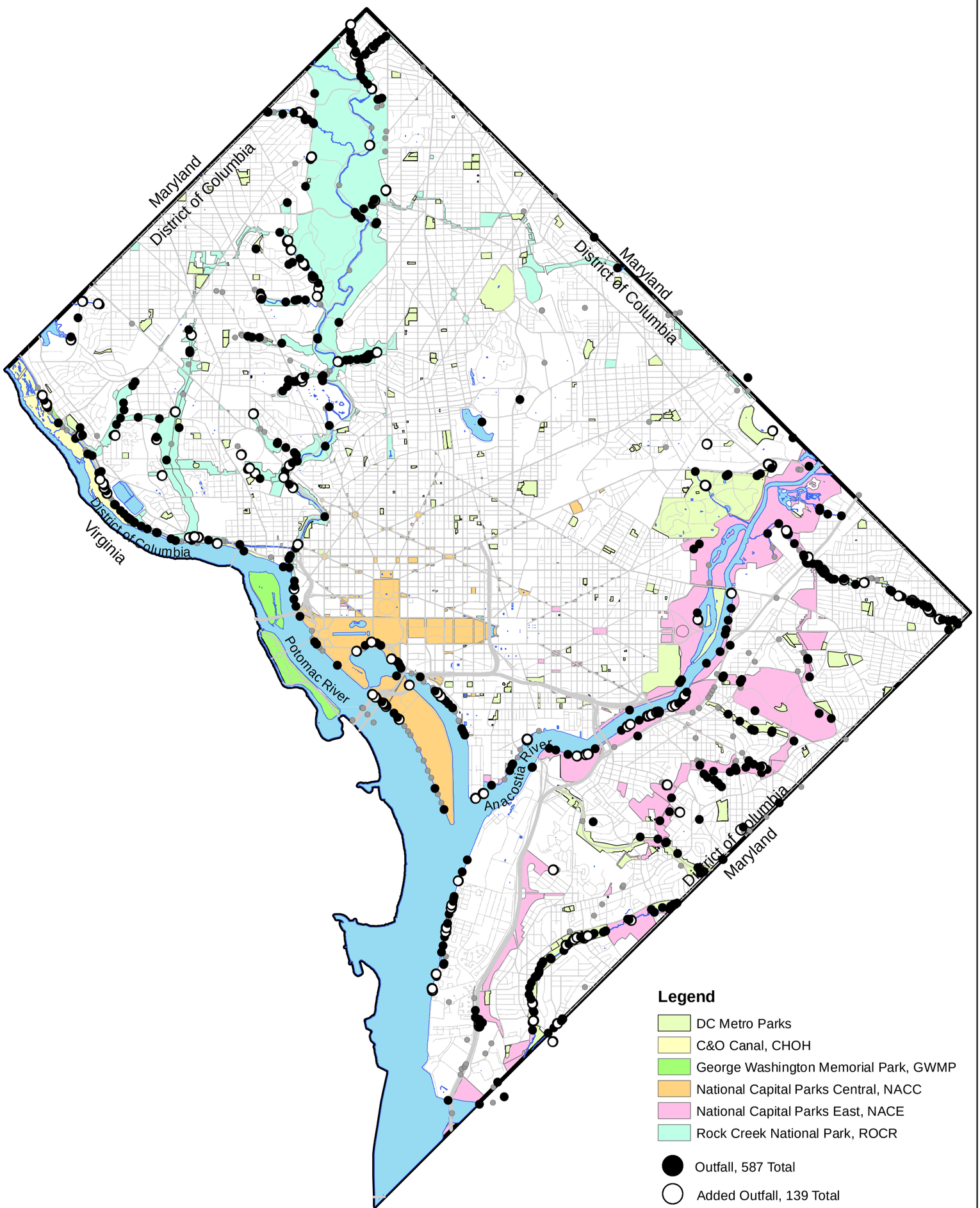


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Figure 2-6
2013 OUTFALL INVENTORY
MS4 Outfall Program Report

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3.0 OUTFALL REPAIR METHODOLOGY

3.1 OUTFALL SCORING SYSTEM

The outfall inspection form provides a document for the inspector to record the condition of the outfall structure. A specific condition assessment rating system was developed for the outfall inspection program to analyze the visual inspection data gathered to assess each outfall's condition and criticality. A rating system was developed for the outfall's condition and implemented based on the judgment of the inspection team and DC Water.

Streambank/pool assessments were given a higher weight in the scoring/rating system because of the water quality focus of this program. The grades for the visual assessment of the outfall streambank/pool were assigned values using the numeric codes with comparative ranges from 0 to 3, with "0" indicating no obvious defects and "3" indicating the most severe water quality impacts encountered. The stream/pool score was multiplied by 2 to represent the higher weighting of water quality related stream characteristics when summing the outfall's total score.

Structures were assigned values using the numeric codes with comparative ranges from 0 to 3, with "0" indicating no obvious defects and "3" indicating the most severe defects encountered.

The outfall rating system is as follows:

Streambank/Pool (x 2):

0 — Stable; Streambank and discharge pool are stable.
1 — Some Erosion; Streambank or discharge pool have experienced minor erosion in the past, but now show evidence of bedrock, plant growth, or other signs of improved streambank and discharge pool stability.
2 — Active Erosion; On-going moderate erosion evident due to bare soil and incised streambanks or discharge pools.
3 — Severe Erosion; Deeply incised streambanks and pools with continuing widespread erosion evident.

Structure:

0 — Excellent/Like New; Structure is stable; minor defects acceptable.
1 — Moderate; Some structural defects, but not likely to increase in severity in the future.
2 — Poor; Structural defects likely to increase in magnitude over time.
3 — Very Poor; Structural defects are a major on-going contributor to sediment loading, have become a public safety issue, increase the risk of roadway loss, or other acute consequence.

Some outfalls are more critical to repair than others. For example, outfalls located

along roadways, adjacent to national monuments, or near pedestrian/bike trails would have a higher criticality rating for public safety, environmental, or economic reasons. Outfalls with a greater difference between the elevation of the receiving stream and the outfall invert may result in more severe embankment erosion and thus more catastrophic failure. Severely incised streambanks along critical roadways, national monuments and public areas would thus be assigned a higher criticality score. The grade for the assessment of the outfall's criticality was assigned values using the numeric codes with a comparative range from 0 to 2, with "0" indicating the outfall is not located near an important or critical asset and "2" indicating the outfall's close proximity to the critical infrastructure or other assets, as follows:

Criticality:

0 — Normal; A non-critical structure such that impact of structure failure to the public, safety, or environment is MINOR.
1 — Important; An important structure such that impact of structure failure to the public, safety, or environment is SIGNIFICANT.
2 — Critical; A critical structure such that impact of structure failure to the public, safety, or environment is EXTREME.

