

Storm Water Pollution Prevention Plan



NASA Goddard Space Flight Center
Medical and Environmental Management Division, Code 250
Greenbelt, Maryland 20771

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Prepared by:



PREFACE

This National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) Storm Water Pollution Prevention Plan (SWPPP) (document; 250-SWPPP-2019.1) has been updated by the DDC 4C Environmental Team for the GSFC Medical and Environmental Management Division (MEMD) under Contract Number NNG16AZ05C.

EXECUTIVE SUMMARY

This SWPPP, herein referred to as the Plan, was prepared in compliance with federal storm water regulations and GSFC's National Pollutant Discharge Elimination System (NPDES) Industrial Surface Water Individual Discharge Permit (NPDES Permit no. MD0067482). The Plan also meets the requirements of GSFC's two general permits: the NPDES General Permit for Discharges from State and Federal Small Storm Water Municipal Separate Storm Sewer System (MS4) (NPDES Permit no. MDR055501), and the NPDES General Permit for Discharges from Tanks, Pipes and Other Liquid Containment Structures at Facilities Other Than Oil Terminals (NPDES Permit no. MDG067). The Plan is designed to identify activities at GSFC with potential sources of pollution to storm water discharges; identify Best Management Practices (BMPs) to reduce and control the potential for such pollution; and implement these practices. This Plan is applicable to the Greenbelt, Maryland location only.

GSFC has identified and included in this Plan activities that are subject to storm water regulations. The Plan describes the sites where activities that can result in pollution of storm water occur, and the BMPs developed to minimize their pollution potential to storm water.

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LIST OF ACRONYMS AND ABBREVIATIONS

AC	Activity Coordinator
AETD	Applied Engineering and Technology Directorate
AST	Above ground Storage Tank
BMP	Best Management Practice
CFR	Code of Federal Regulations
COMAR	Code of Maryland Annotated Regulations
CWA	Clean Water Act
E&SC	Erosion and Sediment Control
EALOTO	Environmental Administrative Lockout Tagout
EOSDIS	Earth Observing System/Data Information System
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-To-Know Act
ESB	Exploration Sciences Building
ESSB	Earth System Science Building
FMD	Facilities Management Division
FOG	Fats, Oils, and Grease
GDMS	Goddard Document Management System
GH	Good Housekeeping
GSFC	Goddard Space Flight Center
HCFC-22	Chlorodifluoromethane
HMCP	Hazardous Materials Contingency Plan
ICP	Integrated Contingency Plan
LMD	Logistics Management Division
MDE	Maryland Department of the Environment
MEMD	Medical and Environmental Management Division
MS4	Municipal Separate Storm Sewer Systems
NASA	National Aeronautics and Space Administration
NPDES	National Pollutant Discharge Elimination System
NSWD	Non-Storm Water Discharges
PG	Prince George's (County)
PM	Preventive Maintenance
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SDS	Safety Data Sheet [previously referred to as Material Safety Data Sheet (MSDS)]
SHEtrak	Safety, Health, and Environmental tracking
SOC	Security Operations Center
SSO	Sanitary Sewer Overflow
SPCC Plan	Spill Prevention, Control, and Countermeasures Plan
SWM	Storm Water Management
SWPPP	Storm Water Pollution Prevention Plan
SWPPT	Storm Water Pollution Prevention Team

VI Visual Inspection
VOC Volatile Organic Compounds
WSSC Washington Suburban Sanitary Commission

1.0 Introduction

This SWPPP, herein referred to as the Plan, is required to meet the conditions of GSFC's NPDES Industrial Surface Water Individual Discharge Permit (NPDES Permit no. MD0067482), the NPDES General Permit for Discharges from State and Federal Small Storm Water MS4 (NPDES Permit no. MDR 055501), and the NPDES General Permit for Discharges from Tanks, Pipes and Other Liquid Containment Structures at Facilities Other Than Oil Terminals (NPDES Permit no. MDG067). The purpose of the Plan is to prevent and control pollutants in storm water discharges associated with Center-wide industrial activities. The Plan is designed to identify potential sources of pollution to storm water discharges and implement BMP to minimize the potential for such pollution.

The Plan is considered a compliance document and must be certified by a GSFC key official or a duly authorized representative. The Director of GSFC has delegated this authority to the Chief of the MEMD. The Plan has been approved at a level of authority necessary to commit the required resources for proper implementation of the Plan. Goddard Procedural Requirements 8500.5, Water Management, requires that all GSFC employees comply with the Plan.

1.1 Certification Statement

Management Certification of SWPPP

(To be signed by GSFC's Director or duly authorized representative)

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

Name: **Kimberly S. Finch, P.E.**

Chief, Medical and Environmental Management Division

Signature: Original Signed Date: 5/31/2019

1.2 Facility Description

GSFC was established in 1958 to provide NASA support for space research and exploration. Today, the Center's mission includes space science, earth science, communications, and data processing. GSFC is federally owned with extensive office buildings, laboratories, and facilities designed to perform testing and fabrication of spacecraft and experiments.

GSFC is located approximately 15 miles northeast of Washington, DC in Greenbelt, Maryland, and is comprised of approximately 1,270 acres (see Figure 1). The facility is composed of several non-contiguous areas, referred to as the main site, the Antenna Test Range (Area 100), the Geophysical and Astronomical Observatory (Area 200), the Magnetic Test Facility (Area 300), and the Bi-Propellant Test Facility (Area 400) (see Figures 2A and 2B). The main site is predominantly office buildings, roads, and parking lots; the remaining areas are wooded. Center buildings contain laboratories, offices, test facilities, a plating facility, shipping/receiving and storage facilities, the heating and refrigeration plants, data processing facilities, employees' services (e.g., cafeterias, Credit Union, Health and Fitness Center, etc.), and a visitor center.

1.3 Background

Section 402 (p) of the Clean Water Act (CWA) requires that facilities with certain industrial activities that discharge to storm water obtain permits under the NPDES program to control the quality of these discharges. The Maryland Department of the Environment (MDE) manages the permits for storm water discharges associated with industrial activities as part of the NPDES program delegated from EPA to the State. GSFC holds an NPDES permit authorizing the discharge of non-contact cooling water and boiler blowdown to waters of the State.

1.4 SWPPP Overview

The Plan includes compliance requirements for storm water discharges associated with industrial activities, discharges from tanks, pipes, and other liquid containment structures at facilities other than oil terminals, and discharges from small storm water MS4.

GSFC is not subject to Emergency Planning and Community Right-To-Know Act (EPCRA) Section 313 reporting. An EPCRA TRI report was submitted to MDE for chlorodifluoromethane (HCFC-22 or R-22) in 2011 due to several equipment failures related to refrigerant use. Chemical inventory thresholds for TRI/Superfund Amendments and Reauthorization Act (SARA) 313 chemicals are evaluated annually to ensure compliance.

GSFC conducts an annual Comprehensive Site Compliance Evaluation; these records are kept in the MEMD files. The Plan was developed in accordance with sound engineering practices and in accordance with EPA guidance documents.

Data, information, and illustrations included in the Plan were obtained from files and other plans available from GSFC and U.S. Geological Survey topographic maps.

The Plan must address each activity subject to storm water regulations, identify its potential sources of storm water pollution, and identify BMPs to reduce or control these pollutants. The Plan includes the following key sections:

- Assessment and BMPs;
- Evaluation and Monitoring; and
- Plan Maintenance.

The Assessment and BMP section provides detailed information on the individual activities, and the BMPs currently in operation.

This Plan includes appendices used primarily for supporting data, procedures, and documents.

1.5 Storm Water Pollution Prevention Team (SWPPT)

The SWPPT is responsible for the development and implementation of the SWPPP at GSFC. The following are members of the SWPPT:

- GSFC Water Program Manager;
- Environmental Personnel; and
- Activity Coordinators (AC).

See Appendix A for a list of GSFC SWPPT members.

The Chief of MEMD is responsible for the overall coordination of the Plan. The SWPPT is accountable for understanding and implementing the Plan. The GSFC Water Program Manager is responsible for ensuring that the Plan is written to fulfill the minimum requirements set in place by GSFC's NPDES permits.

Each activity listed in the Plan has at least one assigned member from the SWPPT who is referred to as the AC. The AC enforces compliance, reports incidents, and ensures the proper implementation of the Plan for their particular area. Each AC is expected to use the SWPPP Inspection Checklist in Appendix E to aid in conducting Visual Inspections (VIs) of their area(s).

1.6 Review of Other Plans

Information relevant to storm water pollution prevention contained in the other GSFC environmental management plans was used in preparing site maps and reviewing environmental compliance operating procedures at GSFC. Relevant information from these plans, such as procedures for spill prevention and control from the Integrated Contingency Plan (ICP), is included in the Plan by reference. The plans are listed in Table 1.

Table 1: Existing GSFC Environmental Management Plans

Plan	Prepared By	Remarks
ICP	GSFC MEMD.	The ICP meets requirements of the Hazardous Materials Contingency Plan (HMCP); Spill Prevention, Control, and Countermeasures (SPCC) Plan; Oil Spill Contingency Plan (40 Code of Federal Regulations (CFR) 109) and Contingency Plan and Emergency Procedures (40 CFR 264, subpart D).

1.7 Change History Log

Table 2: Change History Log

Revision	Effective Date	Description of Major Changes	Approval
1995 - 2014		See MEMD file number EM-4.3.8 SWPPP\Archive for archived versions of the Plan.	
2015 Update	3/10/2015	<ul style="list-style-type: none"> • Updated GSFC SWPPT (Appendix A). • Updated locations of GSFC septic systems (section 2.1). • Added Miscellaneous Areas to GSFC Activities and Assessments (section 5.0). • Added Areas Identified with High Erosion Potential (section 6.0). • Removed Parking Lot and Landfill Inspection Figures and associated Checklists (Appendix D and E). • Updated Site Maps as necessary (Figures 2, 5B, 8, 9, 10, 11, 12, 13A, 13B, 14A, 14B). 	Edward A. Connell, 3/16/2015

Revision	Effective Date	Description of Major Changes	Approval
2016 Update	5/6/2016	<ul style="list-style-type: none"> • Incorporated various administrative changes throughout the Plan. • Removed ‘washing of vehicles’ from the list of pollution sources for the Auto Club, SARA Title III, and Area 200 and ‘Outdoor Storage of Potentially Polluting Materials’ (Table 3). • Revised ‘Summary of Significant Spills and Leaks at GSFC’ to include ‘Maintenance’ (section 2.2). • Removed language in Sampling Data Summary (section 2.3). • Added two new GH guidelines to section 3.1. • Added language for inspections of structural and non-structural storm water control measures and documentation (sections 3.2). • Updated language in E&SC Management of Runoff (section 3.5). • Updated language in Employee Training (section 3.6) • Revised Section 3.7. • Revised Table 4. • Deleted the statement ‘No NSWD have been found at this site in the past five years’ in all applicable sections (section 4.0 SWPPP Activities). • Revised Section 4.0 BMP Tables. • Revised language to state that VI are inspected weekly with (Resource Conservation and Recovery Act (RCRA) Form 23-65 (Table 6). 	Theodore J. Meyer

Revision	Effective Date	Description of Major Changes	Approval
		<ul style="list-style-type: none"> • Updated activities and descriptions for Sections 4.3, 4.4, 4.5, 4.8, 4.9, 4.10, 4.11, 4.12, and 5.0. • Combined section 6.2 into section 6.1, ‘Small Scale Construction and Maintenance. • Removed emergency spillway at Beaver Dam Pond from Areas Identified with High Erosion Potential (section 6.4). • Removed reference to Landfill B from ‘Areas Identified with High Erosion Potential’ (section 6.4). • Added Field Screening of Outfalls (section 7.1). • Added Sanitary Sewer Overflow (section 7.2). • Updated GSFC SWPPT members and areas (Appendix A). • Updated Outfall Sampling Data Summary (Appendix C). • Updated Site Maps as necessary (Figures 5A, 5B, 6, 9, 13A, 13B). • Updated BMPs for Activity Checklists. • Removed Appendix for ‘Activity Assessment and BMPs for SARA Title III, Section 313 Water Priority Chemical Activities. • Added ‘Dry Weather Outfall Screening Procedures’ (Appendix G). • Added Maintenance of Storm Water Management Structures (Appendix H). 	

Revision	Effective Date	Description of Major Changes	Approval
2018 Update	05/11/2018	<ul style="list-style-type: none"> • Updated facility description, background, SWPPP overview. • Updated Change History Log to reflect last 5 years. • Deleted B83B/84 from septic system locations. • Added “Auto Club inactive since Feb 2017” to Table 3. • Increased pollution potential from “low” to “moderate” for Emergency and Illicit Discharges. • Revised outdated language in Section 2.4, Comprehensive Site Compliance Evaluation, to reflect current practices. • Incorporated construction complaint procedures (Section IV.D.4) into Sections 3.5, E&SC and Management of Runoff and 6.1, Small Scale Construction and Maintenance. • Updated list of significant spills at GSFC. • Implemented new MS4 permit language regarding GSFC as a medium size property into Section 7.1, Field Screening of Outfalls and Appendix G. • Updated Section 3.6, Employee Training with specific training topics. • Removed all reference to building 16W from Section 4.4, The Shipping and Receiving Facilities’ Loading/Unloading Docks. • Removed Figure 7A (building 16W) • Updated GSFCSWPPT. • Updated appendix C; Outfall Sampling Data Summary. • Removed checklists for: Fire Control System Flushing, Water Distribution Line Flushing and Sanitizing, Hydrostatic Testing and Flushing of Water Tower and Areas of Exposed Soil/E&SC. • Added procedures for illicit discharge identification and investigation to Appendix G. • Revised page numbers to number Appendices independently. • Updated Figures to remove Building 16W and add Building 36, Flight Project Building. 	<p>Kimberly S. Finch</p>

Revision	Effective Date	Description of Major Changes	Approval
2019 Update	05/10/2019	<ul style="list-style-type: none"> • Updated table of contents. • Updated Change History Log to reflect last 5 years. • Updated list of significant spills at GSFC • Reordered BMP lists under each activity to make them uniform. • Updated GSFC SWPPT. • Updated appendix C; Outfall Sampling Data Summary. • Renumbered figures. • Deleted all references to the auto club. • Combined Fire Control System Flushing, Water Distribution Lines Flushing and Sanitizing, and Hydrostatic Testing, Maintenance, or Flushing of the Water Tower into one activity for Potable Water Discharges. • Added de-watering operations to Section 6.1, Small Scale Construction and Maintenance. • Consolidated all activities checklists into one Center wide checklist; deleted all activity checklists and added current consolidated checklist • Added verbiage in Section 8.0, Storm Water Management Practices, regarding the MS4 permits coverage of all stormwater conveyances, outfalls, and structures. 	

2.0 SWPPP Assessment, Evaluation, and Maintenance

2.1 Overview of Activities

GSFC activities subject to storm water regulations are listed in Table 3, Summary of Pollution Potential. The GSFC site maps show the location of these activities.

The surface water on the west side of the main site drains to three storm water management (SWM) structures: the building 29 Pond (SWM004) on the northern edge parallel to Cobe Road across from building 29; the building 28 Spillway (SWM003), a drainage area next to building 28; and the Main Pond (SWM001) on the northwest corner of GSFC. The runoff from undeveloped areas on the east side of the main site flows north to an on-site wetland area at Beaver Pond and the Soil Conservation Road Wetland. In addition, the east side of the main site has five storm water management structures. These include the Earth Observing System/Data Information System (EOSDIS) Pond on the southwest corner of building 32; the Earth System

Science building (ESSB) Pond on the southeast corner of the main site near building 33; the building 31 Pond adjacent to building 31 on the north end opposite the parking area; the Exploration Sciences Building (ESB) Pond on the northwest corner of the building 34 parking lot; and the Explorer Road Pond located next to Explorer Road adjacent to building 27A.

GSFC maintains storm sewer and sanitary sewer systems on the main site (Figure 3A/B), which could provide pathways to sensitive waters of the State in the event of an unmitigated release. The GSFC storm drainage system, which can be divided into several sub-drainage basins (see Figure 4A/B, discharges to various storm water management structures on and off GSFC property. Drainage from the northern sub-basins flows into the Anacostia River via Beaverdam Creek and Beck Branch. The remainder of the drainage discharges into Bald Hill Branch (a tributary to the Western Branch of the Patuxent River) from the southern sub-basins (Figure 4B). Beaverdam Creek, Beck Branch, and Bald Hill Branch are all classified as Use I waters, which are protected for water contact recreation, fishing, aquatic life, and wildlife. Industrial wastewater is discharged to NPDES Outfalls 001 (in the northwest corner of the Center exiting the Main Pond) and 004 (in the southeast portion of the Center exiting the EOSDIS Pond).

Sanitary wastewater is discharged to Washington Suburban Sanitary Commission (WSSC). The following buildings use individual septic systems:

- Building 83;
- Area 100, Security Training Trailer and building 101;
- Area 200, buildings 201, 205, 206, and 208;
- Area 300, buildings 302 and 304; and
- Area 400, buildings 405, 407, and 414.

Table 3: Summary of Pollution Potential

Activity (Location)	Pollution Source	Pollution Potential
Vehicle Maintenance Facility (building 27 and compound area)	Oil leaks and fuel spills from parked vehicles, above ground storage tanks (ASTs), and refueling area.	Moderate. Spills/leaks of fuel, oil, and lubricants evident in area.
<90-Day Waste Accumulation Facility (building 27A)	Hazardous waste being loaded and unloaded at the facility.	Moderate. Loading ramp is partially exposed to rain and is without berms to control spills.
Heating and Refrigeration Plants (buildings 24 and 31)	Used oil, and #2 fuel oil.	Low to Moderate. A storm drain is located at the oil transfer location at buildings 24 and 31. The storm drain is covered prior to transfer of product at these locations.

Activity (Location)	Pollution Source	Pollution Potential
Shipping and Receiving Loading/Unloading Docks (building 35)	Chemicals, petroleum products, sand/ salt from truck deliveries.	Low. Loading Docks are under cover with spill kits.
Salt Dome (building 27D)	Salt-sand mixture.	Low. Small amounts of salt-sand mixture spilled during loading and unloading and cleanup of tools.
Landscaping Facility (building 83 complex)	Herbicides and petroleum products used in landscaping equipment.	Low. The landscaping facility uses very low volumes of herbicides.
Staging/Storage Areas	Materials stored for recycling, maintenance/construction supplies or equipment. Potential discharge of sediment from temporary storage of dirt piles.	Low to moderate. Materials are kept under cover when possible. Large items and materials that are stored outside are secured and inspected as needed. Oil operations and heavy equipment stored have the potential to leak. Potential release of sediment from exposed soil.
Fire Equipment Maintenance	Potable water.	Low. Potable water is chlorinated. Chlorine can disrupt biological processes, but dissipates quickly.
Flushing and Sanitizing Water Distribution Lines	Potable water, solids/sediment that have accumulated in the pipes.	Low. Potable water is chlorinated. Chlorine can disrupt biological processes, but dissipates quickly. Release of solids/sediment that have settled in pipes is a potential concern.

Activity (Location)	Pollution Source	Pollution Potential
Hydrostatic Testing or Maintenance of Potable Water Tower	Potable water, settled solids/sediment, and sedimentation from the movement of large volumes of water.	Low to moderate. Potable water is chlorinated. Chlorine can disrupt biological processes, but dissipates quickly. Solids settle at the bottom of the water tower over time, and can be discharged during maintenance activities. The risk level is elevated due to the volume of water involved in hydrostatic testing. Large volumes of water can cause increased sedimentation, elevated chlorine, and change temperatures in receiving waters.
Areas Requiring Additional E&SC	Sediment, silt.	Moderate. Some groundbreaking operations and some areas of exposed soil release sediment and silt.
Emergency and Illicit Discharges	Boiler chemicals, sanitary wastewater, etc.	Moderate. Emergency and illicit discharges occur on occasion and are often associated with various industrial activities/processes on site.

2.2 Significant Releases at GSFC

Storm water regulations require an inventory of significant spills and leaks during the three years prior to the effective date of the current Plan. Spill information is recorded and maintained in the spill log or database. Significant spills are any spills that meet the threshold of a reportable quantity (as defined in 40 CFR 302.4, 40 CFR 117.21, and 40 CFR 110) or that have a potential to contribute pollutants to storm water discharges. Appendix B identifies spills that meet these criteria. A record of all spills that occurred since the effective date of this Plan is maintained in the Release Tracking System database under MEMD file number E-0.7 Spill Log - Reports.

2.3 Sampling Data Summary

Outfalls 001 and 004 are monitored at least monthly per the NPDES Industrial Discharge permit requirements. A summary of permit required sampling data is included in Appendix C. Monthly sampling reports are available in the MEMD files.

Additional storm water monitoring results from various studies are available in MEMD file number, E-6 Clean Water.

2.4 Comprehensive Site Compliance Evaluation

GSFC conducts a Comprehensive Site Compliance Evaluation annually. The purpose of the evaluation is to:

- Verify the accuracy of the information in the Plan;
- Verify compliance with the Plan;
- Assess the effectiveness of the BMPs; and
- Identify new BMPs to be implemented, if needed.

The evaluation entails inspections of the activities and documentation review for each site. The following are included in the evaluation process:

- Dry weather screening of storm water drainage areas and outfalls to look for evidence of Non-Storm Water Discharges (NSWD) (see Appendix G);
- Observations of changes in facility operations, physical structures/layouts, etc.;
- Verification that the BMPs in the Plan are being implemented and are effective;
- Identification of any new BMPs that are needed;
- Observing structural measures used as BMPs to ascertain proper operation;
- Review of storm water management structure inspection and maintenance records;
- Identification and potential sampling/analysis of any NSWD;
- Evaluation of the SWPPP training program (effectiveness and frequency); and
- Review of the Plan, the activity checklists, spills records, and other Plan related documentation.