Each score from the three rating systems above are summed to give a total outfall score from 0 to 11. A total score of "0" to "3" indicates no repairs are necessary. A total score between "4" and "8" indicates an outfall condition which is likely to require future attention and is consequentially considered a "medium" priority. A total score of "9" or greater indicates an outfall condition warranting consideration as a "high" priority. Examples of a "4" or higher score would be overturned headwalls, and exposed and separated pipe segments with deeply incised pool and downstream channel and perhaps located near roadways, walking trails or other critical locations. Table 3-1 summarizes the scoring system. Example photos for each scoring category are provided in Figures 3-0(a), 3-0(b) and 3-0(c) below.

Table 3-1, Description of Outfall Scoring System

Total Combined Score	Priority	Action Required
0-3	None	No Action
4-8	Medium	Future Action Required
9-11	High	Action Required

Figure 3-0(a), Example Outfall with Total Score 0-3

Figure 3-0(b), Example Outfall with Total Score 4-8

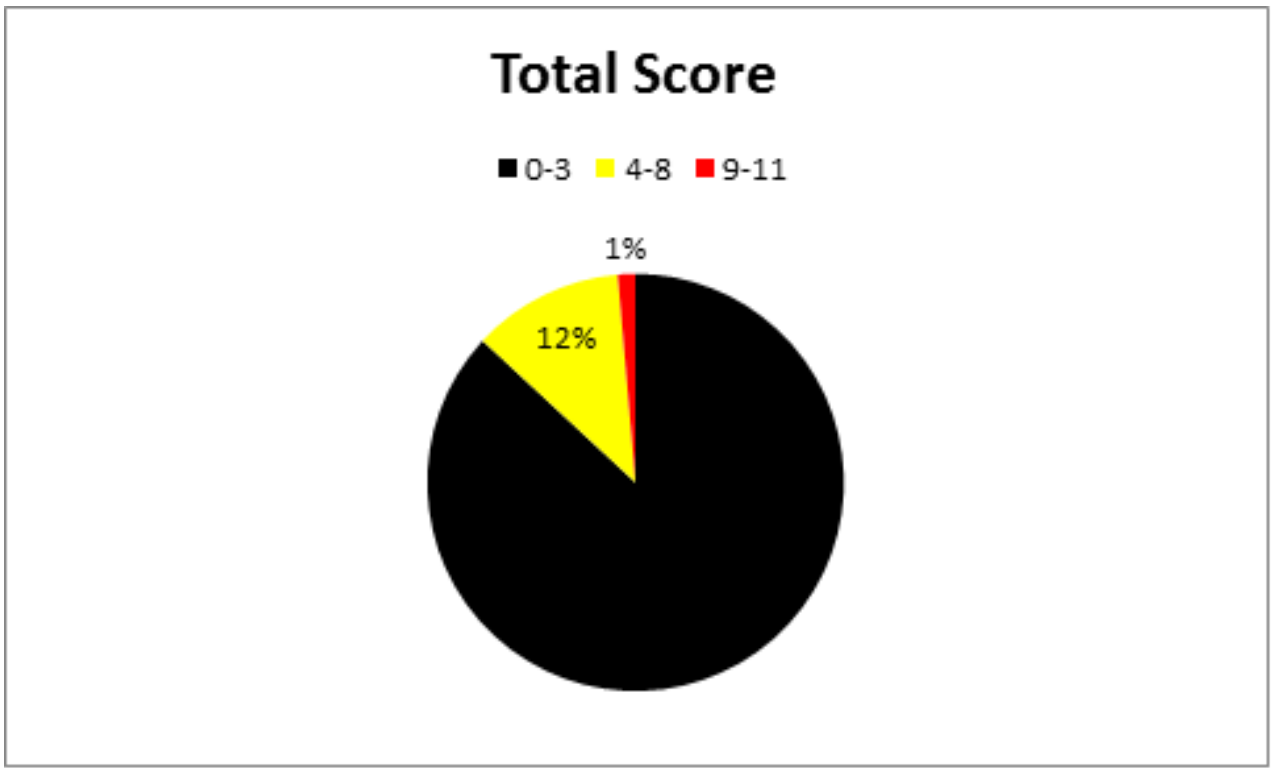
Figure 3-0(c), Example Outfall with Total Score 9-11

3.2 OUTFALL REPAIR PRIORITIZATIONS

Once ratings were assigned and total scores calculated for each outfall's streambank/pool, structure and criticality, the outfall inventory database was sorted for highest to lowest total score. Outfalls earning total scores of "4" or greater were identified as potentially requiring repairs. The high scoring outfalls were then reviewed to identify repair options and opportunities. This outfall repair ranking methodology yielded 69 outfalls with scores "4" to "8" and 8 outfalls with scores "8" to "11" as noted in Table 3-2. There are a total of 77 outfalls recommended for repair.

Table 3-2, Outfall Repair Priorities

Total Combined Score	No. of Outfalls	Percent	Priority	Action Required	Outfall Map Color
0-3	511	87%	None	No Action	
4-8	67	12%	Medium	Future Action Required	
9-11	9	1%	High	Action Required	
Total	587	100%	---	---	---



The ratings and combined total score for each outfall are tabulated within the database and outputted to Outfall Summary Reports. Outfall Summary Reports for outfalls with scores “4” or greater are included in Section 4-2. Outfall Summary Reports for all outfalls are bound separate from this Report.

Figures 3-1, 3-2, 3-3 and 3-4 below show the map location of outfalls with the highest total scores by watershed.

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Figure 3-1
Pimmit Run Watershed
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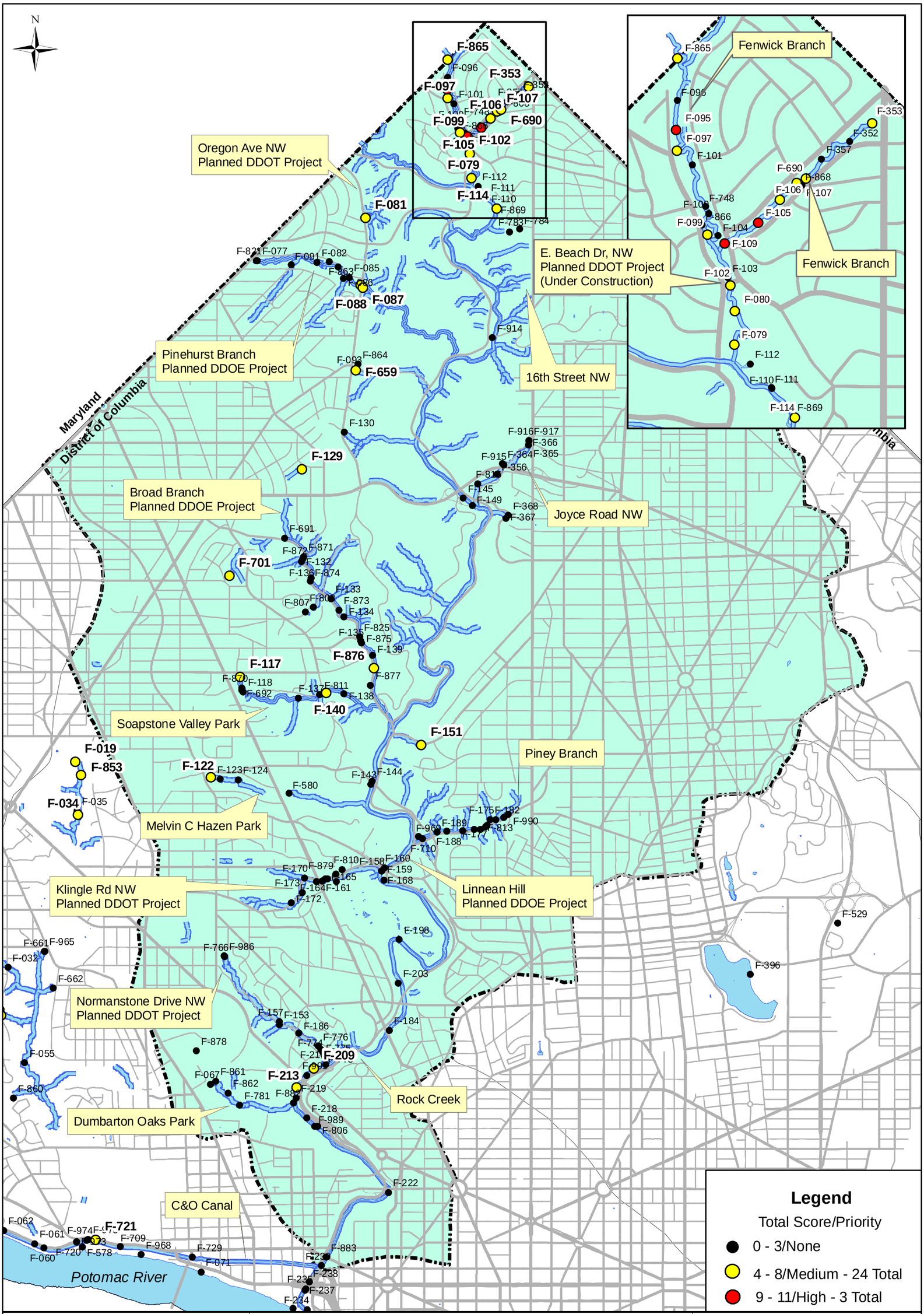

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Figure 3-2
Rock Creek Watershed
Outfall Condition Assessment
MS4 Outfall Program Report

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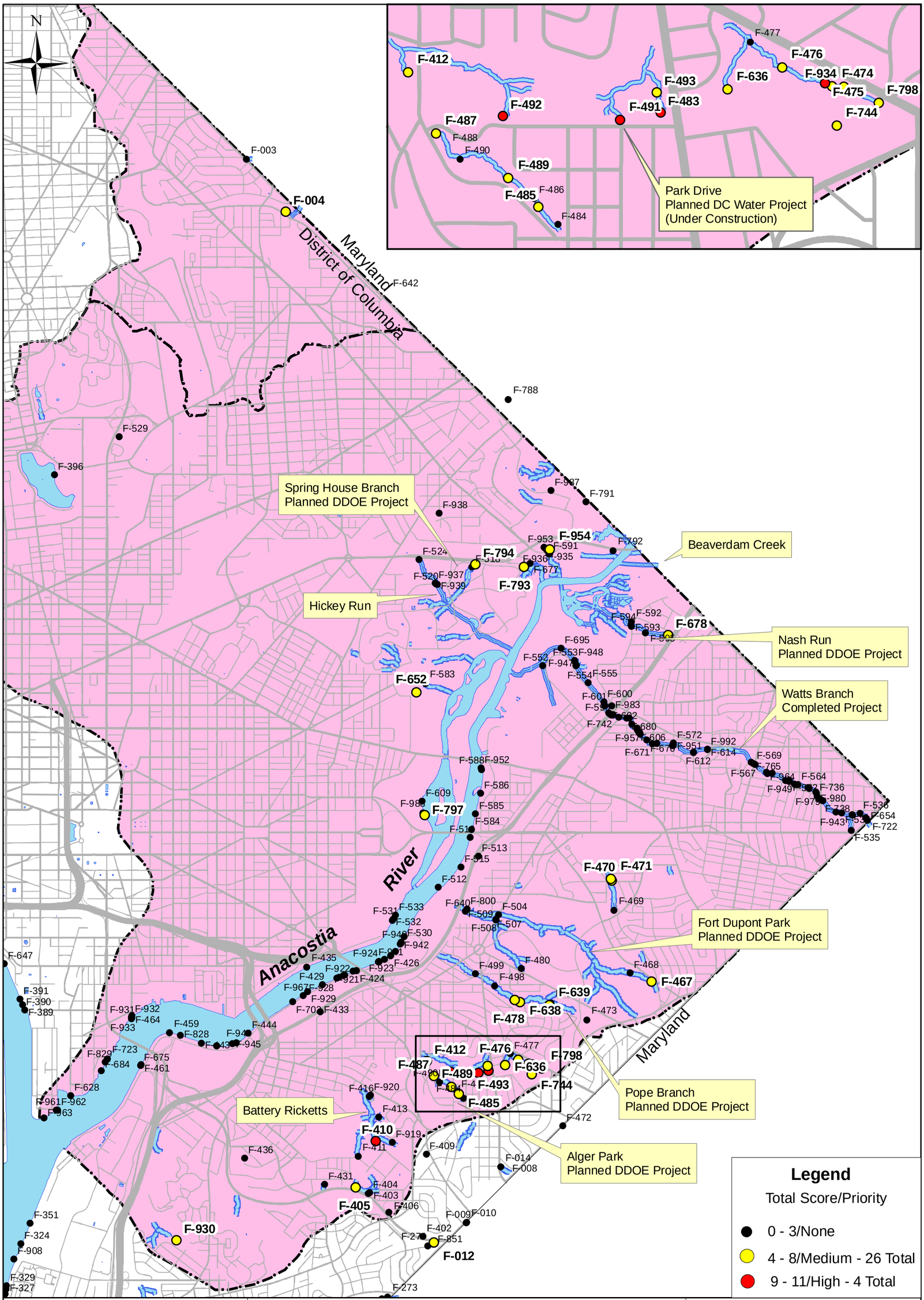