The information obtained during the activity inspections and documentation review is used to assess the Storm Water Pollution Prevention program and identify any necessary changes. See section 2.5 Plan Maintenance for additional information on Plan revisions.

Within six weeks of completing the evaluations, a report is prepared summarizing the results. It includes the following:

- The dates of the inspections and the names of personnel who conducted the inspections;
- Results, observations, and follow-up actions; and
- Identification of non-compliance with the Plan;
- If there are no non-compliances, a certification that GSFC is in compliance with the Plan is made.

SWPPP inspections and findings are tracked in the Safety, Health, and Environmental tracking (SHEtrak) system. Non-compliances that cannot be immediately rectified will be assigned in SHEtrak to the appropriate Civil Servant supervisor, and tracked to closure in the system.

Within 12 weeks of completing the evaluation, implementation of any changes to the Plan will begin. Copies and other related records are kept at the MEMD files with the Plan for three years.

2.5 Plan Maintenance

In accordance with the regulations, the Plan is reviewed at least every three years and is amended as necessary within 90 days of the review. The Plan will be revised whenever there is a major change that may impact discharge to storm water, such as construction, maintenance of industrial activities and/or facilities, and activities that have special requirements, such as MS4, Salt Storage Piles, and EPCRA Section 313 Facilities. The Plan is revised as necessary to ensure it complies with conditions of regulatory permits. The plan will also be reviewed and amended as necessary upon completion of the Site Compliance Evaluation.

Regulatory agencies (State of Maryland and federal) may require modifications to the Plan. Modifications must be completed within 90 days of notification, unless otherwise notified. A certification that the modifications have been completed is prepared by the Chief of the MEMD and submitted to the permitting authority.

Copies

In accordance with the regulations, a copy of the Plan is maintained in MEMD files for three years after expiration of the NPDES permit.

Requests for Copies

The Plan is considered a public document [Section 308(b) of the CWA] and, upon request through MDE, copies will be provided to any requesting organization/citizen. The following procedure is used for open requests:

- All requests must be written.
- Requests received through federal or state regulatory agencies will be forwarded to the Chief of MEMD.
- The request will be reviewed. Any text or information deemed sensitive, such as maps or personnel information will be redacted from the copy.
- Within ten days after receipt of the request, the Chief of MEMD will submit a copy of the Plan to the requester, documented in a letter. A copy of the letter will be submitted to the regulatory agency that forwarded the request. A copy will be kept in the MEMD files.
- Requests received directly by GSFC will be forwarded to the Chief of MEMD. The Chief of MEMD will:
 - Acknowledge receipt of the request in writing to the requester within five business days after receipt of the request;
 - Advise requester that all requests for copies of the Plan must be forwarded to the appropriate federal/state regulator; and
 - Maintain a copy of the letter to the requester in the MEMD files.

3.0 Best Management Practices (BMP)

BMPs are measures or practices used to reduce the amount of pollution entering surface water, air, land, or ground waters. They may take the form of a process, activity, or physical structure. They serve a variety of purposes, such as the preservation of health and safety, and pollution

prevention. The BMPs addressed in this Plan are intended specifically to reduce pollutants in storm water discharges.

Storm water regulations require that the following BMPs be incorporated into the Plan as part of the BMP program for the activities. Additional BMPs are recommended for each activity, based on inspection results.

3.1 Good Housekeeping (GH)

GH measures are designed to maintain a clean and orderly workplace and include equipment, hazardous materials, and physical work areas. The following are common GH guidelines (this is not an exhaustive list):

- Outside areas are clean and organized;
- Drips and leaks from equipment or pipes are contained;
- Dumpster and roll off boxes are covered (if possible);
- Adequate space is present in work areas to minimize spills;
- Materials are stored in appropriate containers;
- Garbage and trash are removed regularly;
- Storm drains are kept free of debris (sand, silt, rock, leaves, trash, etc.);
- Walkways and passageways are easily accessible and free of easily spilled materials;
- No evidence of dust is present from painting, sanding, or other industrial activities;
- GH reminders and posters are visible in work areas;
- GH inspection schedule is posted in work areas; and
- Spill kits (dry sorbent, shovel, broom, collection container, booms) are complete and in serviceable condition.

3.2 Preventive Maintenance (PM)

PM involves regular inspections, maintenance, testing, and repair or replacement of facility equipment and systems to discover or prevent a problem that could discharge pollutants into storm water. The following are common PM guidelines (this is not an exhaustive list):

- Inspection of pumps, pipes, hoses, pressure vessels, pressure relief valves, storage tanks, and bins to ensure proper operation;
- Inspection of equipment used to handle potentially polluting materials;
- Inspection of storm water runoff management devices (oil/water separator, catch basins, and other structural BMPs);
- Inspection of structural and non-structural storm water control measures (storm water management ponds);
- Prompt repair or replacement defective equipment or problems found during inspections;
- PM reminders and posters visible in work areas;
- PM inspections schedule posted in work areas;
- Records maintained for PM procedures; and
- Inspection records documented in the maintenance project management database.

3.3 Visual Inspections (VI)

Routine VIs are intended to identify conditions at the facility that may pollute storm water runoff. This includes visually inspecting work and storage areas for spills and leaks, faulty equipment, inadequate drainage systems, and improper storage of chemicals. The VI program complements both the GH and PM programs. VIs identify the following (this is not an exhaustive list):

- Corroded or damaged drums, tanks, tank supports, tank drain plugs;
- Drums without plugs or covers;
- Torn bags or bags exposed to precipitation;
- Corroded or leaking pipes, valves or fittings;
- Evidence of leaking pumps/hose connections;
- Broken/cracked embankments, dikes, walls, or other structural controls;
- Land conditions (eroded stream banks, trash accumulation in surface water); and
- Water conditions (oily sheen on surface water).

3.4 Spill Prevention and Response

Spill prevention and response practices are designed to help reduce releases to storm water by incorporating adequate plans, operating procedures, personnel training, response and cleanup equipment, spill containment structures, and spill prevention signs.

GSFC has an ICP that outlines the requirements of the SPCC Plan, Oil Spill Contingency Plan, and the HMCP. The ICP contains specific procedures for spill prevention, response, control, countermeasures, and cleanup. The ICP describes the notification and reporting procedures to be made in the event of a spill. GSFC maintains a supply of spill response equipment and materials, and retains a spill contractor to clean up spills that are beyond internal capabilities. As part of the ICP, response personnel are trained on spill prevention and response. Laboratory facilities at GSFC also have spill response procedures included in their Chemical Hygiene Plans. Safety Data Sheets (SDS) for chemicals used at GSFC are available through GSFC's Hazardous Materials Management System. Users should also maintain electronic or hard copies for quick reference on-site.

3.5 Erosion and Sediment Control (E&SC) and Management of Runoff

E&SC plans are developed for construction projects with a disturbed area greater than 5,000 square feet or 100 cubic yards by volume, in accordance with the current version of the *Maryland Standards and Specifications for Soil Erosion and Sediment Control*. These plans are then sent to MDE for approval. GSFC construction projects that disturb fewer than 5,000 square feet or 100 cubic yards of soil must comply with the E&SC practices defined in the current version of the *Maryland Standards and Specifications for Soil Erosion and Sediment Control*, even though submitting an E&SC Plan to MDE is not required. For any construction activity greater than one acre, an additional written request for coverage under the general Maryland NPDES Permit is sent to MDE. GSFC's ongoing E&SC efforts include:

- Incorporating low impact development designs for storm water management into the construction of new facilities;
- Implementing adequate E&SC measures appropriate for the construction site;
- Inspection of onsite construction for compliance with E&SC requirements

GSFC areas with high erosion potential are identified in section 5.0, Areas Requiring Additional E&SC. In addition, individual activity sections will address E&SC as it applies to the activity.

Any complaints that are received in relation to construction activities within the GSFC's jurisdiction will be handled in accordance with procedures outlined in Section 6.1, Small Scale Construction and Maintenance.

3.6 Employee Training

All persons responsible for the management and oversight of activities monitored under the Plan are required to complete the *GSFC- SWPPP Training* annually. The training is available online via the System for Administration, Training, and Educational Resources for NASA (SATERN). For employees without SATERN accounts or computer access, a PowerPoint version of the training may be provided or classroom training will be given at least once per year or upon request. The GSFC Water Program Manager is responsible for establishment and implementation of the GSFC training program. Each AC is responsible for ensuring personnel in their activity are trained. There is an annual SWPPT meeting for ACs to review changes to the Plan and discuss activities and BMPs.

Training topics will include a minimum of the following:

- Background of storm water regulations and permits;
- Activities Covered by the SWPPP;
- AC responsibilities;
- BMPs;
- Types of Discharges;
- Construction Related Storm Water Controls;
- Release Reporting Procedures; and
- Inspections, record keeping, and reporting requirements.

3.7 Records and Reports

Records relative to the Plan, its implementation, compliance, reviews, updates, and reports are retained for three years. ACs are responsible for maintaining activity-specific records, such as SWPPP Checklists.

Record keeping and reporting of Plan activities at GSFC include the items listed in Table 4.

Table 4: Record Keeping and Reporting

Records	Responsible Party	Activity Frequency	Record Retention
SWPPP	MEMD	Update every 3 years or as necessary	NRRS 8/23.5A10 Destroy 5 years after issuance of a new plan or procedure.
Annual Comprehensive Site Compliance Evaluation Report	MEMD	Annually	NRRS 8/23.5A11 Destroy after second reissuance of permit or 10 years after permit expires or is cancelled. Retention should be coordinated with related permit.
Activity Checklists or alternative record keeping practice	AC or their assigned designee	Variable frequency, see BMPs for activity	NRRS 8/23.5A3a Destroy 5 years after superseded or when no longer needed, whichever is later. Retention should be coordinated with related permit.
Supporting documents to the Plan including field notebooks, drawings and maps	AC	Variable frequency, see BMPs for activity	NRRS 8/23.5A10 Destroy 5 years after Issuance of a new plan or Procedure. Retention should be coordinated with related permit.
Outfall screening visual assessment checklists for outfall screenings.	MEMD	Annual or as necessary	NRRS 8/23.5A3a Destroy 5 years after superseded or when no longer needed, whichever is later.
Records of any reviews, reports, inspections, certifications, and updates	MEMD	Annual or as necessary	NRRS 8/23.5A3a Destroy 5 years after superseded or when no longer needed, whichever is later.
Records of correspondence from federal and state regulators pertaining to the Plan and its implementation	MEMD	As they occur	NRRS 8/23.5A11 Destroy after second reissuance of permit or 10 years after permit expires or is cancelled.

4.0 Activity Assessments and BMPs

This section documents the assessment of each activity identified in Table 3 and provides the following information (where applicable):

- Site description;
- Site map (figures located in Appendix D);
- Industrial activities and associated polluting sources;
- Activities subject to special requirements;
- NSWDC (annual certification is included in the Comprehensive Site Compliance Evaluations saved under MEMD file number EM-4.3.8.2 Inspections.);
- BMPs; and
- Storm water pollution potential.

The SWPPP Inspection Checklist is used to aid in the BMP inspections. The Checklist, located in Appendix E, must be used unless the AC can demonstrate that the BMPs are addressed by another record keeping practice. The alternative record keeping practice must meet the minimum requirements of the established BMPs for that activity, and be approved by the Water Program Manager. The alternative record must be auditable and available upon request. The alternative practice will be referenced in the BMPs section for the activity. Any changes to the record keeping practice must be approved by the Water Program Manager before implementation.

4.1 Vehicle Maintenance Facility

Description of Site

The GSFC Vehicle Maintenance is located in building 27 on the east side of GSFC's main site. The facility includes one building and a parking lot to store the vehicles and equipment under repair. Vehicle maintenance is performed inside the shop. Vehicles are fueled at this facility with gasoline, biodiesel, and E85 fuel from ASTs. This facility is also the point of distribution and control of all government vehicles (the Motor Pool). The Motor Pool stores all the vehicles not permanently assigned to a particular division or branch in this parking area.

The Vehicle Maintenance Facility includes an indoor wash bay to wash GSFC vehicles and equipment. Wastewater is discharged through an oil-water separator prior to discharge to the sanitary sewer. The shop floor also connects to the oil-water separator via floor trenches around the perimeter of the garage.

Site Map

The location of the Vehicle Maintenance Facility is shown in Figure 5.

Industrial Activity and Associated Polluting Sources

Vehicle maintenance, fueling, and materials supply are the primary industrial activities associated with the Vehicle Maintenance Facility. Potentially pollution sources from the Vehicle Maintenance Facility include:

- Fueling operations;

- Overflow of perimeter trenches due to clogging;
- Hazardous materials including solvents, coolants, degreasers, lubricants, paints, aerosols, lacquers, and miscellaneous chemicals used and stored inside the shop; and
- Oil and grease drips from parked vehicles.

NSWD at GSFC Vehicle Maintenance Facility

The discharge points for the Vehicle maintenance Facility are inspected for NSWD. Annual NSWD certification is found in Comprehensive Site Compliance Evaluations saved under MEMD file number E-6.2.2.2 Inspections.

BMPs

Table 5: BMPs at Vehicle Maintenance Facility

BMP	Descriptions
VI	Complete and record VI weekly. Inspect perimeter floor drains weekly for solids and clogging.
GH	Keep the facility clean and orderly.
Materials Kept Under Cover	Do not store materials outside or in any area exposed to the outside elements.
Spills/ Leaks Contained	Leaks must be immediately contained. Report spills to Security Operations Center (SOC) by calling 911 from a GSFC phone or 301-286-9111 from a cell phone.
PM	Ensure that wastes are stored in appropriate areas and that waste containers are in proper working order. Inspect oil/water separator and have it cleaned out as needed and at least bi-annually (twice per year). Check for actively leaking vehicles.
Pollution Prevention/ Spill Notification Procedures posted	Ensure visual aids pertaining to pollution prevention and spill response procedures are posted in areas where chemicals are stored.
Spill Kits Available	Keep spill kits stocked, and in neat and orderly fashion to allow for easy and quick access.
Proper Refueling of Tanks	Follow tank-refueling procedures outlined in the ICP.

BMP	Descriptions
Monthly Inspections of Tanks	Conduct monthly inspections of all tanks and oil storage systems in accordance with the ICP.
SWPPP Training	Complete annual SWPPP training.
Records Retention	Maintain copies of checklists, inspections, SDS, oil-water separator cleanout for three years.

Storm Water Pollution Potential

The fueling station lacks full cover, which poses a moderate to high risk of pollution to waters of the State. In the event of a spill on the south side of the pumps during a rainstorm rain event, fuel would be easily transported to a nearby storm water management pond.

4.2 <90-Day Waste Accumulation Facility

Description of Site

GSFC operates a <90-Day Waste Accumulation Facility. This facility is located in building 27A on the east side of the GSFC main site. GSFC is classified as a “large quantity generator” of hazardous wastes under the RCRA Program.

Wastes accumulated at building 27A are kept indoors in secondary containment areas. GSFC staff operating building 27A are trained annually on the contents of the ICP. SDSs and an inventory of the materials kept at the site are kept current in the chemical management system. Spill-control kits are readily available on-site at building 27A.

Site Map

The location of the <90-Day Waste Accumulation Facility is shown in Figure 5.

Industrial Activity and Associated Polluting Sources

Solvents, degreasers, anti-freeze, used oil, chemicals, lubricants containing Volatile Organic Compounds (VOC), metals, and other regulated and non-regulated materials are the potentially polluting materials stored within building 27A.

NSWD at <90-Day Waste Accumulation Facility

The discharge points for building 27A are inspected for NSWD. Annual NSWD certification is found in the Comprehensive Site Compliance Evaluations saved under MEMD file number EM-4.3.8.2 Inspections.

BMPs

Table 6: BMPs at the <90-Day Waste Accumulation Facility

BMP	Description
VI	Conduct weekly VI during required RCRA inspections. Refer to GSFC Form 23-65 for inspection items.
GH	Keep the facility and chemical storage areas neat and orderly.
Materials Kept Under Cover	Do not store materials outside or in any area exposed to the outside elements.
Spills/Leaks Contained	Leaks must be immediately contained. Report spills to SOC by calling 911 from a GSFC phone or 301-286-9111 from a cell phone.
PM	Ensure that wastes are stored in the appropriate areas to minimize the risk for spills.
Pollution Prevention/Spill Notification Procedures posted	Ensure visual aids pertaining to pollution prevention and spill response procedures are posted in areas where chemicals are stored.
Spill Kits Available	Keep spill kits stocked, and in neat and orderly fashion to allow for easy and quick access.
Eliminate Wastes Stored Near Drains	Do not store wastes near any storm or sanitary sewer drain.
SWPPP Training	Complete annual SWPPP training.
Records Retention	Maintain copies of inspections, SDSs, etc. for three years.

Storm Water Pollution Potential

The <90-Day Waste Accumulation Facility poses a moderate risk of pollution to waters of the State. There are no potentially polluting materials exposed to rainfall and runoff at this site. There is a potential for spillage of hazardous materials during the transfer of materials from the vehicles into the facility or storage tanks. Spill contingency plans, adequate equipment, and trained personnel are present during transfer operations to prevent spills.

4.3 Heating and Refrigeration Plants

Description of Site

The Heating and Refrigeration Plants consist of the Central Heating and Refrigeration Plant (building 24) and the East Campus Refrigeration Plant (building 31). The Central Plant cooling water system is configured with six chillers and two cooling towers. The steam production system is configured with five boilers. Natural gas/landfill gas and/or fuel oil are used to operate boilers. Backup power at the Central Plant is provided using generators housed in building 24C. Fuel oil (#2) for the boilers and generators is stored in three 50,000 gallon ASTs. Used oil is stored in a 2,000 gallon AST, which is located north of the building. The East Plant cooling water system is equipped with four chillers and four cooling towers. East Plant backup power is provided using generators fueled by #2 fuel oil stored in two 20,000 gallon ASTs, which are located west of the building.

There are several storm inlets located in the vicinity of both buildings. ASTs at both plants are protected by secondary containment. There are oil-cooled transformers associated buildings 24 and building 31. GSFC implements the alternative requirements prescribed by 40 CFR 112.7(k) (2), which includes an oil spill contingency plan following the provisions of 40 CFR 109, for the oil-filled transformers.

Site Map

The locations of the Heating and Refrigeration Plants are shown in Figures 6A and 6B.

Industrial Activity and Associated Polluting Sources

GSFC maintains an NPDES permit to discharge non-contact cooling water and boiler blowdown from building 24 and non-contact cooling water blowdown from building 31. At building 24, cooling tower and boiler blowdown are discharged to the storm drainage system northwest of the building to Outfall 001. Additionally, there are cooling fans on the roof of building 24 such that could leak to the roof area and overflow to the area outside of the building. The sumps in building 24 are designed to collect water. The possibility exists of oil being discharged into the sump. Both of these areas are inspected monthly. At building 31, cooling tower blowdown is discharged to the storm drainage system southwest of the building to Outfall 004. GSFC conducts monthly sampling at both outfalls to ensure compliance with the NPDES permit.

Several activities at the Heating and Refrigeration Plants involve handling and storage of fuels and lubricants and are considered a potential source of pollution to the area. These activities are subject to the requirements specified in GSFC's Oil Operations Permit with the State of Maryland and procedures detailed in GSFC's ICP.

The building 24 and 31 transformer yards each have underground secondary containment. There is a pump in the underground tank that discharges to the ground. The pump is manually operated and VI of secondary containment is conducted before discharging contents.

Activities at the site include:

- Accumulation of hazardous materials such as oil, solvents, and other chemicals; and
- Refueling of #2 fuel oil tanks.

Steam generation is not a regulated activity unless it is used to generate power. Backup power generation using fuel is not a regulated activity under storm water regulations.

NSWD at the Heating and Refrigeration Plants

The discharge points for the Heating and Refrigeration Plants are inspected for NSWD. Generally, NSWD found at this site have been associated with discharges authorized by GSFC’s NPDES permit for Industrial Discharges. Annual NSWD certification is found in Comprehensive Site Compliance Evaluations saved under MEMD file number EM-4.3.8.2 Inspections.

BMPs

Table 7: BMPs at Heating and Refrigeration Plants

BMP	Description
VI	Complete and record VI monthly.
GH	Keep the facility and chemical storage areas neat and orderly.
Materials Kept Under Cover	Do not store materials outside or in any area exposed to the outside elements.
Spills/Leaks Contained	Leaks must be immediately contained. Report spills to SOC by calling 911 from a GSFC phone or 301-286-9111 from a cell phone.
Proper Discharge of Secondary Containment	Inspect secondary containment for oily residue prior to discharge. Oil/water mixture must never be discharged into the storm drain or ground.
PM	Ensure that wastes are stored in appropriate areas to minimize the risks for spills.
Pollution Prevention/Spill Notification Procedures posted	Ensure visual aids pertaining to pollution prevention and spill response procedures are posted in areas where chemicals are stored.
Spill Kits Available	Keep spill kits stocked, and in a neat and orderly fashion to allow for easy access.
Proper Refueling of Tanks	Follow tank-refueling procedures outlined in the ICP.
Monthly Inspections of Tanks	Conduct monthly inspections of all tanks and oil storage systems in accordance with the ICP.
SWPPP Training	Complete annual SWPPP training.
Records Retention	Maintain copies of inspections, SDS, etc. for three years.

Storm Water Pollution Potential

The Heating and Refrigeration Plants pose a moderate to high risk of pollution to waters of the State. A sizable amount of liquid fuels and used oil is kept at all times in the tank-farm area. The opportunity for fuels and lubricants to contaminate surface waters in the area could occur if a transfer valve or pipe broke or if during refueling operations a hose, pipe, or pump burst.