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Figure 3-3
Anacostia Watershed
Outfall Condition Assessment
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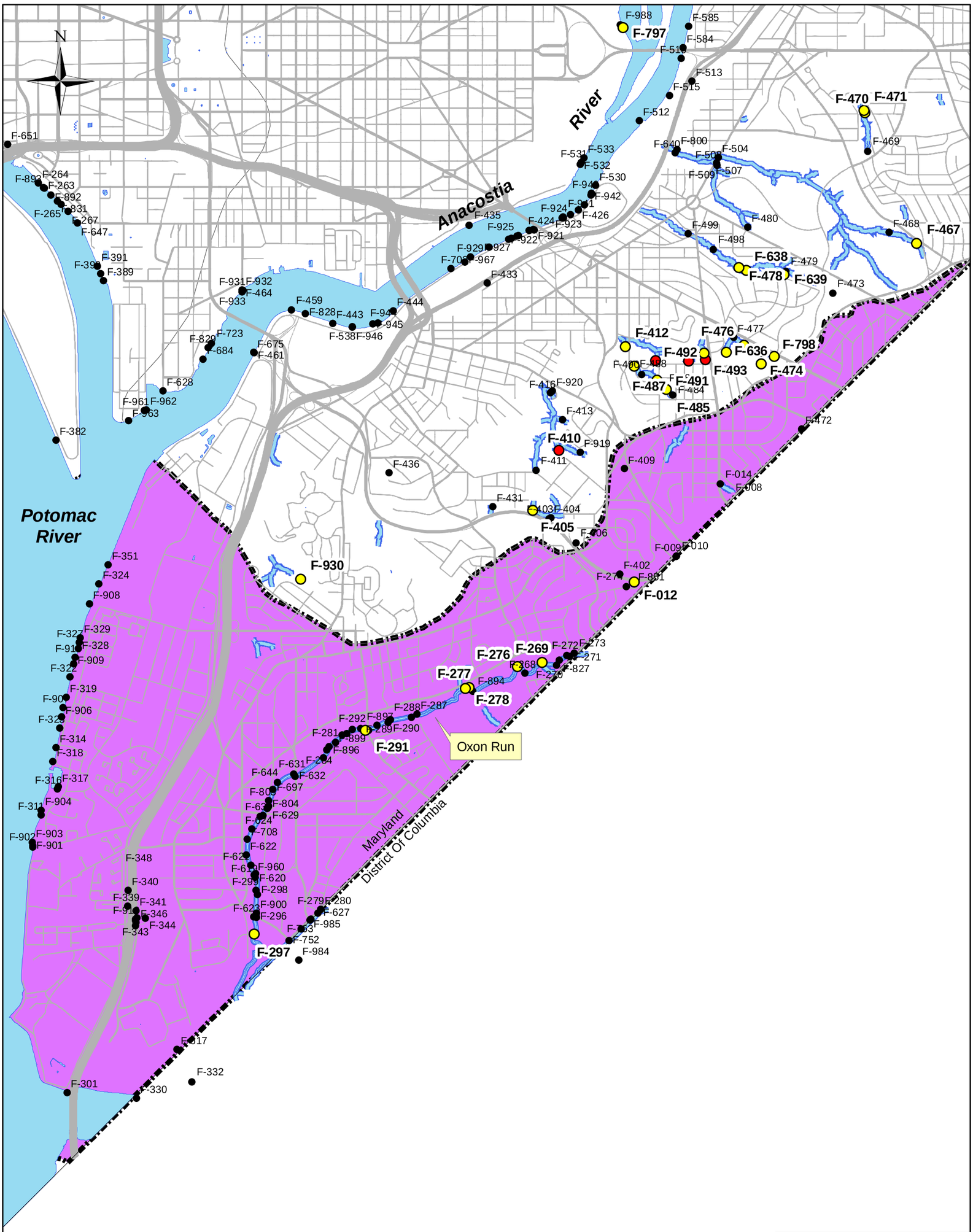

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Figure 3-4
Fourmile Watershed
Outfall Condition Assessment
MS4 Outfall Program Report

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3.3 OPTIONS FOR ORGANIZING PROJECTS FOR REPAIR

The outfall repair prioritization system developed above ranked the outfalls based on the severity of streambank/pool erosion, structure condition and degree of criticality to other DC assets. Through coordination between DDOE and DC Water, other important criteria were considered for deciding the prioritization of outfalls to be repaired. The following options were considered when selecting the final prioritization of the outfall repair projects:

- Criticality
- Total score (highest to lowest)
- Ease of access
- Complexity of construction
- Combine outfall projects with others within the same receiving stream
- Combine outfall projects with others within the same National Park
- Combine outfall projects with nearby, planned DDOE stream restoration projects
- Combine outfall projects with nearby, planned DC Water sanitary sewer rehab projects
- Combine outfall projects with nearby, planned DDOT roadway improvement projects

Combining outfall repair projects with other interagency projects will impact the Outfall Repair Schedule due to additional interagency coordination requirements. However, the cost savings is likely to prove beneficial. Projects planned by other agencies under consideration at the time of this report are as shown on Figures 3-1, 3-2, 3-3 and 3-4 above.

In addition to the projects shown on the attached figures, DDOT is considering improvements to several segments along Canal Road. DDOT noted Canal Road has been requiring more frequent repair than expected due to erosion and undercutting of the road. DDOT expressed an inclination for taking a holistic approach to Canal Road repairs offering an opportunity for collaboration between different District agencies and DC Water.

3.4 DDOE OUTFALL REPAIR SCHEDULE METHODOLOGY

3.4.1 DDOE OUTFALL REPAIR SCHEDULE CATEGORIES

DDOE Watershed Protection Division and Stormwater Management Division staff used the condition assessment outfall scoring system and options for organizing repairs as the starting point for organizing outfall repairs into categories as shown in the MS4 Outfall Repair Schedule. In review of the outfalls with scores greater than or equal to “4”, several outfalls with a score of “4” were deemed as not in need of repair (F-004, F-019, F-026, F-476, F-711, F-721, and F-

787). These outfalls were removed from the Repair schedule but are included in Section 4.3 as a reference. Based on the timeframe for outfall repair project coordination, design and construction, five outfall repair categories were identified.

Category 1 - Outfall repairs completed by a District project as of May 2012. This category applies to outfalls that have been repaired as part of a District stream restoration, roadway repair, or sewer line repair project between the issuance of the most recent permit renewal and the completion of this report. The majority of these outfalls, indicated as "Complete" in the Outfall Repair Schedule, were restored to good condition as part of DDOE's Watts Branch stream restoration construction project completed in May of 2012. These outfall repairs warranted repair prior to acceptance of the MS4 Outfall Repair Schedule.

Category 2 - Outfall repairs to be addressed by a near-term or mid-term planned District project. This category applies to outfalls that will be repaired and restored to good condition as part of a stream restoration, roadway repair, or sewer line repair project currently planned by DDOE, DDOT, or DC Water, respectively. These projects, indicated in the Outfall Repair Schedule as to be completed in the "Near- to Mid-Term" timeframe, are likely to be completed within five years of acceptance of the Outfall Repair Schedule.

Category 3 - Outfall repairs to be potentially addressed by a long-term project that will require coordination with the National Park Service, other federal entity, or other third party. This category applies to a large group of outfalls for which repair projects will require extensive coordination with federal, District, and/or private entities. The majority of these outfalls are on NPS property. Repairs to these outfalls would require NPS approval, and would likely require an initial Environmental Assessment and/or Environmental Impact Statement in compliance with federal NEPA regulations. As a result, proposing a definitive schedule for these projects is not possible. Thus these projects are indicated in the Outfall Repair Schedule as to be completed in the "Long-Term" timeframe. The District will work to address these coordination requirements with the goal of scheduling these outfalls for repair within 10 years of the approval date of this plan.

Category 4 - Outfall repairs to be potentially addressed by a long-term project that will require multi-jurisdictional coordination. This category applies to a large group of outfalls which are exposed to heavy wet-weather flow from watershed boundaries upstream of the District. Any current District repair projects would eventually be damaged and eroded by flow beyond the District's control. The majority of these outfalls are in upper Rock Creek downstream of Silver Spring, MD. As a result, the District hopes to address these outfalls through a multi-jurisdictional

effort with Montgomery County, MD. Due to the coordination required for this effort, proposing a definitive schedule for these outfalls is not possible. Thus these projects are indicated in the Outfall Repair Schedule as to be completed in the "Long-Term" timeframe. The District will work to address these coordination requirements with the goal of scheduling these outfalls for repair within 10 years of the approval date of this plan.

Category 5 - Outfall repairs to be potentially addressed by a long-term project for which no project opportunities are currently identified. This category applies to outfalls identified for repair but for which the District must first identify project opportunities (such as a DDOE stream restoration project or a DDOT road reconstruction project) that lend the opportunity to fix these outfalls in combination with a larger project, in the interest of efficiency and cost-effectiveness. These projects are indicated in the Outfall Repair Schedule as to be completed in the "Long-Term" timeframe. The District will work to identify such project opportunities and their funding sources with the goal of scheduling these outfalls for repair within 10 years of the approval date of this plan.

Organizing the outfall repairs per DDOE's categories, provides for completion of approximately 50% of scheduled repairs to be completed in years 1 through 5 and the remaining 50% to be completed in years 6 through 10. DDOE's MS4 Outfall Repair Schedule categories, timeframes are summarized in Table 3-3.

Table 3-3, DDOE Outfall Repair Schedule Categories

DDOE Category	Description	Completion Timeframe	Outfalls with Water Quality Impacts	Percent of Total
1	Completed as of May 2012	Completed	25	24%
2	Include with a planned District project	5 Years*	27	27%
3	Require NPS, Federal or third-party coordination	10 Years*	34	34%
4	Require multi-jurisdictional coordination	10 Years*	13	13%
5	Require identification of project opportunities	10 Years*	2	2%
Total		10 Years*	101	100%

* Completion timelines may be extended as there are coordination and approval requirements beyond the District's control.

3.4.2 OUTFALL REPAIR COST DEVELOPMENT

A broad review of the outfall inspection photos indicated several types of stream repairs and/or structural repairs would be necessary. Outfall repairs under this program encompass outfall structure repairs or replacements, localized streambank point repairs, stream restorations, and regenerative stormwater conveyance (gully restoration) projects. A rough order of magnitude estimate of construction cost was developed for these typical repair approaches to gain a sense of the overall MS4 Outfall Program construction costs. The costs in this section and included in Section 4.0 are estimated costs for planning purposes only, and do not represent a funding commitment by any District agency or DC Water.

The estimated construction costs presented in Section 4 – MS4 Outfall Repair Schedule are generally based on unit prices as follows:

Structural Repairs/Replacements (per each)	$20,000 to $50,000
Stream Point Repairs (per each, 50 LF, one bank only)	$20,000 to $50,000
Stream Repairs (per 100 LF repaired, one bank only)	$100,000
Stream Restorations (per 300 LF restored)	$300,000
Regenerative Stormwater Conveyance (i.e. Gully Restorations, per 300 LF restored)	$300,000

In addition to construction costs, total outfall repair project costs may include planning and design fees, property and easements, geotechnical subsurface investigations, utility relocations, mitigation fees for trees and wetlands, permits and environmental assessments, as well as other project costs.