Over-filling the tanks and improper discharge from the secondary containment area create a potential risk for spill. There are procedures in place for spill prevention, control, and cleanup in the ICP. The ASTs are contained in a facility, which includes secondary containment. Lubrication oils are protected by shallow berms.

4.4 The Shipping and Receiving Facility Loading/Unloading Docks

Description of Site

The building 35 Shipping and Receiving Facility Loading/Unloading Docks receive most materials and supplies for the Center before redistribution to various GSFC activities. Building 35 has multiple loading/unloading docks on the east and south sides of the building. A trench is located at the docks which drains to SWM022, building 35 pond. This is important to note because any spills occurring on the loading dock will be introduced to storm water via the trench.

Although there are no materials routinely exposed to rainfall and runoff at building 35 (materials are kept indoors under cover), GSFC has chosen to include this facility in this Plan as part of its pollution prevention activities.

Site Map

The location of the Shipping and Receiving Facility (building 35) is shown in Figure 7.

Industrial Activity and Associated Polluting Sources

The following activities at the Shipping and Receiving Facilities pose a low risk:

- Parked trucks leaking oil and/or hydraulic fluid.
- While loading and unloading potentially polluting materials, there is potential for spills. Loading and unloading is normally conducted from the inside of the trailer to and from the roofed ramp. In the unlikely event of a spill during a rain event, materials could flow into a storm drain inlets.
- There is a trench at the building 35 loading dock which drains to storm water management structure (SWM022). Any spills occurring in this area will enter the trench and make their way to storm water; these type of spills may be reportable.

NSWD at the Shipping and Receiving Facilities Loading/Unloading Docks

The drainage points for the Shipping and Receiving Facility Loading/Unloading Docks are inspected for NSWD. Annual NSWD certifications are found in Comprehensive Site Compliance Evaluations saved under MEMD file number EM-4.3.8.2 Inspections.

BMPs

Table 8: BMPs at the Shipping and Receiving Facilities Loading/Unloading Docks

BMP	Descriptions
VI	Complete and record VI monthly.
GH	Keep the facility and chemical areas neat and orderly.
Materials Kept Under Cover	Do not store materials outside or in any area exposed to the outside elements.
Spills/Leaks Contained	Leaks must be immediately contained. Report spills to SOC by calling 911 from a GSFC phone or 301-286-9111 from a cell phone
PM	Ensure that wastes are stored in the appropriate areas to minimize the risk for spills.
Pollution Prevention/Spill Notification Procedures posted	Ensure visual aids pertaining to pollution prevention and spill response procedures are posted in areas where chemicals are stored.
Spill Kits Available	Keep spill kits stocked, and in neat and orderly fashion to allow for easy access.
SWPPP Training	Complete annual SWPPP training.
Records Retention	Maintain copies of inspections, SDSs, etc. for three years.

Storm Water Pollution Potential

There are few products with the potential to pollute storm water located at building 35; therefore, the Shipping and Receiving Facilities’ Loading/Unloading Docks pose a low risk. Delivery trucks frequenting the Shipping and Receiving Facilities’ Loading/Unloading Docks present a low risk for potential leaks.

4.5 Salt Domes

Description of Site

The Salt Domes (buildings 27G and 27H) are located on the eastern edge of the Vehicle Maintenance Compound on the east side of the main site. A mixture of salt and sand is used for de-icing roads and streets at GSFC. This salt/sand mixture is stored in the smaller dome. Salt used for snow days is stored in the large dome.

Site Map

The location of the Salt Domes is shown in Figure 5.

Industrial Activity and Associated Polluting Sources

The CWA and storm water regulations required that all salt-storage areas be covered on or before September 30, 1995. GSFC meets the regulatory criteria to be exempt.

NSWD at the Salt Dome

The discharge points from the Salt Dome are inspected for NSWD. Annual NSWD certification is found in Comprehensive Site Compliance Evaluations saved under MEMD file number EM-4.3.8.2 Inspections.

BMPs

Table 9: BMPs at Salt Domes

BMP	Descriptions
VI	Complete VI quarterly during off seasons and weekly during peak seasons. Record findings.
GH	Keep the area neat and orderly.
Salt/ Sand Kept Under Cover	Periodically inspect the salt/sand domes to verify that the salt/sand is being stored under cover.
Spill Cleanup/Prevention Measures	Immediately clean up any spilled sand or salt from the parking lot.
SWPPP Training	Complete annual SWPPP training.
Records Retention	Maintain copies of all inspections, etc., for three years.

Storm water Pollution Potential

There is very low potential for pollution of waters of the State by the salt domes, provided there is no spillage in the associated parking lot. Rain events have the potential to carry spilled material to surface waters and increase turbidity.

4.6 Landscaping Facility

Description of Site

The landscaping facility is comprised of several small buildings and sheds. All of the buildings occupied by landscaping are associated with building number 83 (i.e., 83, Lot 83, etc.); henceforth, referred to as the building 83 complex. The building 83 complex is on the east side of the GSFC main site and is the storage and staging area for lawn care, maintenance, and herbicide storage.

Site Map

The location of the Landscaping Facility is shown in Figure 9A.

Industrial Activity and Associated Polluting Sources

The building 83 complex contains powered equipment, fuel and oil, herbicides, lime, grass seed, and fertilizer. Mixing of herbicides is conducted within secondary containment, outside on asphalt and is only conducted on an as needed basis. None of the materials are exposed to rainfall or runoff while in storage.

NSWD at Landscaping Facility

The discharge points for the Landscaping Facility are inspected for NSWD. Annual NSWD certification is found in Comprehensive Site Compliance Evaluations saved under MEMD file number EM-4.3.8.2 Inspections.

BMPs

Table 10: BMPs at the Landscaping Facility

BMP	Description
VI	Complete and record VI monthly.
GH	Keep the facility, including surrounding areas, and chemical storage areas neat and orderly.
Materials Kept Under Cover	Do not store materials outside or in any area exposed to the outside elements.
Spills/Leaks Contained	Leaks must be immediately contained. Report spills to SOC by calling 911 from a GSFC phone or 301-286-9111 from a cell phone.
PM	Inspect equipment for leaks and damage. Ensure that all PMs are performed as recommended by manufacturer.
Spill Kits Available	Keep spill kits stocked, and in neat and orderly fashion to allow for easy and quick access.
Pollution Prevention/Spill Notification Procedures posted	Ensure visual aids pertaining to pollution prevention and spill response procedures are posted in areas where chemicals are stored.
Containment for Chemical Storage/Use Area	Fuels, oils, wastes, and other chemicals must be stored in areas with secondary containment. Mixing chemicals must be conducted within a containment area.
SWPPP Training	Complete annual SWPPP training.
Records Retention	Maintain records of inspections, SDSs, etc. for three years.

Storm Water Pollution Potential from the Landscaping Facility

Operations at the landscaping facility present a low pollution potential to waters of the State. Materials are required to be stored indoors under cover and spill kits are located in each storage unit. Loading and unloading is performed manually using individually sealed containers or bags. Landscaping equipment maintenance and repairs are conducted using oil pans for containment. Oil absorbents are kept on site at all times.

4.7 Staging/Storage Areas

Description

Staging/storage areas are located at various sites throughout GSFC. Staging/storage areas are defined as any location that uses industrial materials or practices material handling activities that are exposed to precipitation. These areas include long and short term storage of materials or equipment including those used in the assembly, testing, and transport of satellites and satellite hardware. Staging/storage areas will be marked with an asterisk in Appendix A.

Site Map

Permanent locations of staging/storage area are shown in Figure 9 maps.

Industrial Activity and Associated Polluting Sources

There are no industrial activities associated with staging/storage areas. Potential pollution sources include:

- Trash/debris;
- General construction staging (e.g. concrete washout structures);
- Stored equipment that has the potential to leak; and
- Sediment from temporary storage of dirt and other materials that can contribute to sediment runoff.

NSWD in Staging/Storage Areas

There are multiple storm water discharge points in staging/storage areas. Annual NSWD certification is found in Comprehensive Site Compliance Evaluations saved under MEMD file number EM-4.3.8.2 Inspections.

BMPs

Table 11: BMPs for Staging/Storage Areas

BMP	Description
VI	Conduct VI weekly.
GH	Keep area clean and organized to discourage open dumping and manage excess material.

BMP	Description
PM	Inspect equipment, containers, etc., for leaks, or damage that could result in leaks. Ensure that adequate E&SC are in place.
Records Retention	Maintain records of spills and inspections.
SWPPP Training	Complete annual SWPPP training.

Storm Water Pollution Potential from Staging/Storage Areas

The pollution potential of activities in staging/storage areas ranges from low to moderate depending on the materials and equipment being stored and used at the site in question. Sites that store equipment and materials properly present a low risk. However, the risk increases if equipment and materials are stored improperly. When equipment is not managed, it can encourage open dumping and allow materials and trash to pollute storm water. In addition, equipment containing fluids has the potential to leak.

All equipment maintained at a staging/storage area shall be free of chemicals, oils, and petroleum products, or it shall be stored in a containment area and/or under cover. Adequate sediment and erosion controls must be in place if dirt and other materials that can contribute to sediment runoff are being temporarily stored in these areas. Large equipment that cannot be staged/ stored in containment or under cover shall be inspected for leaks weekly and noted on the checklist. For additional information reference GSFC ICP. The pollution potential of staging/storage areas that have oil operations or store heavy equipment, even if they are not subject to oil operation requirements, present a moderate risk of storm water pollution.

4.8 Potable Water Discharges

Description

Potable water discharges include Fire Control System Flushing, Water Distribution Lines Flushing and Sanitizing, and Hydrostatic Testing, Maintenance, or Flushing of the Water Tower. Discharges associated with these activities will be conducted in accordance with the General Permit for Discharges from Tanks, Pipes, and Other Liquid Containment Structures at Facilities Other than Oil Terminals.

GSFC performs maintenance on several different types of fire control systems to include fire hydrants, building sprinkler systems, and fire pumps, all of which use domestic water supplied by WSSC. Flushing the systems helps maintain pressure and ensures the equipment is operating properly. Fire control systems are flushed at least once annually.

GSFC maintains its own water distribution system, including a water tower that distributes water to the Center without the use of pump station. When new lines are installed or repairs to existing lines are made, the lines must be flushed to remove particulates that settle in the pipes. The tower creates pressure in the system to distribute water without the use of pump stations and to provide a backup water supply for firefighting purposes. The holding capacity of the tower is 300,000 gallons. Maintenance requiring discharge of the total volume occurs approximately once every five years.

Site Map

The locations of fire hydrants and buildings containing fire pumps are shown in Figure 9. A map of the GSFC domestic water distribution system and water tower are provided in Figure 10.

Industrial Activity and Associated Polluting Sources

There are no industrial activities associated with potable water discharges described in this section. Potential pollution sources include chlorine levels in domestic water and solids/sediment that have accumulated in the pipes or at the bottom of the Center’s water tower.

Potable Water NSWD

NSWD associated with fire control system flushing are infrequent (once per year for each building and fire hydrant). The volumes of these discharges can vary. Fire hydrants are expected to produce about 1,000 Gallons per Minute (GPM) assuming the hydrants are flushed from a 1 ½” opening. Sprinkler systems are estimated to produce 500 to 750 gallons during flushing. This may vary depending on the size of the building. Fire pumps are expected to discharge approximately 6,000 gallons during maintenance flushing. All volume estimates were calculated using industry standards and estimates from AC.

Flushing of the domestic water distribution lines and hydrostatic testing of the water tower will result in NSWD. These NSWD will consist of potable water and occur only when new construction or repairs are conducted. The volume and frequency of these events will vary greatly. MEMD must be notified, at minimum, one week prior to hydrostatic testing, maintenance, or flushing of the water tower to evaluate potential pollutants, discharge location, and any monitoring required. Any discharges greater than 100,000 gallons have additional monitoring and reporting requirements associated; MEMD must notify MDE 48 hours prior to these discharges. See Section 9.1 for details.

BMPs

Table 12 provides a complete list of all BMPs established to meet the requirements of the General Permit for Discharges from Tanks, Pipes and Other Liquid Containment Structures at Facilities Other than Oil Terminals. For additional details on the permit, see section 9.1.

Table 12: BMPs for Potable Water Discharges

BMP¹	Description
Volume controls (Volumes of 100,000 gallons or more have additional requirements.)	Flush no more water than is necessary to achieve maintenance goal.

BMP ¹	Description
De-chlorination devices	De-chlorination devices should be used for volumes expected to be greater than 1,000 gallons or when super-chlorination ² is used for disinfection. De-chlorination can be achieved chemically (using a chlorine neutralizing agent) or physically (allowing the chlorine to naturally dissipate).
Redirect water	Whenever possible discharge water to the sanitary sewer. When not possible, ensure that the water is directed to an area that allows infiltration and in a manner to prevent sediment erosion.
Notification (Volumes of 100,000 gallons or more)	Notify MEMD at least one week prior to hydrostatic testing, maintenance, or flushing of the water tower to evaluate potential pollutants, discharge location, and any monitoring required. MEMD must notify MDE 48 hours prior to discharging volumes greater than 100,000 gallons per day.
Monitoring Requirements	Some discharges may require monitoring for temperature and chlorine. ²

¹See general discharge permit (NPDES Permit No. MDG67), Part IV for details.

²There are special monitoring requirements associated with super-chlorination or mechanical cleaning. See section 9.1 to determine when temperature monitoring is necessary.

- Fire hydrants use volume control and de-chlorination devices. Redirecting water is not feasible for this activity. However, considerations are taken to prevent sediment erosion whenever possible.
- Sprinkler systems use volume control, but de-chlorination devices are not used. Sprinkler systems cannot be redirected, but are plumbed to sanitary or to discharge to the ground. Therefore, this BMP is only considered during the installation of sprinkler systems and is not part of the monitored BMPs.
- Fire pumps use volume control and redirection of water. Each building usually has three to six fire pump outlets. The maintenance goal is achieved by running the pump outlets simultaneously, in parallel. De-chlorination can be achieved by several means. The following methods have been evaluated and determined effective at chlorine removal:
 - De-chlorination mats can be used on the adjacent asphalt and storm drain inlets.
 - De-chlorination devices can be connected to fire pump outlets.

Storm Water Pollution Potential from Potable Water Discharges

Potable water discharges produces a moderate risk of pollution to waters of the State. Chlorine and suspended solids are the primary pollutant of concern from domestic water. Chlorine can interrupt biological processes by killing beneficial bacteria. Chlorine dissipation rates will depend on temperature and the volume of chlorinated water. The warmer the weather, the more quickly dissipation will occur. In addition, smaller volumes of water will dissipate more quickly than larger volumes of water. There is also the potential to cause erosion when discharging water at high rates and/or volumes.

5.0 Miscellaneous Areas and Activities

GSFC maintains various pieces of oil-filled equipment that, due to their proximity to storm drains, could pose a risk of pollution to waters of the State. Examples of miscellaneous oil-filled equipment include, but are not limited to a hydraulic system that maintains pop-up barriers at the GSFC Main Gate, a transformer located adjacent to the 7G Lot, and a High Capacity Centrifuge (HCC) in building 15.

GSFC maintains a large area of roads and parking lots. The locations of vehicle parking lots and impervious surfaces are shown in Figure 12. Vehicles may leak oil, fuel, antifreeze, and other pollutants, which could contribute to non-point source pollution of surface waters during rain events. Spills and releases to the environment are managed in accordance with GSFC's ICP. Building Facility Operational Managers (FOM) are responsible for ensuring GH practices in and around buildings. FOM may be required to survey the grounds around their building to identify potential problem areas, such as litter accumulation, and implement corrective actions.

6.0 Areas Requiring Additional Erosion and Sediment Controls

This portion of the SWPPP addresses the plans and policies relating to any E&SC issues at GSFC that were not covered in the previous activities. Project managers for construction or modifications to existing facilities, equipment, or processes are required to complete the Facilities Management Division (FMD) checklist for construction projects (GSFC Form 23-73). The form is maintained on the Goddard Document Management System (GDMS). Project managers should check the site for the most recent version of the form before completing it.

All GSFC construction areas greater than 5,000 square feet surface area or 100 cubic yards of disturbed soil require an MDE-approved E&SC Plan. Either FMD or the support contractor performing the work completes the E&SC plan. Once completed, it is reviewed by FMD and then sent to MDE for approval before construction begins. Construction activity greater than or equal to one acre requires a notice of intent to be filed with MDE.

6.1 Small Scale Construction and Maintenance

Construction projects, routine and emergency maintenance repairs, and other groundbreaking activities on Center that are fewer than 5,000 square feet surface area or 100 cubic yards of disturbed soil are not required to submit E&SC plans to MDE for approval; however, the E&SC practices identified in the most recent *Maryland Standards and Specifications for Soil Erosion*

and Sediment Control are still required to be followed. In the event that emergency maintenance activities or excavation are required, soil E&SC must be implemented and the site stabilized upon completion of the project.

In the event of receiving an interested party complaint related to any construction activity within GSFC’s jurisdiction, the complaint will be processed through the project site civil servant project manager. Any environmental concerns raised in the complaint will be forwarded on to MEMD. Environmental non-compliances will be tracked via SHEtrak or the project’s tracking system to include findings and corrective actions. The interested party will be notified of the findings and investigation status (i.e., ongoing or closed) within seven (7) days of receipt of the initial complaint.

Site Map

There are no site maps for small construction sites since they are continually changing and generally only last short periods of time. The FMD manages construction activities at GSFC.

BMPs

Table 15: BMPs for Small Scale Construction Activities at GSFC

BMP	Description
PM	Implement soil and sediment erosion control practices.

6.2 Areas of Exposed Soil

Areas at GSFC that are barren and or void of vegetation will be monitored for soil erosion. These areas may be prioritized so that time and resources can be allocated to address the areas that warrant the most attention.

BMPs

Table 16: BMPs for Areas of Exposed Soil

BMP	Description
VI	Complete facility wide inspections biannually, taking note of areas with greatest need for E&SC.
PM	Grade and permanently seed areas for optimum soil stability. Follow the requirements in the current version of <i>Maryland Standards and Specifications for Soil Erosion and Sediment Control</i> .
Follow Up	Routinely inspect areas that have undergone soil stability practices to ensure they are working.

Storm Water Pollution Potential from Areas of Exposed Soil

Areas of exposed soil pose a moderate risk of pollution to waters of the State. Rain and wind have the potential to displace soil, which could affect waters of the state by increasing the turbidity of surface water.

6.3 Areas Identified with High Erosion Potential

GSFC has identified the following areas as having high potential for soil erosion, based on topography, hydrology, activities, or other factors. These areas include, but are not limited to:

- The hillside, east of Cobe Road, towards the intersection of Goddard Road;
- Adjacent sides of Cobe Road at building 28 (where a storm water conduit passes beneath the road); and
- The hillside east of Explorer Road (across from the building 34 parking lot).

BMPs

Table 17: BMPs for Areas Identified with High Erosion Potential

BMP	Description
VI	Inspect identified areas during annual storm water inspections.

Annual VI of the identified areas will help MEMD provide recommendations to FMD in how to limit erosion. The condition of the identified areas will be documented using the SHetrak reporting system. Implementing erosion prevention measures will be dependent on risk priority and Center funding. VI results and coordination with FMD regarding areas with high potential for soil erosion will be documented in the Annual Comprehensive Site Evaluation Report. The location of areas identified with high erosion potential is shown in Figure 13.

7.0 Emergency and Illicit Discharges

An emergency discharge is an instance in which unauthorized discharges to the storm drain system occurs due to leaking or broken pipes, water tower overfills, etc. Per MDE, GSFC is to include emergency discharges in its Plan in lieu of modifying its NPDES permit to include such discharges. Emergency discharges are usually detected and repaired immediately. When there is a failure or rupture in the system that cannot be readily repaired, the emergency discharge shall be treated as an illicit discharge. Illicit discharges are discharges that would require a permit, if the discharge were intentional. Corrective actions for illicit discharges are tracked under the requirements of GSFC’s NPDES MS4 permit. See section 8.0 for more information on the NPDES MS4 permit.

The following are known emergency discharges that have occurred at GSFC (this is not an exhaustive list):

- Return steam condensate or chilled water lines break and discharge to the storm system at the building where the break occurred;
- Water tower overfills are discharged to the storm system. Water is constantly being pumped into and out of the water tower. In the event of a communication failure (e.g., the high level alarm fails), an overfill is discharged to the storm system; and
- Sanitary sewer lines break and discharge sanitary wastewater into surface waters (only when line break is near surface water or enters a storm drain).

GSFC reports emergency discharges with pollution potential to MDE, in accordance with NPDES permit requirements. The MEMD must be notified of emergency discharges, including releases of “clean” potable water, to the storm sewer system, to determine regulatory reporting, monitoring, and corrective action requirements.

7.1 Field Screening of Outfalls

Field screenings of GSFC’s outfalls are conducted to identify potential illicit connections or illicit discharges to the storm drain system. GSFC is considered a medium sized property. Low priority outfalls are required to be inspected once per permit term. Outfalls that are considered high priority are located within drainage areas where industrial activities occur. High priority outfalls are inspected once per year with the exception of Outfall 001 (Main Pond) and Outfall 004 (EOSDIS Pond at building 32), which are monitored monthly as a part of NPDES Industrial Discharge Permit compliance. Additional high priority outfalls to be screened should be added upstream from “exempt” or large drainage basins. The MEMD will perform outfall screenings concurrently with annual SWPPP Comprehensive Site Compliance Evaluations.

The GSFC Outfall Screening VI Checklist will be completed for each outfall inspected in accordance with the procedures for completing dry weather outfall screenings (see Appendix G). All inspections, findings, and follow-up actions will be input into the SHEtrak reporting system and tracked to closure.

7.2 Sanitary Sewer Overflow (SSO)

Table 18 outlines the procedures to be followed if a SSO occurs outside of buildings on the Center.