4.0 OUTFALL REPAIR SCHEDULE

4.1 OUTFALL REPAIR SCHEDULE

Outfall No.	Cond. Assess. Total Score	DDOE Catagory No.	Currently Planned Project?	Suggested Stream Repair Type	Tentative Repair Timeframe	Stream Repair Construction Cost [1]	Structure Repair Construction Cost [1]	Total Construction Cost
F-012	5	3	No	Stream Restoration	Long-Term	$30,000	$20,000	$50,000
F-019	4	2	DC Water	Stream Restoration	Near- to Mid-Term	$50,000	$5,000	$55,000
F-034	7	2	DC Water	Stream Restoration	Near- to Mid-Term	$100,000	$30,000	$130,000
F-042	5	2	DC Water	Point Repair	Near- to Mid-Term	$0	$50,000	$50,000
F-052	5	2	DC Water	Point Repair	Near- to Mid-Term	$0	$50,000	$50,000
F-058	4	2	DC Water	Point Repair	Near- to Mid-Term	$0	$50,000	$50,000
F-079	6	4	No	Stream Restoration	Long-Term	$300,000	$20,000	$320,000
F-080	5	4	No	Stream Restoration	Long-Term	$50,000	$20,000	$70,000
F-081	4	2	DDOT	Potential RSC	Near- to Mid-Term	$100,000	$50,000	$150,000
F-087	5	2	DDOT	Potential RSC	Near- to Mid-Term	$100,000	$20,000	$120,000
F-088	5	2	DDOT	Potential RSC	Near- to Mid-Term	$50,000	$20,000	$70,000
F-095	10	4	No	Stream Restoration	Long-Term	$100,000	$30,000	$130,000
F-097	7	4	No	Stream Restoration	Long-Term	$100,000	$50,000	$150,000
F-099	7	4	No	Stream Restoration	Long-Term	$300,000	$20,000	$320,000
F-102	5	2	DDOT	Stream Restoration	Near- to Mid-Term	$0	$50,000	$50,000
F-105	9	4	No	Stream Restoration	Long-Term	$20,000	$20,000	$40,000
F-106	6	4	No	Stream Restoration	Long-Term	$50,000	$20,000	$70,000
F-107	4	4	No	Stream Restoration	Long-Term	$100,000	$20,000	$120,000
F-109	9	4	No	Stream Restoration	Long-Term	$0	$40,000	$40,000
F-114	6	4	No	Stream Restoration	Long-Term	$100,000	$30,000	$130,000
F-117	4	2	DC Water	Point Repair	Near- to Mid-Term	$50,000	$50,000	$100,000
F-122	7	3	No	Stream Restoration	Long-Term	$50,000	$50,000	$100,000
F-129	5	2	DDOT	Point Repair	Near- to Mid-Term	$50,000	$20,000	$70,000
F-140	7	2	DC Water	Potential RSC	Near- to Mid-Term	$200,000	$30,000	$230,000
F-151	6	3	No	Potential RSC	Long-Term	$100,000	$20,000	$120,000
F-209	6	3	No	Point Repair	Long-Term	$200,000	$20,000	$220,000
F-213	7	2	DC Water	Point Repair	Near- to Mid-Term	$100,000	$50,000	$150,000
F-269	4	3	No	Stream Restoration	Long-Term	$100,000	$30,000	$130,000
F-276	6	3	No	Stream Restoration	Long-Term	$300,000	$100,000	$400,000
F-277	4	3	No	Stream Restoration	Long-Term	$50,000	$0	$50,000
F-278	5	3	No	Stream Restoration	Long-Term	$100,000	$30,000	$130,000
F-291	4	3	No	Stream Restoration	Long-Term	$0	$20,000	$20,000
F-297	6	3	No	Stream Restoration	Long-Term	$50,000	$50,000	$100,000
F-353	4	4	No	Stream Restoration	Long-Term	$50,000	$0	$50,000
F-405	6	3	No	Potential RSC	Long-Term	$100,000	$20,000	$120,000
F-410	9	3	No	Potential RSC	Long-Term	$300,000	$30,000	$330,000
F-412	4	3	No	Potential RSC	Long-Term	$50,000	$50,000	$100,000
F-467	7	3	No	Stream Restoration	Long-Term	$20,000	$20,000	$40,000
F-470	8	3	No	Point Repair	Long-Term	$50,000	$50,000	$100,000
F-471	8	3	No	Point Repair	Long-Term	$20,000	$20,000	$40,000
F-474	4	3	N/A	Potential RSC	Long-Term	$50,000	$0	$50,000
F-475	9	3	No	Potential RSC	Long-Term	$300,000	$30,000	$330,000

Outfall No.	Cond. Assess. Total Score	DDOE Catagory No.	Currently Planned Project?	Suggested Stream Repair Type	Tentative Repair Timeframe	Stream Repair Construction Cost [1]	Structure Repair Construction Cost [1]	Total Construction Cost
F-478	5	2	DDOE	Stream Restoration	Near- to Mid-Term	$100,000	$20,000	$120,000
F-479	3	2	DDOE	Stream Restoration	Near- to Mid-Term	$100,000	$5,000	$105,000
F-483	9	3	No	Potential RSC	Long-Term	$100,000	$30,000	$130,000
F-485	8	2	DDOE	Potential RSC	Near- to Mid-Term	$300,000	$30,000	$330,000
F-486	7	2	DDOE	Potential RSC	Near- to Mid-Term	$200,000	$50,000	$250,000
F-487	4	2	DDOE	Potential RSC	Near- to Mid-Term	$50,000	$20,000	$70,000
F-489	6	2	DDOE	Potential RSC	Near- to Mid-Term	$100,000	$50,000	$150,000
F-490	1	2	DDOE	Potential RSC	Near- to Mid-Term	$0	$50,000	$50,000
F-491	11	2	DC Water	Potential RSC	Near- to Mid-Term	$200,000	$30,000	$230,000
F-492	9	3	No	Potential RSC	Long-Term	$100,000	$30,000	$130,000
F-493	8	3	No	Potential RSC	Long-Term	$100,000	$30,000	$130,000
F-537	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-563	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-564	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-565	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-567	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-570	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-571	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-572	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-604	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-605	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-606	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-607	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-612	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-613	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-614	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-636	6	3	No	Potential RSC	Long-Term	$100,000	$0	$100,000
F-638	7	2	DDOE	Stream Restoration	Near- to Mid-Term	$50,000	$20,000	$70,000
F-639	5	2	DDOE	Stream Restoration	Near- to Mid-Term	$100,000	$30,000	$130,000
F-652	6	3	No	Point Repair	Long-Term	$0	$20,000	$20,000
F-655	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-659	5	2	DDOT	Potential RSC	Near- to Mid-Term	$200,000	$20,000	$220,000
F-672	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-678	4	5	No	Stream Restoration	Long-Term	$100,000	$5,000	$105,000
F-680	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-681	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-690	6	4	No	Stream Restoration	Long-Term	$100,000	$30,000	$130,000
F-698	4	3	No	Point Repair	Long-Term	$20,000	$20,000	$40,000
F-701	5	2	DDOE	Potential RSC	Near- to Mid-Term	$100,000	$10,000	$110,000
F-734	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-735	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-736	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-739	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-740	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-744	6	3	No	Potential RSC	Long-Term	$50,000	$100,000	$150,000
F-749	6	3	No	Potential RSC	Long-Term	$100,000	$20,000	$120,000