BMPs

Table 18: Sanitary Sewer Overflow

BMP	Description
SSO Reporting and Response	Report SSOs immediately upon discovery to SOC by calling 911 from a GSFC phone or 301-286-9111 from a cell phone. In the event that an SSO reaches receiving waters (i.e., a storm drain, stream, or other surface water conveyance), MEMD assess whether

BMP	Description
	external notifications to regulators are required. MEMD will contact MDE and the Prince George’s (PG) County Health Department within 24 hours, in accordance with Code of Maryland Annotated Regulations (COMAR) 26.08.10, if required. Additional monitoring of receiving waters may be required per direction from MDE or PG County Health Department.
Site Security	The GSFC FMD secures the overflow site to prevent contact by members of the public until the site has been cleaned.
Documentation	The MEMD will take photos of the impacted area to document the nature and extent of impacts. The SSO will be recorded in the MEMD Release Tracking System.
General Cleanup Actions	<p>The GSFC FMD provides cleanup actions for SSOs. The MEMD advises FMD for cleanup actions when an SSO has reached surface waters (or water conveyance), and for waste disposal. Absolutely no run-off during clean-up process should reach storm drain inlets.</p> <ul style="list-style-type: none"> • If SSO occurs near a storm drain, block drain until cleanup occurs. • If sewage has pooled up, pump liquid sewage back into sewer system. • Rake all paper and solids either back into the sanitary sewer or, if not possible, collect and transport for proper disposal. • After solids have been returned to sanitary sewer or collected for removal from site, treat area by spreading hydrated lime. Enough hydrated lime should be applied to raise the pH to 12 for two hours, at minimum. Lime treated areas should be restricted

BMP	Description
	<p>during the disinfecting period. The overflow area can be opened 24 hours after disinfection. Any residual hydrated lime, after 24 hours, shall be swept up by FMD and collected. Contact the MEMD for proper disposal.</p> <ul style="list-style-type: none"> • Solids that cannot be raked back to the sanitary sewer or solids that are not permitted to be disposed in the sanitary sewer shall be collected in closed containers or double-bagged and placed into a solid waste dumpster. Liquids are not permitted to be placed into a solid waste dumpster.
Clean up of right of way or grassy areas	<ul style="list-style-type: none"> • Remove all paper and solids and transport for proper disposal (as stated in General Cleanup Actions). Treat area by spreading hydrated lime. • If SSO has damaged grass, restore the area after cleanup (e.g., spread topsoil, seed, and straw over the impacted area.)
Clean up of streams	Remove and collect all paper and solids and transport for proper disposal (as stated in General Cleanup Actions).
Clean up of storm drain catch basin and systems	Remove and collect all paper and solids and transport for proper disposal (as stated in General Cleanup Actions).

8.0 Storm Water Management Practices

GSFC maintains a storm water drainage system, which directs runoff into storm water management structures regulated by the Center’s NPDES MS4 permit. This permit covers all storm water conveyances, outfalls, and structures to include swales, ditches, culverts, etc., and requires them to be maintained and repaired in accordance with the SWPPP and Maryland state requirements. For details on the requirements associated with the general permit see section 9.2, Additional Requirements – NPDES MS4. Refer to Appendix H for a complete list of maintenance requirements for all storm water conveyances.

BMPs

Table 19: BMPs for Storm Water Management Drainage System

BMP	Description
VI	Routinely inspect storm drainage areas, remove trash and debris and repair damage to stormwater conveyances, outfalls and structures (swales, ditches, culverts, etc.).

9.0 Additional Requirements

9.1 *General Permit for Discharges from Tanks, Pipes and Other Liquid Containment Structures at Facilities Other Than Oil Terminals (NPDES General Permit No. MDG67)*

GSFC operates under an NPDES General Permit for Discharges from Tanks, Pipes and Other Liquid Containment Structures at Facilities Other Than Oil Terminals (NPDES Permit no. MDG67). This general permit requires practice of BMPs and visual monitoring when performing general maintenance and operational activities on water utilities. General maintenance and operational activities include; fire control systems flushing, hydrostatic testing, and repair and replacements of pipes and associated structures. BMPs established in compliance with this general permit are outlined in sections 4.8. Additional requirements may exist for non-routine activities. The requirements are summarized in a flow chart in Appendix F. The requirements of the permit and BMPs were developed to ensure compliance with COMAR 26.08.03.06, Chlorine Discharges. Per COMAR 26.08.03.06, discharges shall not contain chlorine or chlorine-containing compounds at detectable levels. The detectable level shall be less than 0.1 mg/L as determined by a method approved in accordance with 40 CFR 136 or an alternative method approved by MDE.

9.2 NPDES General Permit for Discharges from State and Federal Small MS4

GSFC operates under an NPDES General Permit for Discharges from State and Federal Small MS4 (NPDES Permit no. MDR 055501), which takes a holistic approach to minimizing storm water pollution and improving storm water quality. The permit outlines minimum control measures that must be met. Corresponding practices are included in the MS4 Annual Report located in under MEMD file number E-6.2.3 MS4. The annual report is an evolving document that is used to identify improvements and accomplishments from year to year.

10.0 References

2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control, Maryland Department of the Environment, Water Management Administration.

Developing Your Storm Water Pollution Prevention Plan: A Guide for Industrial Operators, February 2009, U.S. EPA 833-B-09-002.

Energy Independence and Security Act, section 438, 2007, United States Congress.

Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices, U.S. EPA 833-R-92-002.

Appendix A: GSFC Storm Water Prevention Team (SWPPT)

A-1

Document No.: 250-SWPPP-2019.1

Check this site <https://gs279sharepoint2.gsfc.nasa.gov/sites/ems/SWPPT/default.aspx> to verify that this is the correct version prior to use.

Name	Organization	Area	Extension
Lori Levine	MEMD	Environmental – Water Program Manager	6-6741
Phillip Nessler	MEMD	Environmental –	6-4693
Lauren Wicklund	MEMD	Environmental – Soil Erosion/Outfall Screening	6-8716
Dann Brown	Applied Engineering and Technology Directorate (AETD)	Super FOM	6-5033
Frank Coleman	AETD	Super FOM Alternate	6-3976
Rob Dipalo	Logistics Management Division (LMD)	Vehicle Maintenance Facility	6-6225
Jim Pavey	LMD	Vehicle Maintenance Facility	6-9597
Dave Bast	LMD	Vehicle Maintenance Facility	6-6340
Lixa Rodriguez-Ramon	MEMD	<90-Day Waste Accumulation Facility	6-4613
Leo Hrybyk	MEMD	<90-Day Waste Accumulation Facility	6-3816
Dave Wright	FMD	Central and East Heating and Refrigeration Plants	4-5029
Beth Booker	LMD	Shipping and Receiving Facilities Loading/Unloading Docks/ Vehicle Maintenance Facility/ *Logistics Management Storage Facility	6-3414
Edward “Pat” Burns	LMD	Shipping and Receiving Facilities Loading/Unloading Docks	6-6611
Bryan “Scott” Hayley	FMD	Salt/Sand Dome/ Fire Control System Flushing/ Domestic Water Distribution Lines Flushing	6-1401
Frank Gavel	FMD	Salt/Sand Dome/ Fire Control System Flushing/ Domestic Water Distribution Lines Flushing	6-1135
Ray Hummel	FMD	Domestic Water Distribution Lines Flushing/ Hydrostatic Testing or Flushing of the Water Tower	6-8796
Allen Boone	FMD	Landscaping Facility/building 25 Staging/Storage Area	6-8658
Bill Ridenhour	FMD	*Facilities Management Staging/Storage Areas/ Landscaping Facility/Storm Water Management Practices (PM)/ SSO	6-3468

Name	Organization	Area	Extension
Roy White	FMD	*On-Site Construction Support Facility	6-0553
John Musselman	FMD	*On-Site Construction Support Facility	6-0136
Ray McGaha	FMD	*On-Site Construction Support Facility	6-0553
Eric Saul	FMD	*On-Site Construction Support Facility	6-2127
Marvin Jackson	LMD	*Logistics Management Storage Facility	6-9042
Keith McNair	LMD	*Logistics Management Storage Facility	6-2995
Marvin “Bo” Kaufman	Mechanical Systems Division	*Building 5 fabrication shop	6-6271
Robert Kaufman	Mechanical Systems Division	*Building 5 fabrication shop	6-6442

*Staging/Storage Areas

Rev. 05/2019

Appendix B: Significant Spills at GSFC from 2013-Present

B-1

Document No.: 250-SWPPP-2019.1

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Significant Spills and Releases at GSFC from 2014 to Present

Spill Location	Date Of Spill	Estimated Quantity	Material Spilled	Point of Discharge
Building 12	08/16/2018	33,000 gallons	Chilled Water	DB8
Building 5	01/7/2018	5,281 gallons	Chilled Water	DB8
Building 8	04/1/2017	1,575 gallons	Chilled Water	DB1
Building 9	08/8/2016-09/27/2016	2,500 gallons a day	Chilled Water	DB8

Rev. 05/2019

Appendix C: Outfall Sampling Data Summary

C-1

Document No.: 250-SWPPP-2019.1

Check this site <https://gs279sharepoint2.gsfc.nasa.gov/sites/ems/SWPPT/default.aspx> to verify that this is the correct version prior to use.

Outfall Sampling Data Summary¹

Outfall	Parameter	Permit Limit ²	Benchmarks Values ³	Sampling Data	Units ⁴
001	Total Copper	13 daily; 9 monthly average	12.3	7.10	ppb
	Dissolved Copper	Report	n/a	5.60	ppb
	Total Residual Chlorine	0.10	n/a	0.03	mg/L
	Hardness	Report	100	74.58	mg/L
	Temperature	90	n/a	61.46	° F
	pH	6.5 – 8.5	6.0 – 9.0	7.38	s.u.
	Total Phosphorus	n/a	2.0	0.40	mg/L
	Nitrate + Nitrite	n/a	0.68	0.23	mg/L
	Total Kjeldahl Nitrogen	n/a	n/a	1.41	mg/L
Total Nitrogen	n/a	n/a	1.6	mg/L	
004	Total Copper	13 daily; 9 monthly average	12.3	9.12	ppb
	Dissolved Copper	Report	n/a	5.55	ppb
	Total Residual Chlorine	0.10	n/a	0.04	mg/L
	Hardness	Report	100	77.6	mg/L
	Temperature	90	n/a	61.52	° F
	pH	6.5-8.5	6.0 – 9.0	7.23	s.u.
	Total Phosphorus	n/a	2.0	0.34	mg/L
	Nitrate + Nitrite	n/a	0.68	0.13	mg/L
	Total Kjeldahl Nitrogen	n/a	n/a	1.46	mg/L
Total Nitrogen	n/a	n/a	1.51	mg/L	

¹ Sampling data represents the average of sampling data from October 2001 to December 2018; nutrient sampling data represents the average of sampling data from May 2012 to December 2018.

² This is a maximum limit except where a range is indicated.

³ Benchmark Values were acquired from EPA's 2008 guidance document (EPA 833-B-09-002).

⁴ Unit abbreviations: ppb = parts per billion; mg/L = milligrams per liter; ° F = degrees Fahrenheit; s.u. = standard unit

⁵ Below Quantitative Limits for All Parameters.

Appendix D: Site Maps

D-1

Document No.: 250-SWPPP-2019.1

Check this site <https://gs279sharepoint2.gsfc.nasa.gov/sites/ems/SWPPT/default.aspx> to verify that this is the correct version prior to use.