Outfall No.	Cond. Assess. Total Score	DDOE Catagory No.	Currently Planned Project?	Suggested Stream Repair Type	Tentative Repair Timeframe	Stream Repair Construction Cost [1]	Structure Repair Construction Cost [1]	Total Construction Cost
F-765	Watts Br.	1	N/A	N/A	Completed	$0	$0	$0
F-793	6	3	No	Stream Restoration	Long-Term	$300,000	$30,000	$330,000
F-794	4	3	No	Stream Restoration	Long-Term	$50,000	$20,000	$70,000
F-797	4	3	No	Point Repair	Long-Term	$5,000	$30,000	$35,000
F-798	6	3	No	Potential RSC	Long-Term	$200,000	$30,000	$230,000
F-849	9	3	No	Potential RSC	Long-Term	$300,000	$30,000	$330,000
F-853	5	2	DC Water	Stream Restoration	Near- to Mid-Term	$100,000	$20,000	$120,000
F-855	4	3	No	Potential RSC	Long-Term	$100,000	$0	$100,000
F-865	6	4	No	Stream Restoration	Long-Term	$50,000	$20,000	$70,000
F-876	4	2	DDOT	Point Repair	Near- to Mid-Term	$0	$30,000	$30,000
F-930	4	3	N/A	Potential RSC	Long-Term	$100,000	$0	$100,000
F-934	6	3	No	Potential RSC	Long-Term	$100,000	$0	$100,000
F-954	5	5	No	Point Repair	Long-Term	$20,000	$5,000	$25,000
TOTAL CONSTRUCTION COST [1]						**$8,035,000**	**$2,140,000**	**$10,175,000**
		Planning and Design		30%		$2,410,500	$642,000	$3,052,500
		Property and Easements		10%		$803,500	$214,000	$1,017,500
		Construction Admin		10%		$803,500	$214,000	$1,017,500
			Contingency	50%		$4,017,500	$1,070,000	$5,087,500
	Total Outfall Repair Program Cost					**$16,070,000**	**$4,280,000**	**$20,350,000**

1. Construction cost estimate is based on rough order of magnitude of stream and structure repair costs.

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4.2 OUTFALL REPAIR MAPS

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Fax (202) 787-2112

Figure 4-1
Pimmit Run Watershed
Outfall Repair Schedule
MS4 Outfall Program Report

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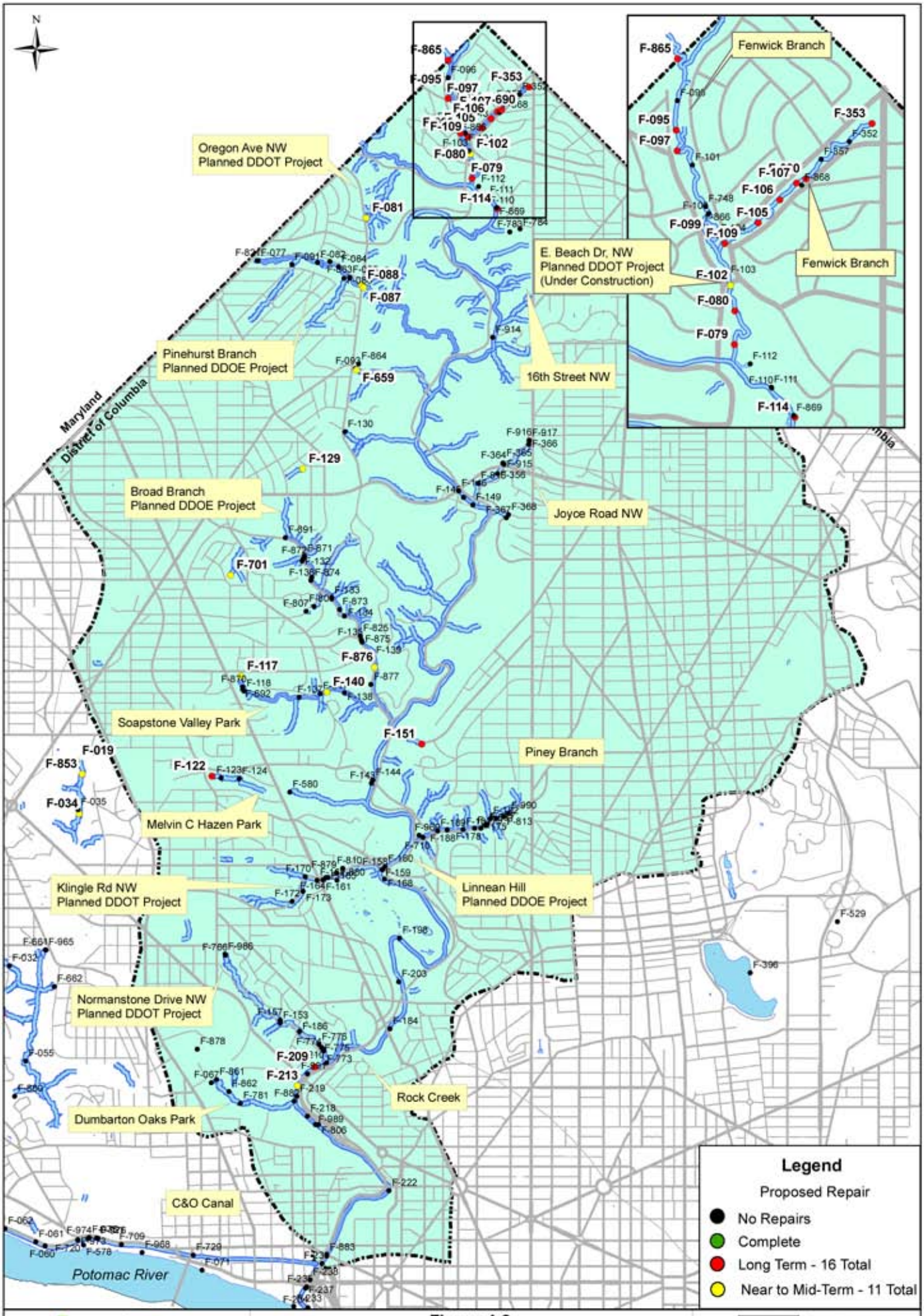

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Figure 4-2
Rock Creek Watershed
Outfall Repair Schedule
MS4 Outfall Program Report