Figure 1: General Location of GSFC

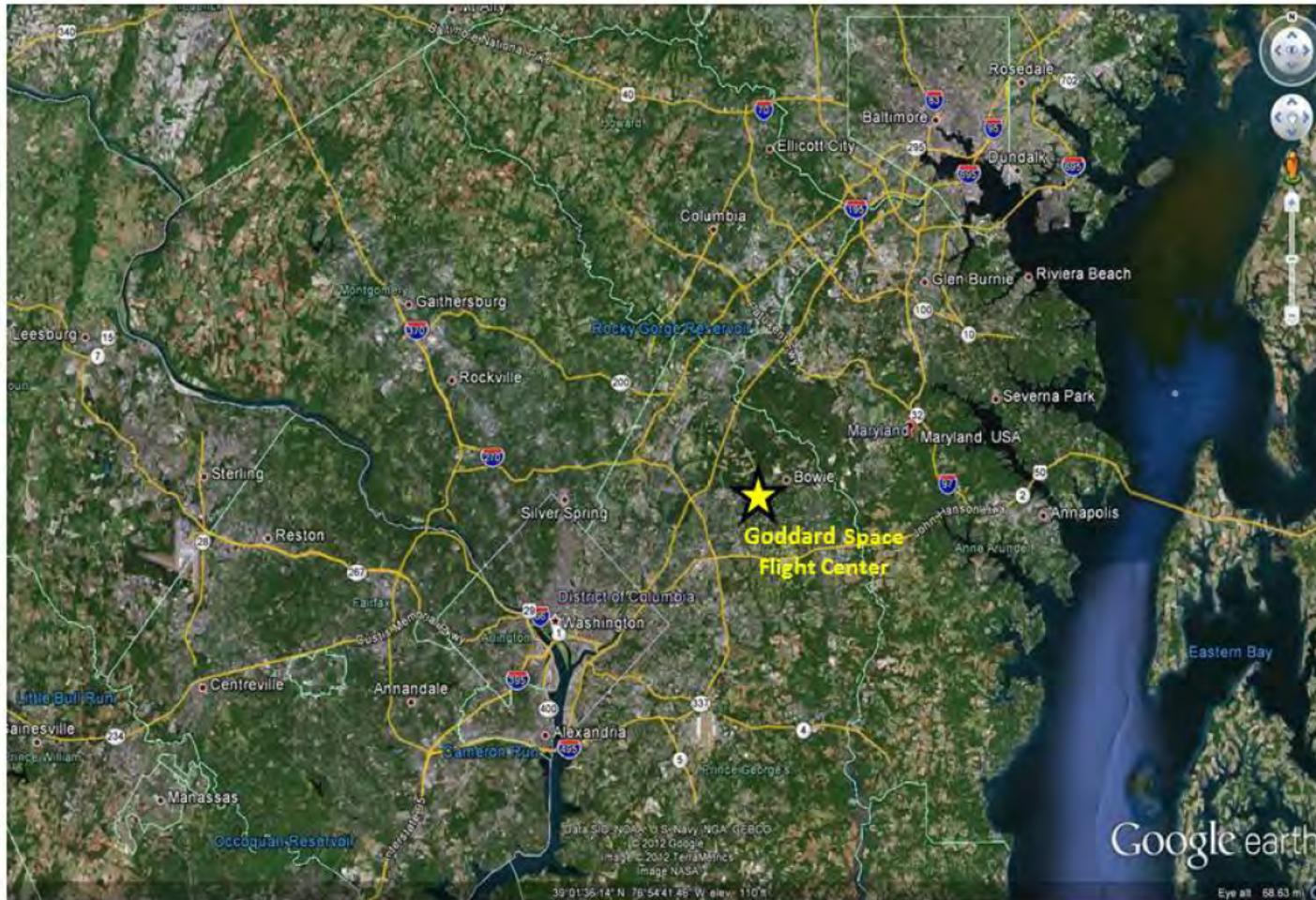


Figure 2A: GSFC Main Site

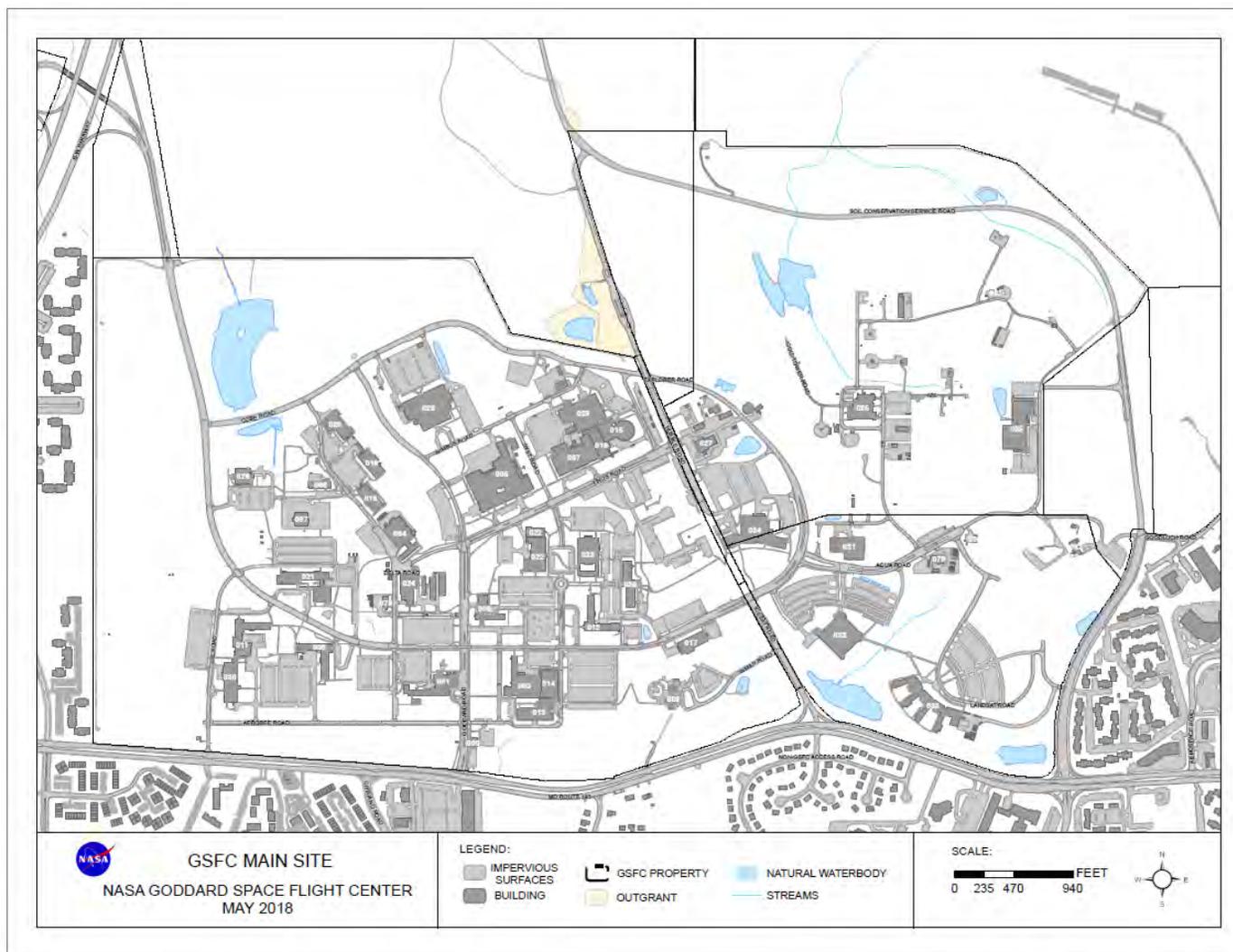


Figure 2B: GSFC Outlying Areas

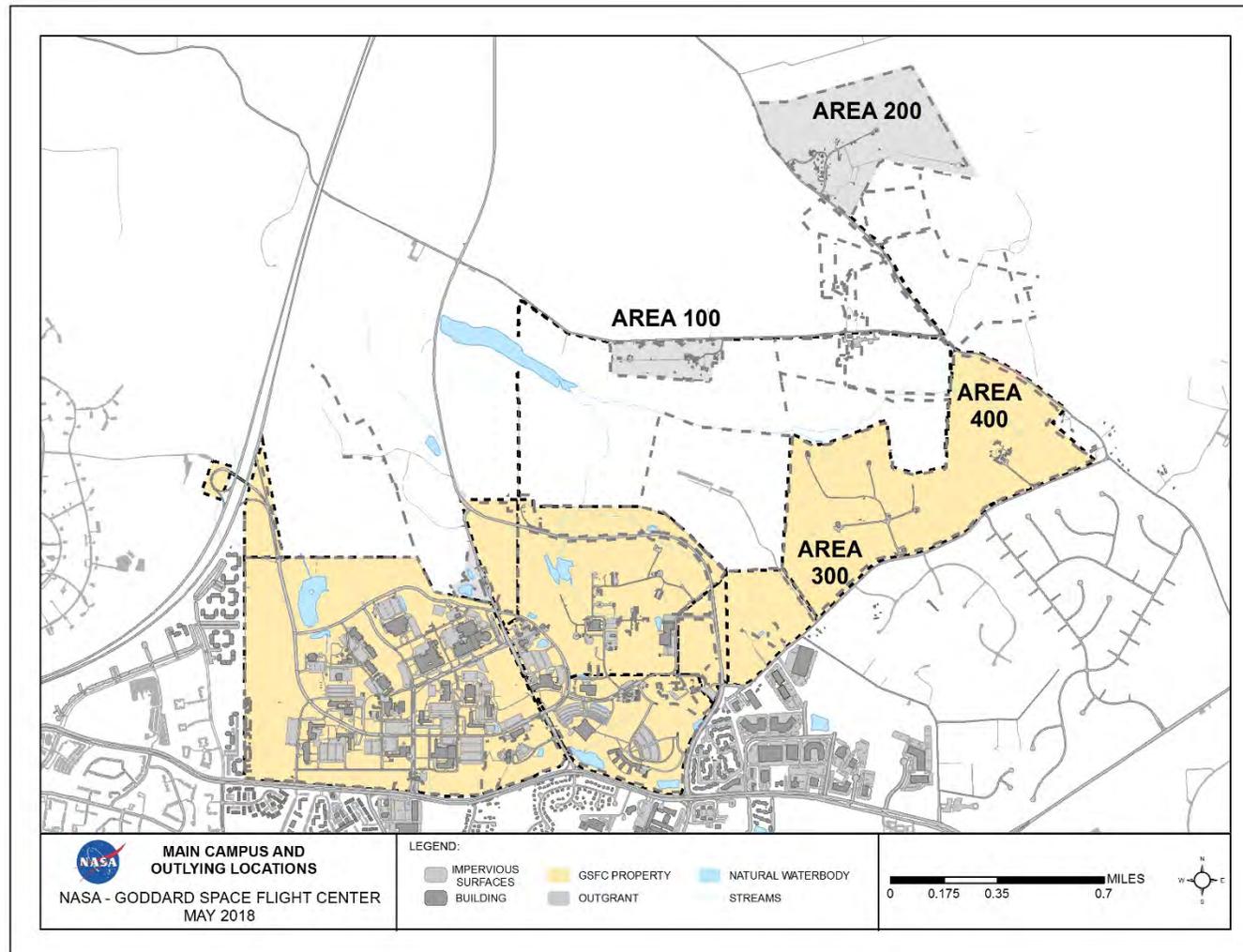


Figure 3A: Storm Drain Schematic at Main Site

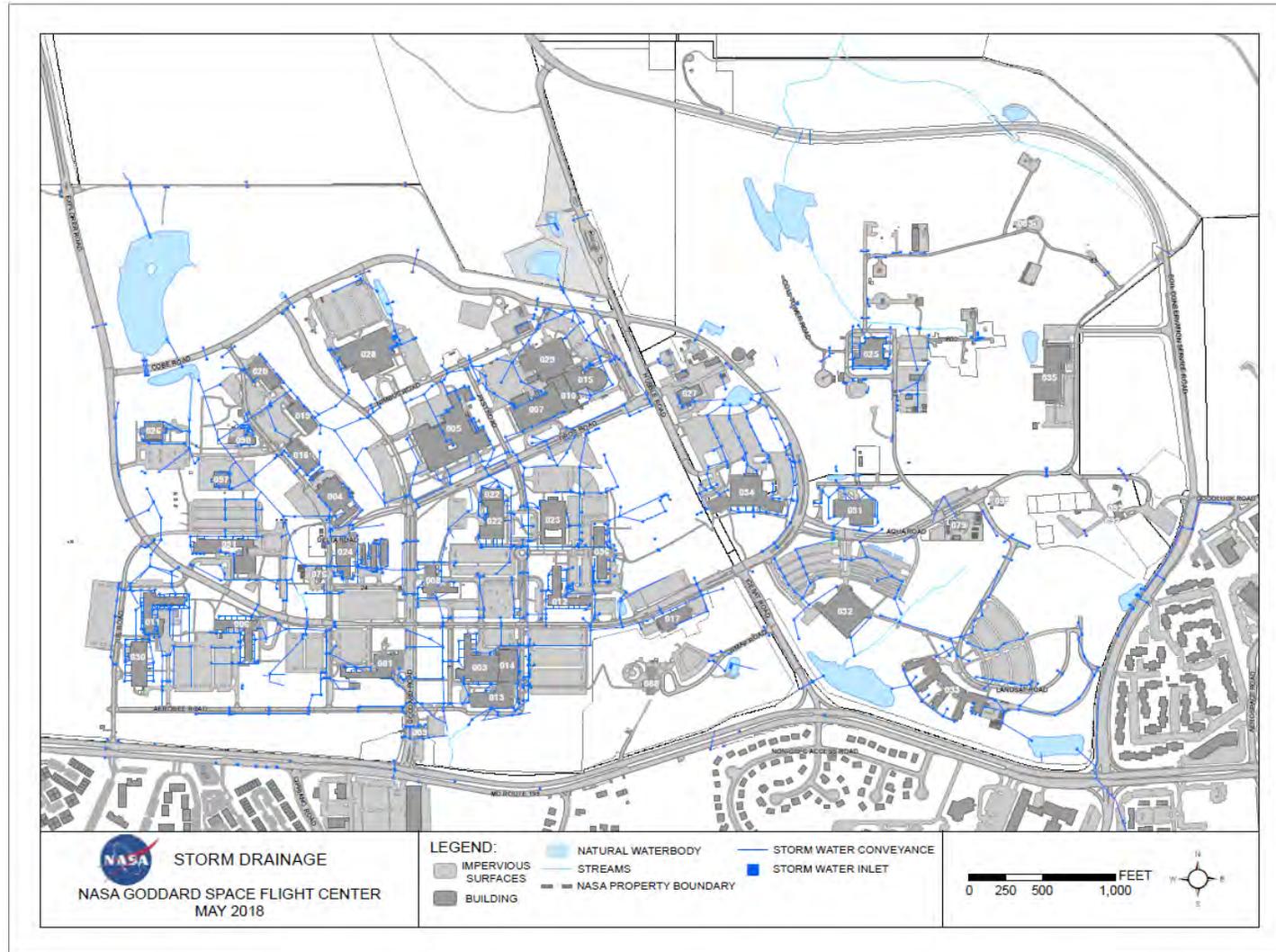


Figure 3B: Storm Drain Schematic at Outlying Areas

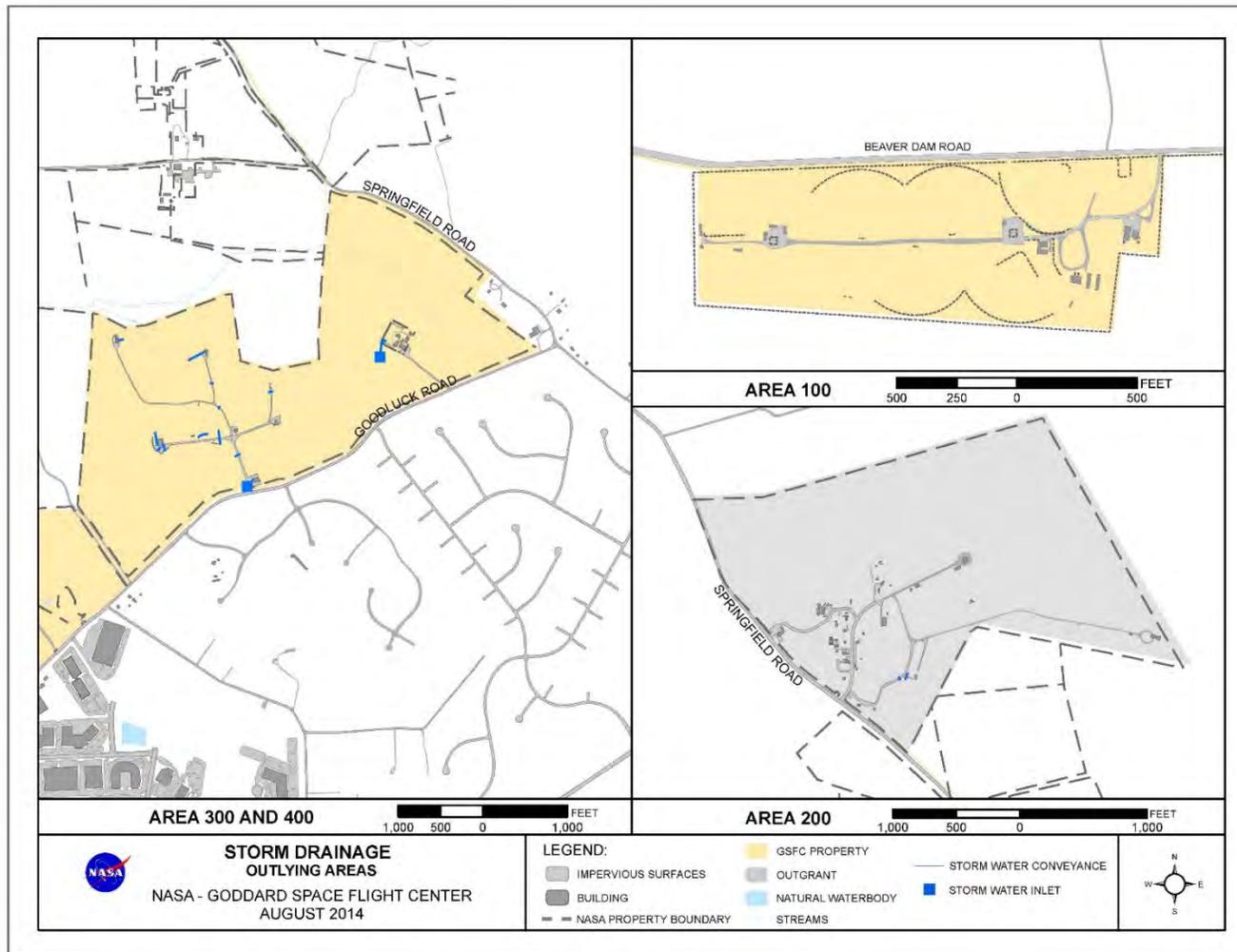


Figure 4A: Drainage Basins at Main Site

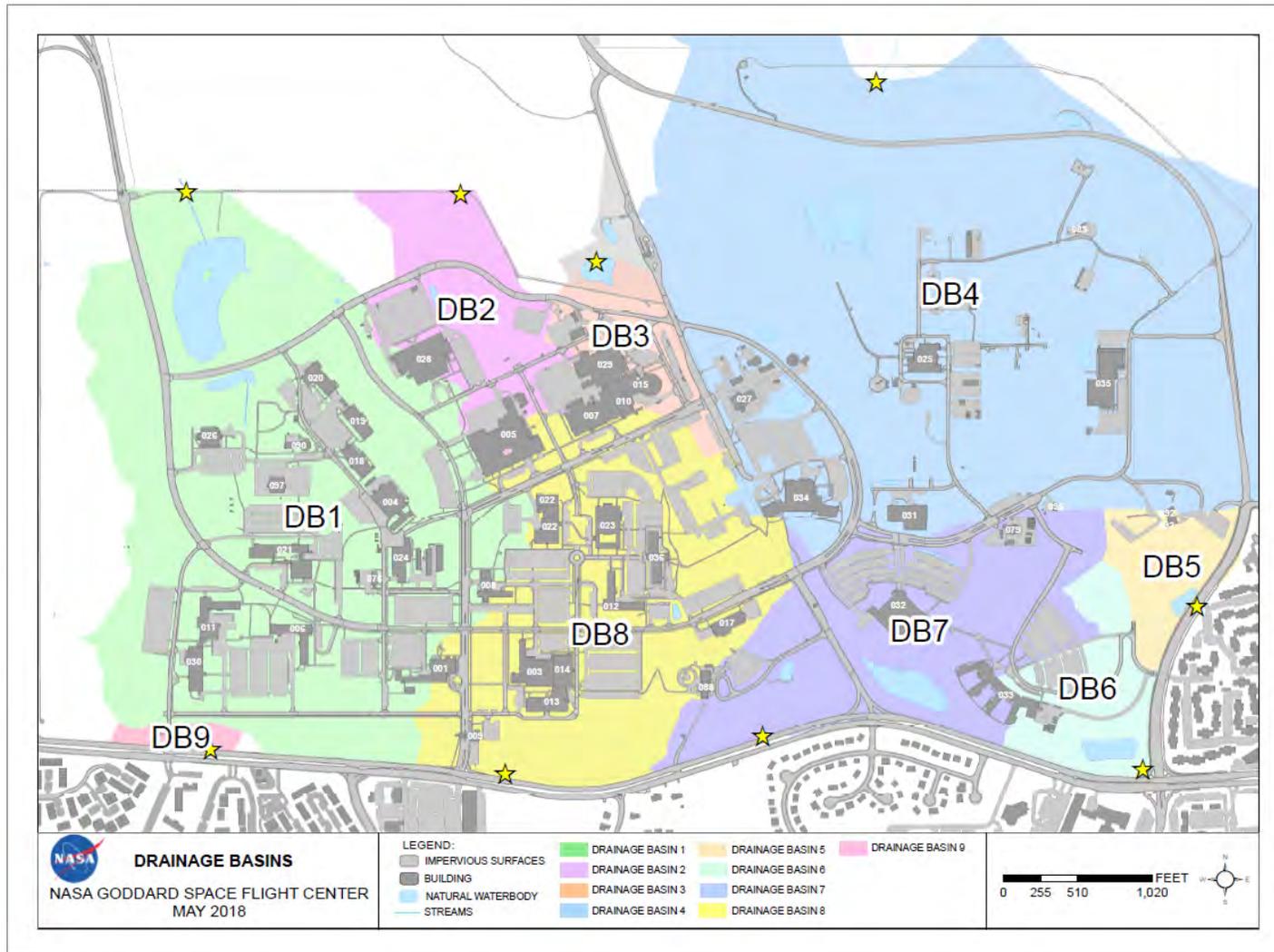


Figure 4B: Drainage Basins Outlying Areas

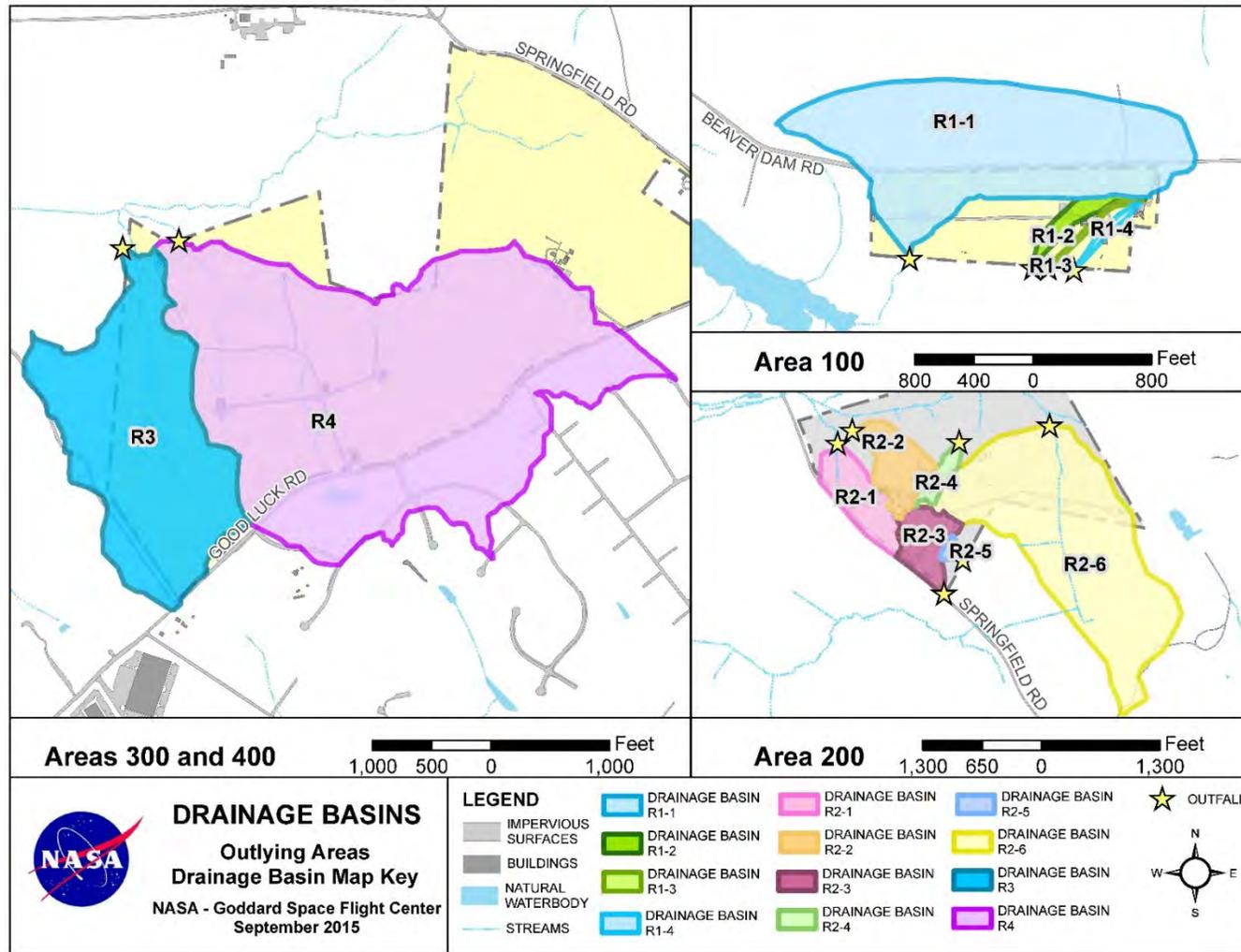
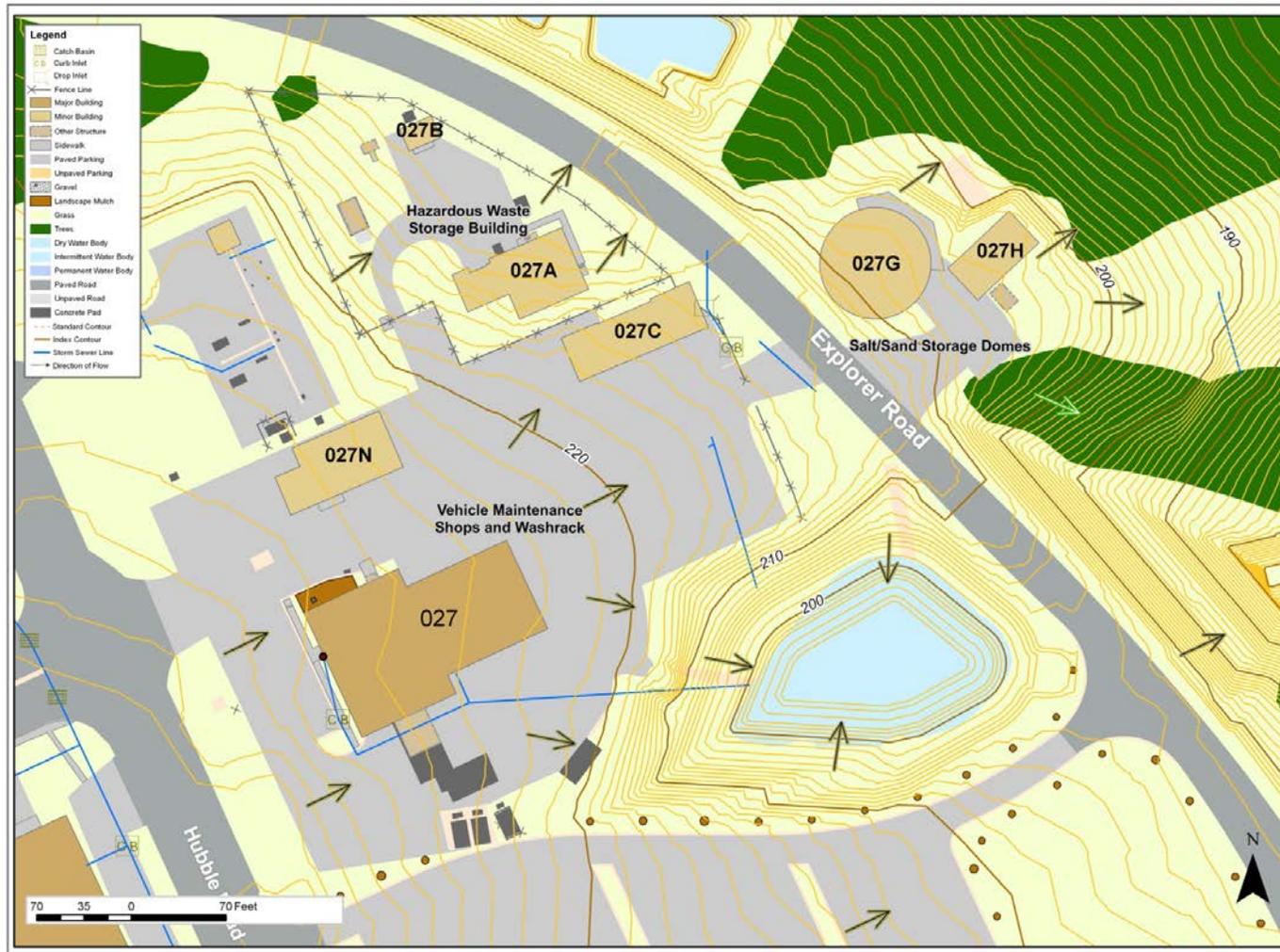


Figure 5: Locations of the Vehicle Maintenance Facility, <90-Day Waste Accumulation Facility, and Salt/Sand Domes



Rev. 11/2011

Figure 6A: Location of the Central Heating and Refrigeration Plant (Bldg. 24)



Rev. 12/2010

Figure 6B: Location of the East Campus Refrigeration Plant (Bldg. 31)



Rev. 12/2010

Figure 7: Location of the Shipping and Receiving Facility Loading/Unloading Dock (Bldg. 35)

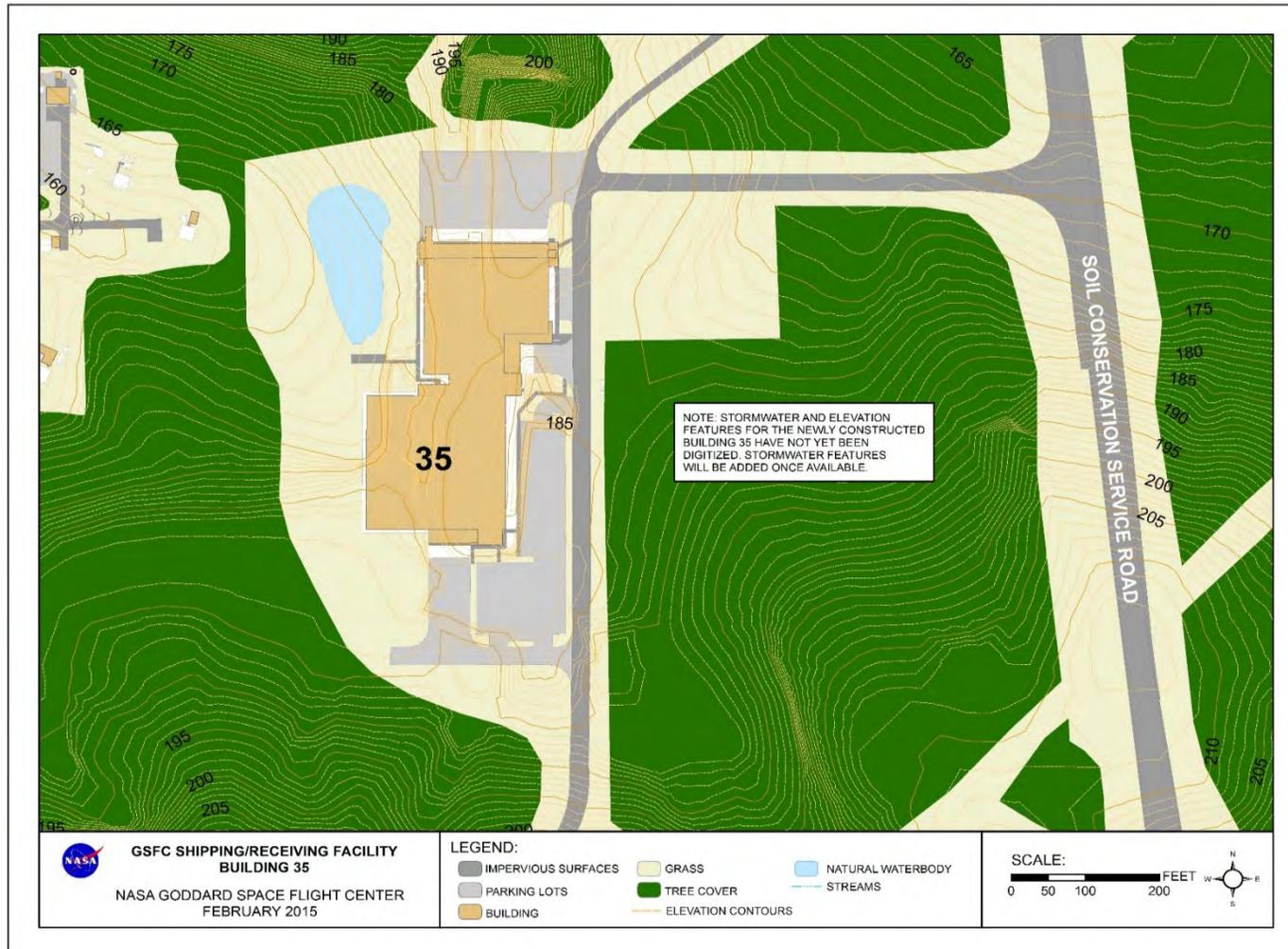


Figure 8A: Location of the Landscaping Facility and the Facilities Management Staging/Storage Area



Rev. 12/2011

Figure 8B: Location of Building 25 Staging/Storage Area

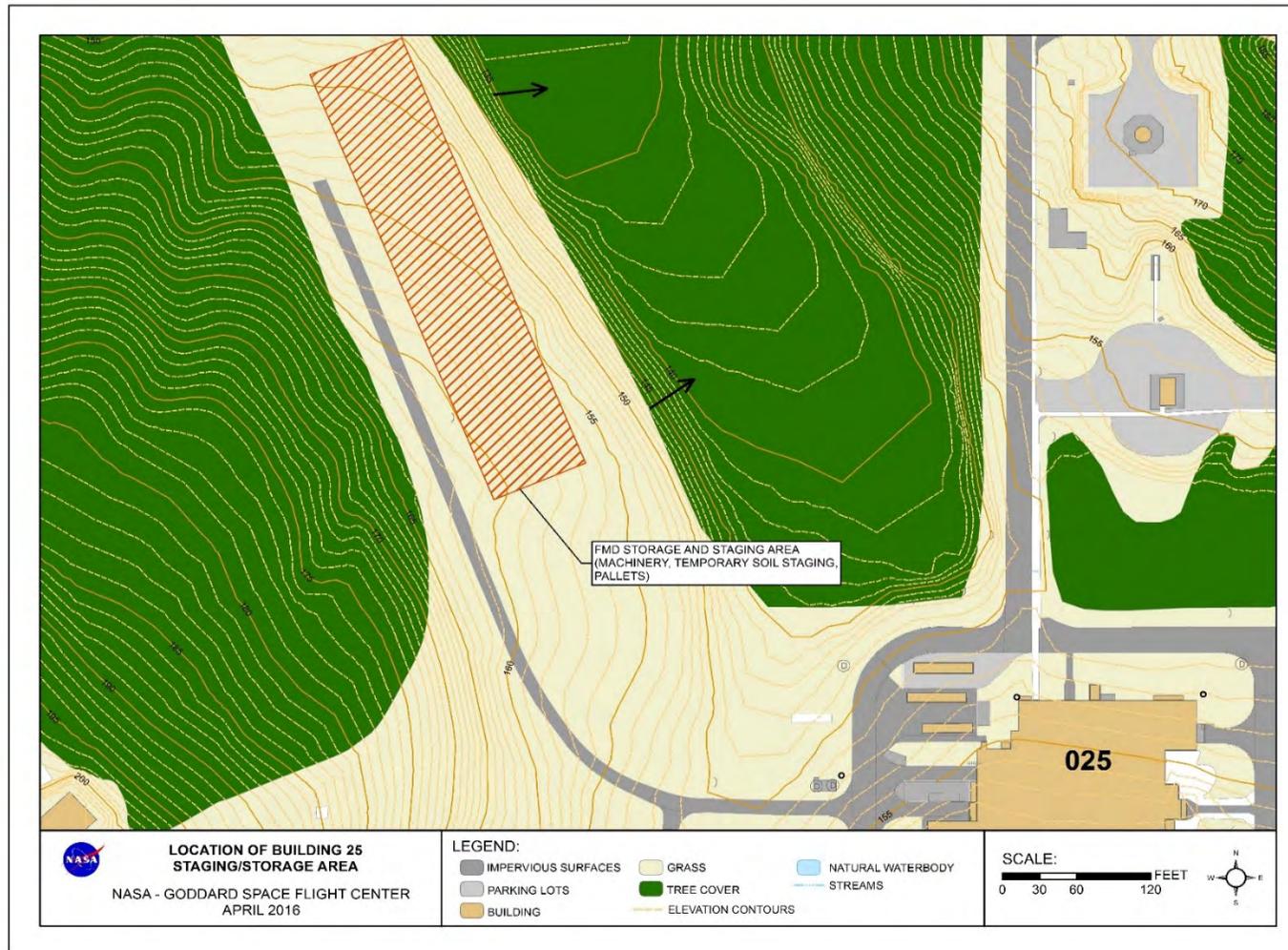
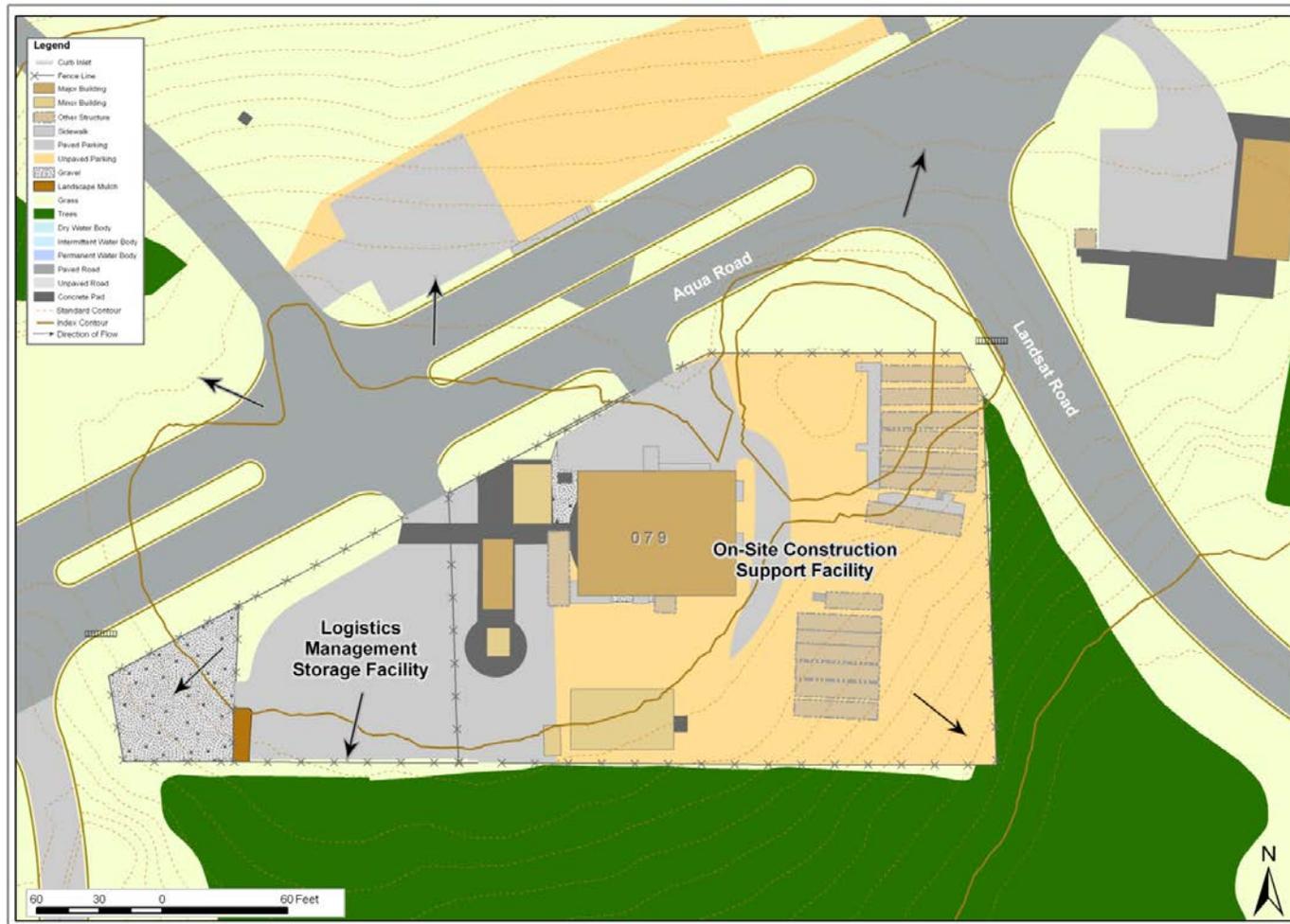


Figure 8C: Location of On-Site Construction Support and Logistics Management Storage Facilities



Rev. 07/2010

Figure 8D: Location of Building 5 Fabrication Shop



Rev. 11/2011

Figure 8E: Location of Building 28 Staging/Storage Area

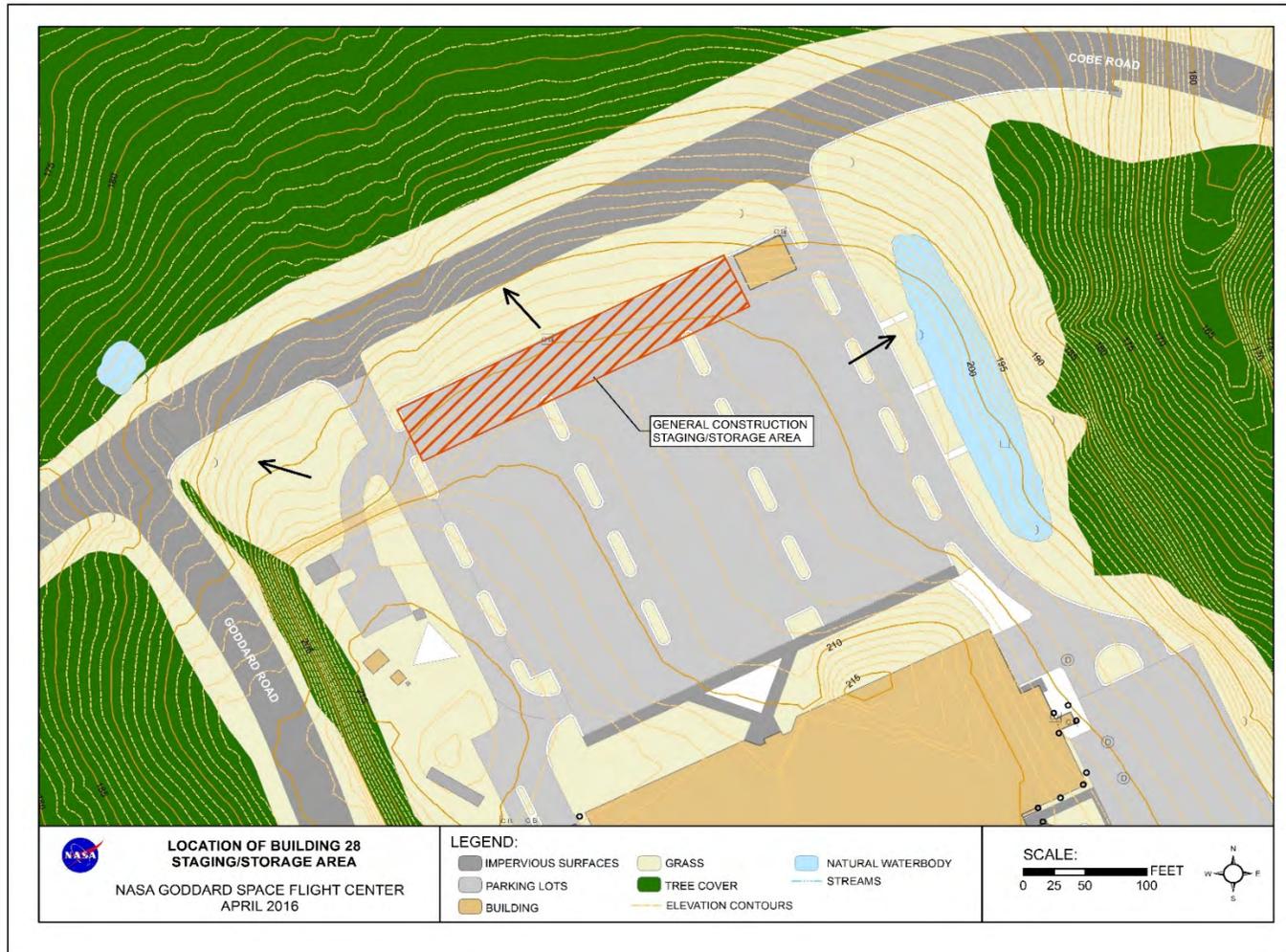


Figure 8F: Location of Building 29 Staging/Storage Area

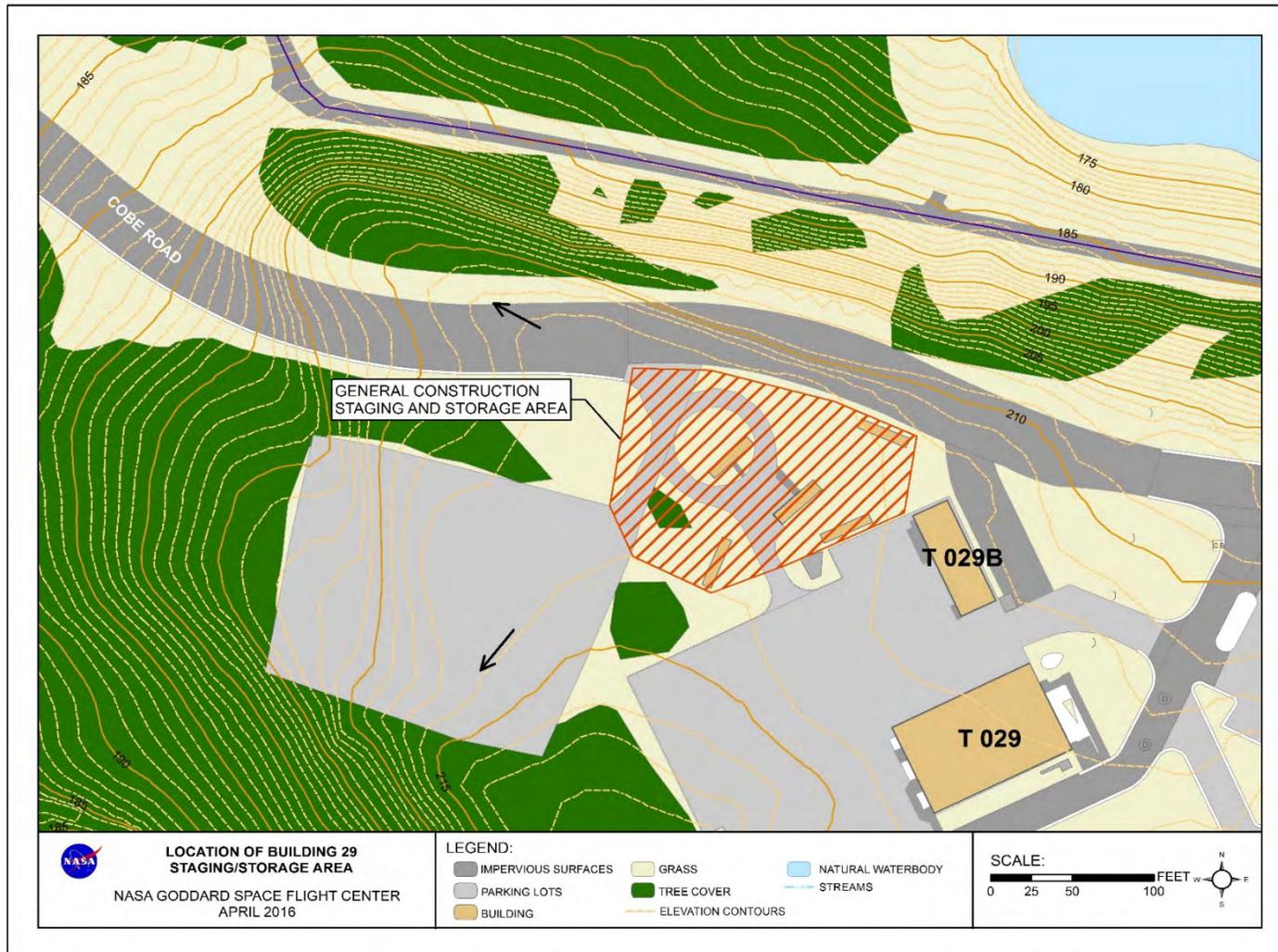
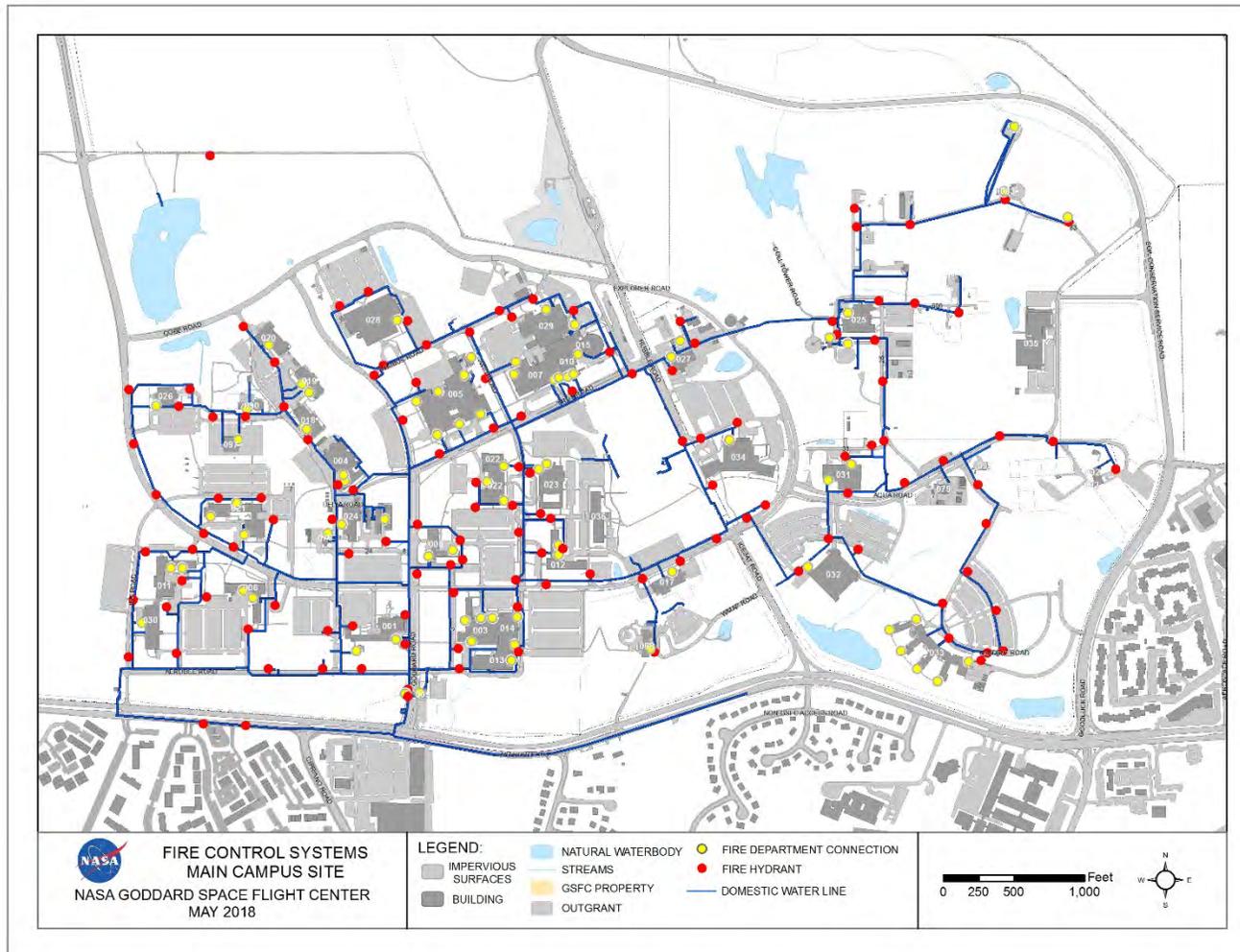