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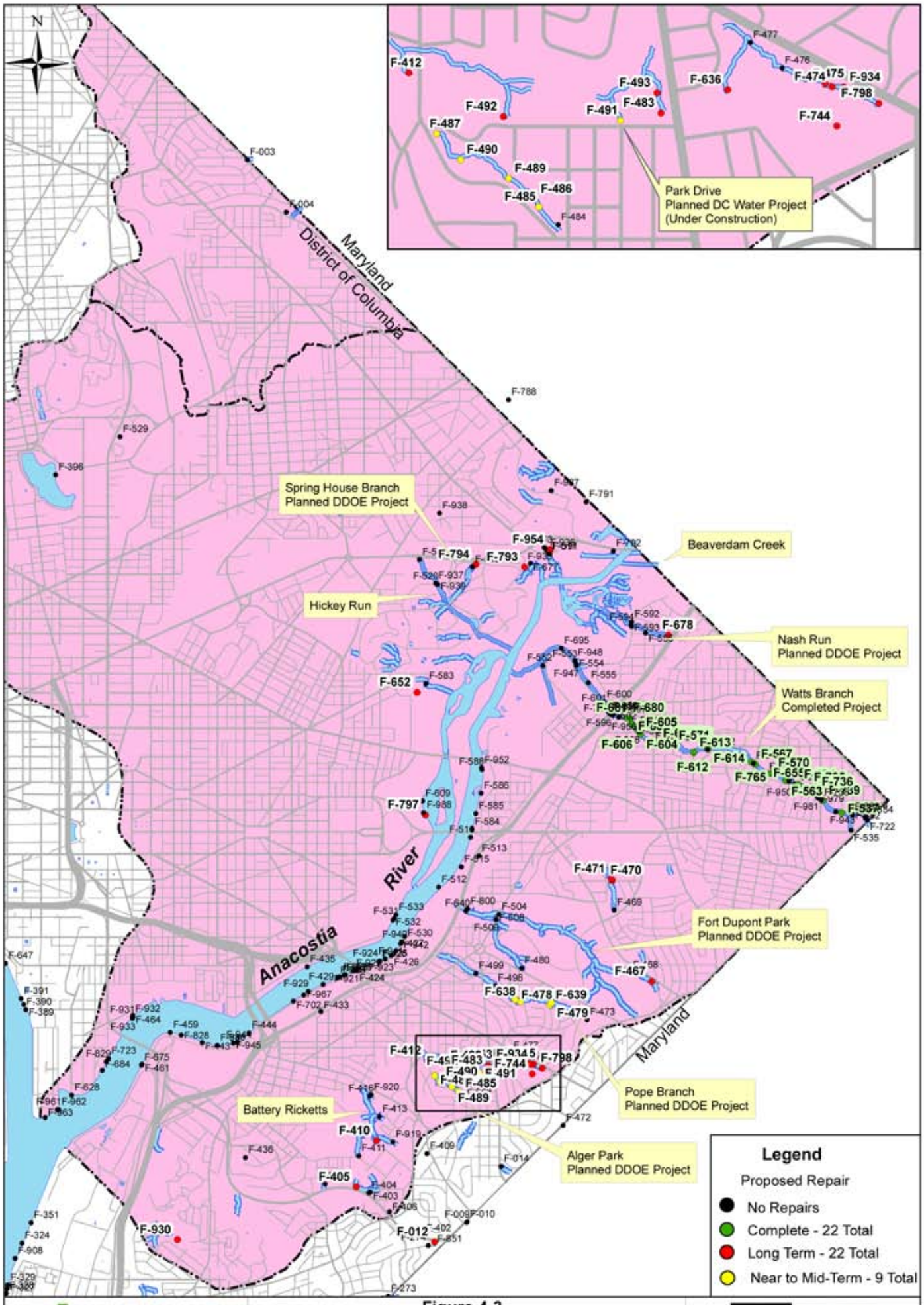

Figure 4-3
Anacostia Watershed
Outfall Repair Schedule
MS4 Outfall Program Report

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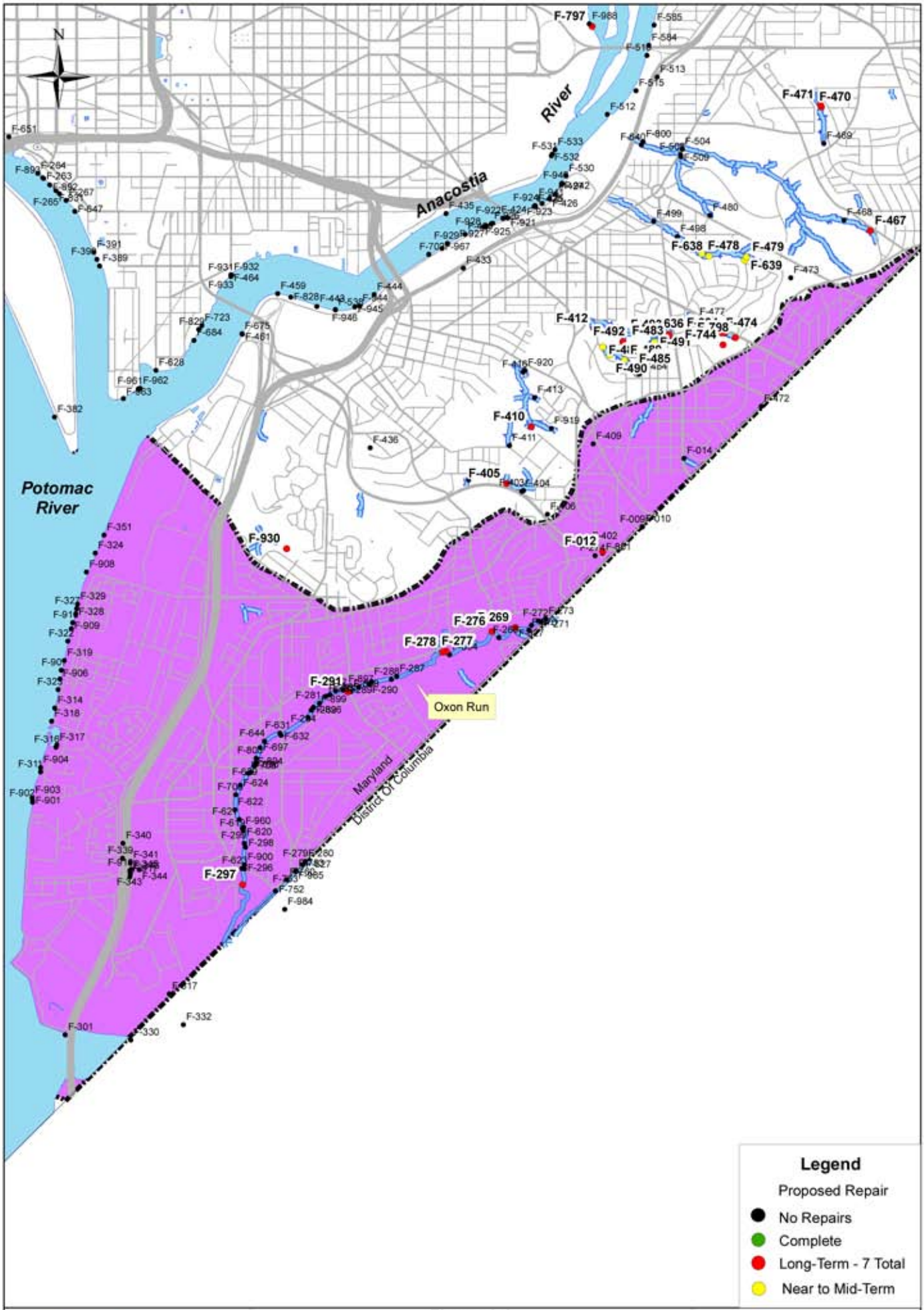

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Figure 4-4
Fourmile Watershed
Outfall Repair Schedule
MS4 Outfall Program Report

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