Figure 9: Fire Control Systems at GSFC



Rev. 05/2018

D-19

Document No.: 250-SWPPP-2019.1

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Figure 10: Water Distribution and Water Tower at GSFC

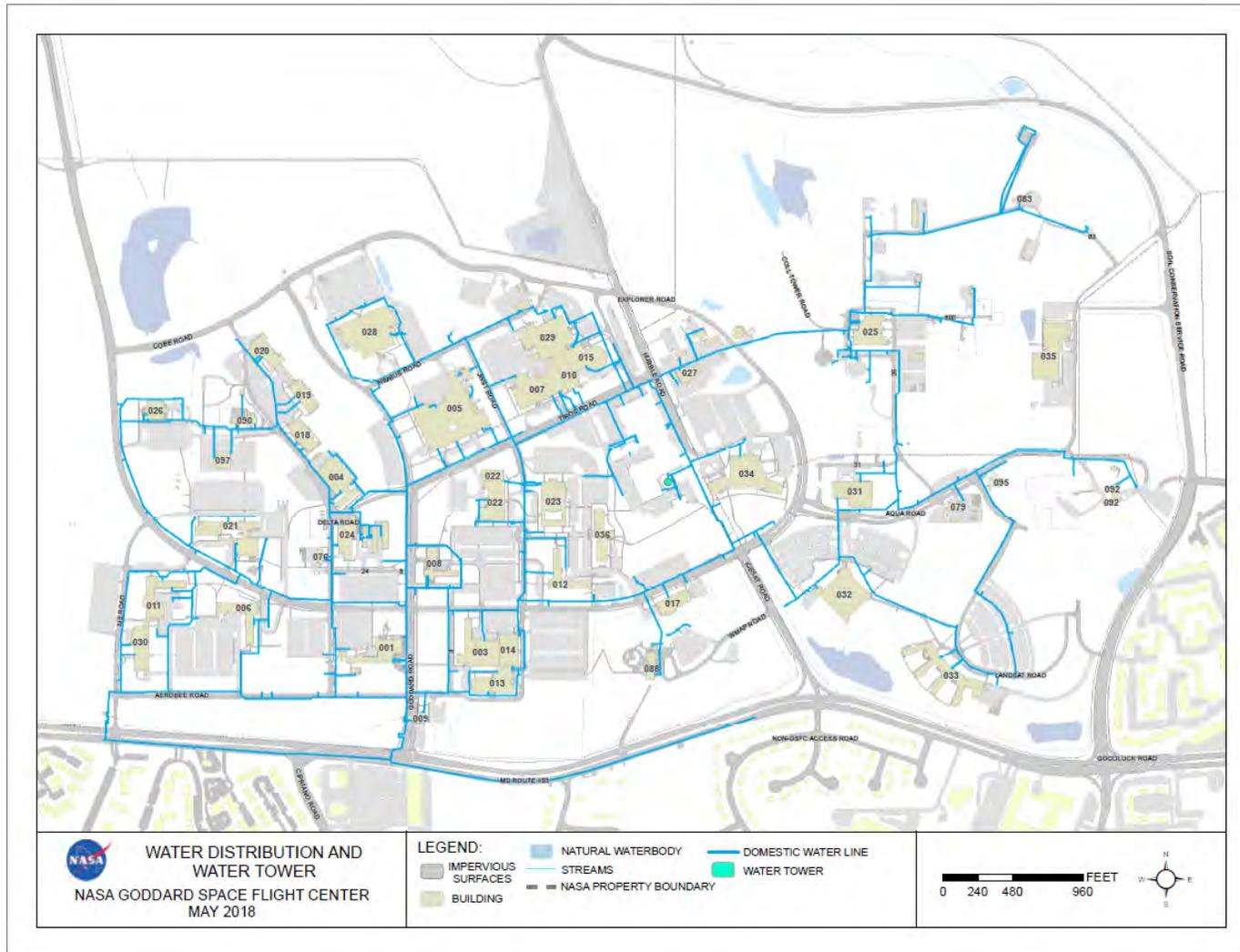


Figure 11: Locations of Parking Lots and Other Impervious Surfaces

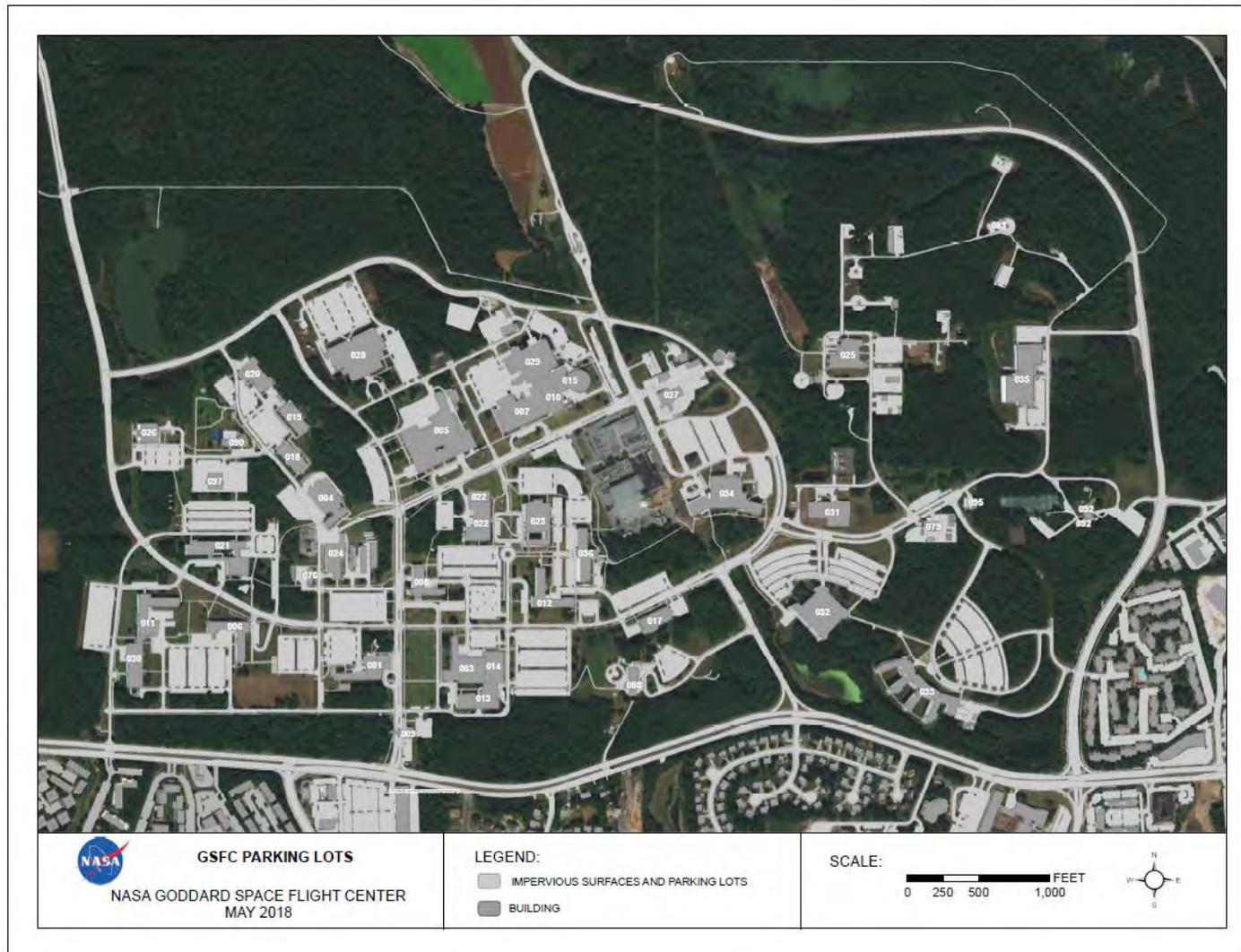
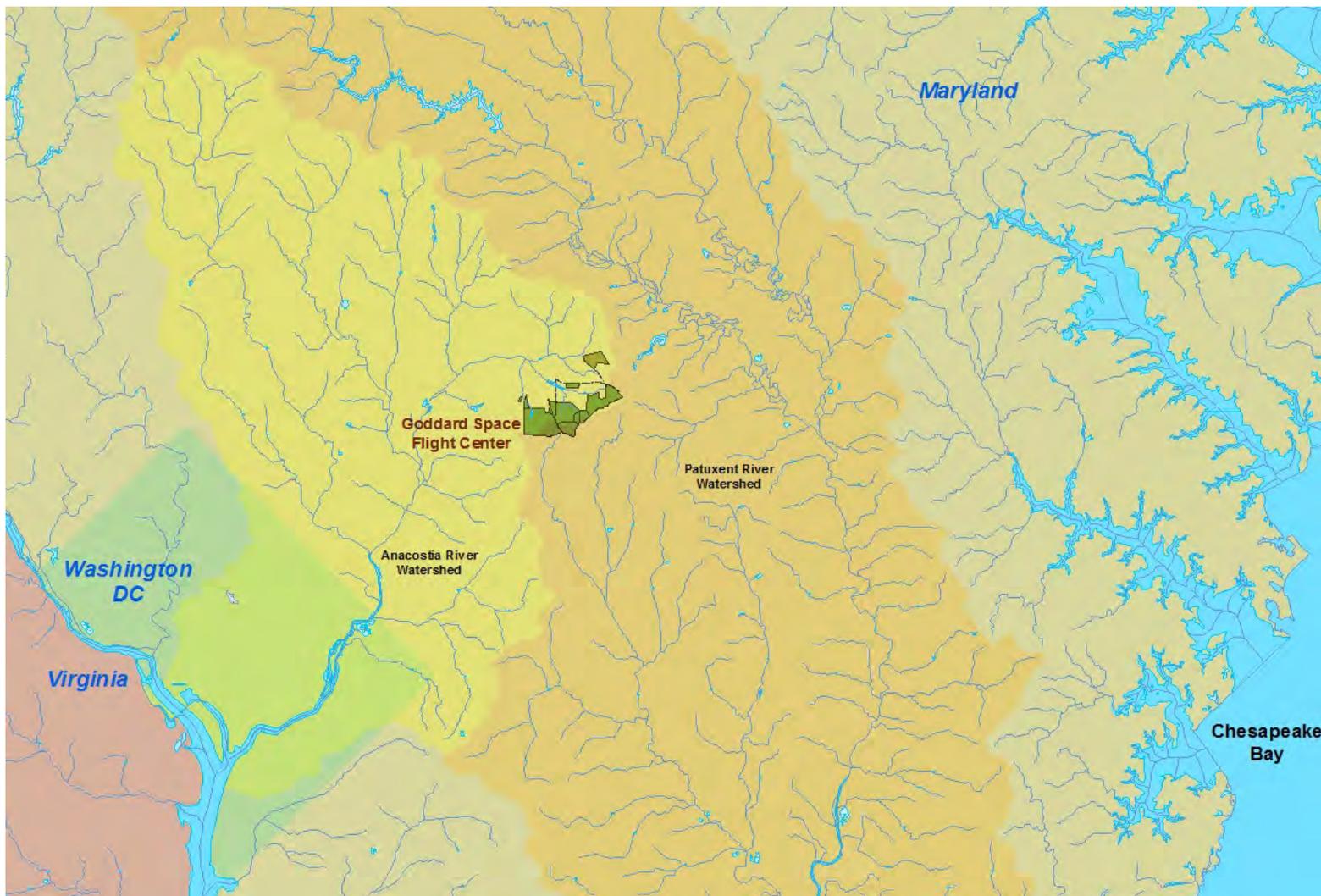


Figure 13: GSFC in Relation to Chesapeake Bay Watershed



Appendix E: GSFC Activity Checklist

E-1

Document No.: 250-SWPPP-2019.1

Check this site <https://gs279sharepoint2.gsfc.nasa.gov/sites/ems/SWPPT/default.aspx> to verify that this is the correct version prior to use.

YEAR:
 MONTH:
 ACTIVITY:

SWPPP Inspection Check List

Checklist Item	Satisfactory			Discrepancies	Week				Corrective Action/Comments
	Yes	No	N/A						
WEEKLY/MONTHLY BASELINE BMP VISUAL INSPECTIONS									
GOOD HOUSEKEEPING IS APPARENT (to include materials kept under cover) *Weekly for Vehicle Maintenance Facility and Staging/Storage Areas, monthly for all others									
PREVENTIVE MAINTENANCE IS BEING CONDUCTED *Weekly for Vehicle Maintenance Facility, monthly for all others									
VISUAL AIDS ON SPILL CONTROL AND POLLUTION PREVENTION ARE POSTED *Weekly for Vehicle Maintenance Facility, monthly for all others									
A SPILL KIT IS AVAILABLE *Weekly for Vehicle Maintenance Facility and Staging/Storage areas, monthly for all others									
ALL SPILLS/LEAKS ARE CONTAINED (CHECK FOR ACTIVELY LEAKING VEHICLES) *Weekly for Vehicle Maintenance Facility and Staging/Storage Areas, monthly for all others									
EMERGENCY NUMBERS AND NOTIFICATION PROCEDURES ARE POSTED *Weekly for Vehicle Maintenance Facility, monthly for all others									
SPILLS REPORTED & RECORDED *Weekly for Vehicle Maintenance Facility, monthly for all others									
PERIMETER FLOOR DRAINS INSPECTED FOR SOLIDS/CLOGGING *Weekly for Vehicle Maintenance Facility ONLY									
THE FLOOR SUMP IS INSPECTED FOR OIL SHEEN *Monthly for Central Heating and Refrigeration Plant ONLY									
THE 24C ROOF COOLING FAN IS INSPECTED FOR LEAKS *Monthly for Central Heating and Refrigeration Plant ONLY									

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YEAR:
 MONTH:
 ACTIVITY:

SWPPP Inspection Check List

Page 2 of 3

Checklist Item	Satisfactory			Discrepancies	Week				Corrective Action/Comments
	Yes	No	N/A						
WEEKLY/MONTHLY BASELINE BMP VISUAL INSPECTIONS									
PROPER TANK REFUELING PROCEDURES FOLLOWED *B24, 27 and 31 ONLY (Monthly) *Refer to the ICP Checklist for further guidance									
SECONDARY CONTAINMENT AREAS ARE INSPECTED FOR PROPER DISCHARGE *Monthly for East Campus Refrigeration Plant/ Central Heating and Refrigeration Plant ONLY									
INSPECT GAS PUMPS FOR LEAKS/ SERVICEABILITY * B27 ONLY (Monthly)									
INSPECT RECOVERY SYSTEMS AT PUMP *Monthly for Vehicle Maintenance Facility									
INSPECT ALARM SYSTEMS FOR SERVICEABILITY (to include overfill alarm systems) *Monthly if applicable									
ADVANCED BMP's									
CLEAN OUT OIL/WATER SEPARATOR AT LEAST 2X PER YEAR *Vehicle Maintenance Facility									
CLEAN PERIMETER DRAINS AT LEAST 2X PER YEAR AND AS NEEDED *Vehicle Maintenance Facility									
INSPECT EQUIPMENT, CONTAINERS, ETC., FOR LEAKS/ DAMAGE THAT COULD RESULT IN LEAKS									
ADEQUATE EROSION AND SEDIMENT CONTROLS IN PLACE									

YEAR:
 MONTH:
 ACTIVITY:

SWPPP Inspection Check List

Page 3 of 3

Checklist Item	Satisfactory			Discrepancies	Week	Corrective Action/Comments
	Yes	No	N/A			
WEEKLY/MONTHLY BASELINE BMP VISUAL INSPECTIONS						
DUAL CONTAINMENT PROVIDED FOR FUEL/OIL/CHEMICAL STORAGE *Landscape Facility						
SALT AND SAND KEPT UNDER COVER *Salt Dome ONLY						
TRAINING & RECORDKEEPING						
ALL RECORDS PROPERLY MAINTAINED (TANK INSPECTION LOGS, SDSs, SPILL LOG, PREVENTIVE MAINTENANCE LOGS, ETC.)						
ANNUAL TRAINING COMPLETED FOR ALL NECESSARY EMPLOYEES						
PRINT				SIGNATURE		
Site Manager:						
Alternate Site Manager:						
Inspector:						
Supervisor:						

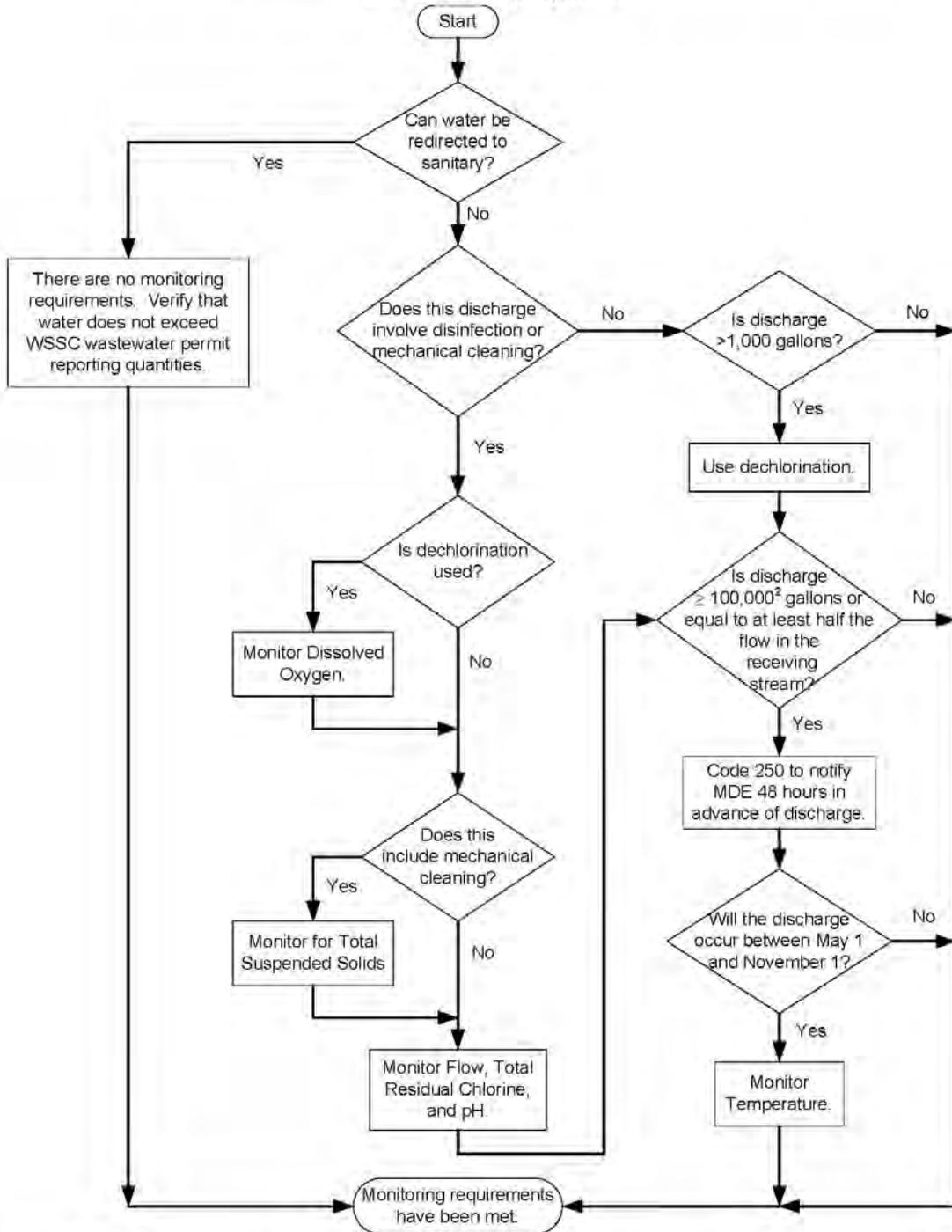
Appendix F: Flow Chart for Discharges from Water Utilities

F-1

Document No.: 250-SWPPP-2019.1

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General Permit Requirements for Stormwater Discharges from Water Utilities
 and Fire Control Systems¹



¹Contact Code 250 for assistance or more information about the monitoring and reporting requirements, notification, and record keeping.
²A permit modification will be required. NOI must be filed at least 60 days in advance.

Appendix G: Dry Weather Outfall Screening Procedures

G-1

Document No.: 250-SWPPP-2019.1

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DRY WEATHER OUTFALL SCREENING PROCEDURES

PURPOSE

GSFC maintains an NPDES General Permit for Discharges from Small MS4 (general discharge permit number 05-SF-5501, NPDES number MDR 055501). As a medium sized property, GSFC performs annual dry weather outfall screenings for NSWDC to comply with the minimum control measure (MCM) for Illicit Discharge Detection and Elimination (IDDE). Dry weather outfall screenings take place concurrently during fall months after leaves have dropped in order to increase outfall accessibility and visibility. In addition to dry weather outfall screenings, GSFC's IDDE efforts include the mapping of storm water conveyances (reviewed annually).

REFERENCES

Refer to the following documents for equipment calibration instructions and sampling procedures:

- 40 CFR 136 – Guidelines Establishing Test Procedures For The Analysis of Pollutants
- 250-WI-8500.5.9 Calibration, Use & Storage of Water Sampling Equipment

TOOLS, EQUIPMENT, AND MATERIALS

- GSFC Outfall Screening Visual Assessment Checklist (one checklist per outfall to be inspected);
- Latex or nitrile gloves;
- Protective eyewear;
- Map figures that show geographic locations of storm water utilities and drainage basin outfalls for GSFC (see SWPPP Figure 3A. Storm Drain Schematic at Main Site, SWPPP Figure 3B. Storm Drain Schematic at Outlying Areas, SWPPP Figure 4A. Drainage Basins at Main Site, and SWPPP Figure 4B. Drainage Basins Outlying Areas);
- Glass sample containers (one container per outfall screening location);
- Tall rubber boot - recommended;
- Sunscreen - recommended;
- Tick/Bug repellent - recommended;
- Extended Dipper;
- Outfall Screening Logbook (note calibration results for all equipment used); and
- Camera or other device capable of taking photos.

If indicators of an illicit discharge are observed during the annual dry weather outfall screening, the following materials to test for pH, temperature, chlorine, and turbidity may be used to evaluate the potential discharge source(s).

- Hanna HI 98183 or 98191 pH/ORP meter;
- pH, 4.0, 7.0, and 10.0 buffers;
- Deionized water (DI) spray/wash bottle;

- Hach Pocket Colorimeter II
- Hach Secondary Standard Kit for Chlorine (includes 1 blank and 3 standards);
- Glass fiber filter;
- Syringe;
- Two 10-mL sample cells;
- DPD Total Chlorine Reagent or DPD Free Chlorine Reagent;
- Glass jar (chlorine sample must be collected in glass);
- 2020we Turbidimeter;
- AMCO© or formazin primary turbidity standards of 0.0, 1.0, and 10.0 Nephelometric Turbidity Units (NTU);
- Four glass 10 mL tubes (0209);
- Water sample bottle;
- Paper towels;
- Graduated pipets; and/or
- Appropriate sampling containers for additional monitoring.

METHOD SUMMARY:

Annual dry weather outfall screenings take place during fall months, after leaves have fallen in order to increase outfall accessibility and visibility. Field screenings will be scheduled during dry weather conditions only. Dry weather conditions are defined as 72 hours with less than or equal to 0.02 inches of precipitation. Weather forecasts must be evaluated prior to scheduling outfall screenings.

Storm water drainage basins have been delineated for GSFC, identifying nine points at which storm water leaves the Center. Outfalls that are downstream of GSFC industrial activities are considered high priority and will be inspected annually, with the exception of Outfall 001 (Main Pond) and Outfall 004 (EOSDIS Pond at building 32), which are monitored at least monthly as a part of NPDES Industrial Discharge Permit compliance. Due to the fact that GSFC is deemed a medium size property (i.e. 100-2,000 acres), 50% of the total number of outfalls must be screened per year. The GSFC Outfall Screening Visual Assessment Checklist will be utilized to perform all dry weather outfall screenings (see attached). A list of GSFC drainage basins, their priority ranking, and screening frequency is provided in the table below:

Priority	Drainage Basin	Screening Frequency
Low	4, 5, 6, 9, Remote Areas	5 years (once per permit term)
High	2, 3, 8	Annually
Exempt	1, 7	Monitored monthly for NDPEs Industrial Discharge Permit

Outfall screening locations for each drainage basin have been selected based on the proximity to the point that storm water leaves the Center and ease of accessibility to the screening location; please refer to Figure 4A, Appendix D, Page D-6 for specific locations of storm water outfalls,

and associated drainage basins. Outfall screening will take place at storm drain headwalls or pipes where storm water leaves the GSFC storm sewer system and enters open channels.

PROCEDURES:

The following procedures will be followed during annual dry weather outfall screenings:

- A minimum of two environmental staff are required to perform dry weather outfall screenings.

Week Prior to/of Sampling:

- Ensure that weather forecast is favorable for performing the outfall screenings; dry weather conditions are required (<0.02 inches of precipitation in 72 hours).
- Order appropriate glass containers or sample jars.

Day of Sampling:

- Collect all required materials to perform and document outfall screening.
- Perform equipment calibrations and record the results in the ‘Outfall Screening Logbook’.
- Note current weather conditions, samplers, the outfalls to be screened, and the date and severity of the previous rain event.
- Prepare one GSFC Outfall Screening Visual Assessment Checklist per outfall. Complete top portion of the checklist prior to going into the field.
 - Provide the appropriate drainage basin identification number on the ‘Drainage Basin’ field on the checklist. Additional identification can also be provided; i.e. GOMAR number of headwall structure upstream.

In the field:

- Arrive to the outfall screening location in the field. If the outfall is not accessible, note the reason on the GSFC Outfall Screening Visual Assessment Checklist. Use available map figures to locate an alternate access immediately upstream to perform the outfall screening.
- Take photos of the outfall/headwall, any water staining within the pipe, flowing or pooled water present, or any observed indicators of storm water pollution that may be present.
- Complete bottom “Parameters” portion of the GSFC Outfall Screening Visual Assessment Checklist. Collect any flowing or pooled water that is present in the glass container. Label container with the appropriate drainage basin identification number.
- Make additional notes of outfall structure, prevalent trash or litter, condition of vegetation surrounding the outfall, or any other obvious indicators of storm water pollution that may be present.
- If an illicit discharge is suspected during the outfall screening an immediate investigation must be initiated. Consult the “Illicit Discharge Indicators” portion of these procedures to assist in identifying a potential source.
- Indicate on the GSFC Outfall Screening Visual Assessment Checklist if additional monitoring is performed, and indicate the results for pH, turbidity, temperature, and chlorine in the provided fields, if analyzed

Post field:

- Allow, at minimum, one half hour for the collected water samples to remain stationary.
- Observe collected water samples in a well-lit area for any settled solids and make notes in the appropriate field on the “GSFC Outfall Screening Visual Assessment Checklist”.
- Pour collected water sample out onto grassy area after observations are complete, if no pollutants are suspected.
- Note any other relevant information from the outfall screenings in the ‘Outfall Screening Logbook’.

REPORTING:

- Oil sheens or other suspected releases (e.g., sewage) should be reported immediately, in accordance with GSFC’s ICP.
- All dry weather outfall screening inspections will be entered into the SHEtrak reporting system for tracking. Illicit discharges or other findings identified during the outfall screenings will be entered into the SHEtrak system under the appropriate inspection and assigned to the appropriate FMD Civil Servant supervisor, based on the source or nature of the discharge. The severity level of the finding will be assigned based on the severity of the pollutants observed and follow-up actions required.
- Outfall screening results will be included with the Annual MS4 Compliance Report. The number and frequency of outfalls screened during the reporting period will be included, in addition to any observations of dry weather flow, or any additional investigations conducted. A map indicating the specific locations of all outfalls screened during the reporting period will also be submitted with the report.

INDICATORS OF ILLICIT DISCHARGES:

If any of the following indicators are observed during the annual dry weather outfall screenings, an illicit discharge may be present. Additional monitoring may be required, based on the observed indicator(s)

In some cases, the outfall is not a useful inspection point to detect an illicit discharge. The inspector may make a field determination to choose an alternate inspection point upstream. The change in inspection point must be documented in the inspection report.

Indicator	Potential Illicit Discharge Source
Dry Weather Flow	<p>Dry weather flow is flow in the storm sewer system after a 72-hour period without a rainfall. The presence of flow might suggest that there is an illicit connection or discharge and further investigation will need to be conducted. Dry weather flow may not indicate a problem if originating from an allowable or conditionally allowed non-storm water discharge. If dry weather flow is observed, other indicators should be explored that could provide evidence of illicit connections or discharges.</p>
Floatables	<p>Floatables are items, such as foam, oil sheen, sewage, and sanitary trash, that are observed floating on the surface of the water. If floatables are observed in a stream or pond on Center, known outfalls or processes upstream should be screened to trace the source. Floatables may also be naturally occurring substances, such as algae, pollen, foam, and oil-like sheens.</p>
Foam	<p>Foam can be an indicator of an illicit connection or discharge, or naturally occurring sources. Foam can be caused by failed septic systems, chemical spills, or soaps/detergents. Foam can pile up to several inches thick on surface waters and spread over large areas. Soap or detergent foam is typically bright white with a soapy smell. Soaps contain phosphates and other chemicals that can cause algae to bloom. Natural foam is caused by the decay of leaves or organic materials. These materials release organic substances that produce foam when mixed with air. Natural foam accumulates in areas of slow moving water. Natural foam is usually light tan or brown in color and has an odor that can be described as “earthy,” “fishy,” or like “freshly cut grass”.</p>
Oil Sheens	<p>Oil sheens can be caused by petroleum, fats, oils, and grease (FOG), or by naturally occurring bacteria. Petroleum products can harm the biological phase of sewage treatment and can also be toxic to aquatic organisms. FOG from animal or vegetable sources has the potential to clog storm and sanitary sewer lines when they solidify. FOG can also attract pests and deplete the oxygen in streams. To test the difference between bacterial film and petroleum sheens, break the film. If the film stays broken it is a naturally occurring sheen. If the film coalesces, it is a petroleum-based sheen.</p> <p>Any oil sheens that are not biological in nature, observed during dry weather outfall screenings, should be reported immediately, in accordance with GSFC’s ICP.</p>

<p>Sewage and Sanitary Trash</p>	<p>The presence of sewage and/or sanitary trash indicates failed septic systems, broken sewer lines, or an illicit connection. The substance can appear grayish due to algae whose growth is associated with sewage discharges. Improperly treated wastewater contains high levels of pathogens that can cause disease in those that come into contact with it.</p> <p>Any evidence of sewage and/or sanitary trash observed during dry weather outfall screenings should be reported immediately, in accordance with GSFC’s ICP.</p>
<p>Iron and Sulfur Bacteria</p>	<p>Iron and sulfur bacteria can deposit significant amounts of iron or sulfur in the form of a slimy substance. There will often be an odor of sulfur or “rotten eggs” when sulfur bacteria are present. Iron oxides and associated bacteria result from water contact with mineral rich soils. These bacteria are not human health hazards or water quality concerns.</p>
<p>Algae</p>	<p>Algae is an indicator that there is an excess of nutrients from fertilizers, faulty septic systems, or polluted runoff from nearby paved areas, soil erosion, or animal wastes.</p>
<p>Staining</p>	<p>Staining in the outfall may indicate that there is intermittent flow. If staining is detected, look for other indicators that may point to a specific illicit discharge.</p>
<p>Odor</p>	<p>Strong chemical or sewage odors in a storm sewer may indicate a potential illicit connection or discharge. If odors are detected, look for other indicators of a specific illicit discharge.</p>
<p>Abnormal Vegetation</p>	<p>Unusual, overabundance, or lack of vegetation around an outfall may indicate that there is an illicit connection or discharge occurring. Weather conditions, time of year, normal vegetation, and other observations should be considered when evaluating vegetation.</p>
<p>Structural Damage</p>	<p>Cracking, deterioration or spalling of concrete, peeling of surface paint, or corroded metal can indicate that there in an intermittent flow of a potential illicit connection or discharge. These types of damage could be caused by discharges that are very acidic or basic in nature. Structural damage may also be caused by poor construction, aging infrastructure, or hydraulic scour. If structural damage is observed, look for other indicators.</p>

GSFC Outfall Screening Visual Assessment Checklist

(Complete a separate checklist for each outfall assessed)

Name of Facility:		Permit No.:	
Street Address:		City:	State: Zip Code:
Drainage Basin Number:	Was Alternate Outfall Screened? <input type="checkbox"/> No <input type="checkbox"/> Yes (identify outfall): _____ Describe why alternate outfall was screened: _____		
Person(s) performing visual assessment:			
Person(s) examining sample:			
Date & Time of Previous Rain Event:	Date & Time Sample Collected: _____	Date & Time Sample Examined: _____	
Parameter			
Color	<input type="checkbox"/> None <input type="checkbox"/> Other (describe): _____		
Odor	<input type="checkbox"/> None <input type="checkbox"/> Musty <input type="checkbox"/> Sewage <input type="checkbox"/> Sulfur <input type="checkbox"/> Sour <input type="checkbox"/> Petroleum/Gas <input type="checkbox"/> Solvents <input type="checkbox"/> Other (describe): _____		
Clarity	<input type="checkbox"/> Clear <input type="checkbox"/> Slightly Cloudy <input type="checkbox"/> Cloudy <input type="checkbox"/> Opaque <input type="checkbox"/> Other (describe): _____		
Floating Solids	<input type="checkbox"/> No <input type="checkbox"/> Yes (describe): _____		
Settled Solids ¹	<input type="checkbox"/> No <input type="checkbox"/> Yes (describe): _____		
Suspended Solids	<input type="checkbox"/> No <input type="checkbox"/> Yes (describe): _____		
Oil Sheen	<input type="checkbox"/> None <input type="checkbox"/> Flecks <input type="checkbox"/> Globs <input type="checkbox"/> Sheen <input type="checkbox"/> Slick <input type="checkbox"/> Other (describe): _____		
Foam (gently shake sample)	<input type="checkbox"/> No <input type="checkbox"/> Yes (describe): _____		
Other Obvious Indicators of Storm Water Pollution	<input type="checkbox"/> No <input type="checkbox"/> Yes (describe): _____		
Additional Monitoring Required at Outfall <input type="checkbox"/> No <input type="checkbox"/> Yes	pH: _____	Turbidity: _____	
	Temperature: _____	Chlorine: _____	

¹Observe for settled solids after allowing the sample to sit for approximately one-half hour.

Appendix H: Storm Water Management Structure Maintenance Requirements

H-1

Document No.: 250-SWPPP-2019.1

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Maintenance of Stormwater Management Structures
Ponds

Inspection Item	Frequency of Inspection	Inspection Requirements	Remedial Action
Principal Spillway	Seasonally (and after a major storm)		
Debris & Trash		Check for trash, debris, and sediment clogging at all openings.	Remove debris. Trash and debris must be disposed of in an acceptable manner according to current regulations.
Trash Rack		Check condition.	Repair or replace to good working condition.
Pond Drain		Check operation. Keep drain chained and locked.	Repair according to the approved plans.
Riser & Barrel		Check for evidence of cracks, spalling, joint failures, and seepage around spillway pipe. Water tightness is necessary.	Repair to achieve operation in accordance with the approved plans.
Vegetation		Check for excessive vegetation blocking orifice openings. Woody vegetation must be less than 5 feet from the barrel and less than 25 feet from the riser.	Remove vegetation and roots as necessary.
Other structural components		Check for missing manhole covers or inlet grates. Check for concrete and structural integrity.	Repair according to the approved plans.
Pond Outlet	Seasonally (and after a major storm)		
Debris & Trash		Check for trash and debris in and around the outlet.	Remove trash and debris.
Riprap Outlet Projection		Check for displacement, blow outs, and erosion below the outlet. Stable conveyance must be provided.	Repair and restore function in accordance with the approved plans.
Abutments		Check for erosion, cracks, and seepage.	Repair as needed.
Pond Embankment	Annually		
Vegetation		Check that there is no woody vegetation on embankment and ground cover is in good condition. Check for wetland type vegetation.	Remove woody vegetation as necessary. Re-seed bare areas according to plan stabilization requirements. Presence of wetland vegetation on the embankment may indicate seepage and structural integrity concerns.
Embankment Integrity		Check upstream face and downstream face for soft spots and boggy areas, boils at the toe, settlements, depressions and bulges, signs of erosion, animal burrows, slope failures, and seepage.	Repair and stabilize in accordance with the approved plans. MDE Sediment and Stormwater Plan Review Division must be contacted for review and approval of any major pond repairs.
Pool/Basin Area	Annually		

Maintenance of Stormwater Management Structures
Ponds

Inspection Item	Frequency of Inspection	Inspection Requirements	Remedial Action
Permanent Pool		Check sediment accumulation, stagnant pool areas, and isolated pond areas.	Clean out sediments and restore elevations to approved plan design.
Vegetation		Check for invasive and undesirable species, algae, and dead or dying vegetation.	Remove unwanted vegetation, and re-seed or re-plant according to approved plan.
Debris & Trash		Check for trash and debris in and around the outlet.	Remove debris.
Pond Inlet Conveyance Systems	Annually		
Endwalls/Headwalls		Check for erosion, cracks, and seepage.	Repair as needed.
Open Channels		Check for erosion, blockages, and stable conveyance.	Repair as needed.
Riprap Projection		Check for displacement, blow outs, unstable conveyance, and erosion below the outlet.	Repair and restore function in accordance with the approved plans.
Forebays & Micropools	Seasonally (and after a major storm)		
Sediment Accumulation		Check for sediment accumulation in the forebay.	Clean out the forebay when depth is less than 50% of the design depth. Restore to approved plan design.
Vegetation		Check for presence of algae and unwanted vegetation.	Remove unwanted vegetation and re-seed or re-plant according to approved plan.
Emergency Spillway	Annually		
Spillway Channel		Check for evidence of erosion, soft or wet areas, or obstructions to stable conveyance.	Stabilize erosion and remove obstructions as necessary.
Vegetation		Check for presence of excessive vegetation obstructing flow or trees in the conveyance channel.	Mow or remove trees as necessary.
Maintenance Access	Annually		
General		Check for accessibility to pond and riser.	Prevent excessive vegetative growth and erosion on the access road. Repair and maintain access road in good condition.
Overall Function of the Facility	Annually	Check aesthetics and unpleasant odors.	Contact MDE for concerns regarding pond function and performance.
Stormwater	Annually		
Vegetation		Check for unhealthy vegetation and unwanted species.	Remove unwanted vegetation and re-seed or re-plant according to approved plan.
Sediment Accumulation		Check for excessive sediment in the wetland area.	Clean out sediment and restore elevation to approved plan design.
Wetland Pool Elevations		Check for adequate water volume, sustained wet conditions, varied pond depths, and seasonal depth fluctuations.	Regrading in wetland may be necessary. Contact MDE to restore wetland function to approved design.

Maintenance of Stormwater Management Structures
Bioretention

Inspection Item	Frequency of Inspection	Inspection Requirements	Remedial Action
Bioretention Basin	Quarterly		
Dewatering		Noticeable odors, stained water on the filter surface or at the outlet, or the presence of algae or aquatic vegetation are indicators of anaerobic conditions, and inadequate dewatering of the facility. Note: this is an indication that the basin is not draining as it should. The basins should not hold water longer than 48 hours.	Assess condition of soil (e.g., is it compacted), filter, and underdrain system. It may be necessary to remove and replace the top three inches of soil with soil material as per plan/design specifications. Follow up inspections must confirm adequate dewatering.
Mulch Layer		Check mulch for adequate cover, sediment accumulation, or discoloration.	Replace and remove old mulch and excess sediments. Provide adequate mulch cover according to approved design.
Vegetative Surfaces	Monthly (as clarified below)		Provide periodic irrigation, weeding, and in-fill planting, as needed. Do not use heavy equipment in bioretention basin to minimize compaction of soil.
Plant Composition and Health	(During growing season only - April through October)	Compare plant composition with approved plans. Check for invasive species or weeds. Check for dead or dying vegetation.	Remove and replace plants in accordance with plan specifications. If specific plants are not surviving, replace with more appropriate species (e.g., salt tolerant, deer resistant, etc.).
Plant Composition and Health	(During growing season only - April through October)	Evaluate watering requirements.	Irrigate the bioretention area in the morning hours during dry, hot periods, particularly when plants are being established. Evaluate plant health as a result of drought.
Vegetative Cover and Erosion		Check for evidence of erosion, runoff channelizing, or bare spots.	Re-seed or re-plant in accordance with approved landscaping plans. Re-grading may be required when concentrated flow causes rills or gullying through the facility.
Debris & Trash Cleanout	Monthly	Check that the facility is clean of trash and debris. Inlets, outlets, and contributing areas around the facility must be checked.	Dispose of trash and debris in an acceptable manner according to current regulations.
Structural Components	Annually	Check for evidence of structural deterioration, spalling, or cracking. Inlet and outlet structures must be in good condition.	Repair to good condition according to specifications on the approved plans.
Outlets	Quarterly (and after major storm)	Check for evidence of erosion, rills, or gullying.	Stabilize all eroded areas and grade to provide stable conveyance.

Reference: MD Stormwater Mgt Guidelines for State Federal Facilities (2010)

**Maintenance of Stormwater Management Structures
 Bioretention**

Inspection Item	Frequency of Inspection	Inspection Requirements	Remedial Action
		Check that riprap outlet is maintained in good functional condition.	Repair according to approved plan.
Pretreatment Forebays	Quarterly (and after major storm)		
Sediment Accumulation		Check for sediment accumulation in the forebay.	When the forebay depth is less than half the proposed design, sediment must be removed and the forebay restored in accordance with the approved design.
Sand Layer		Check sand for staining and sediment accumulation.	Replace first three inches of sand layer with sand materials per plan specifications.
Gravel Diaphragm		Check gravel diaphragm for sediment accumulation and evidence of erosion.	Stabilize or replace gravel according to plan specifications.
Grass Chanel Conveyance Systems	Quarterly (and after major storm)	Check for erosion, flow blockages, and stable conveyance.	Stabilize and grade according to approved pan.
Overall Function of the Facility	Annually	Check that flow splitters are functioning as designed and that bypass is operating as designed.	Construction must be in accordance with approved plans.

Reference: MD Stormwater Mgt Guidelines for State Federal Facilities (2010)

Maintenance of Stormwater Management Structures
Environmental Site Design (ESD)

Inspection Item	Frequency of Inspection	Inspection Requirements	Remedial Action*
Green Roofs	Seasonally (and after a major storm)	Check plant viability, look for invasive plant species (weeds), and evaluate irrigation requirements.	Provide periodic irrigation, weeding, and in-fill planting, as needed.
Permeable Pavements	Seasonally (and after a major storm)		
		Prevent trucks and other heavy vehicles from tracking, spilling, or grinding material onto permeable pavement.	Control traffic at BMP to keep heavy trucks and equipment off of the site (e.g., signs or physical barriers). Sweep and vacuum to reduce sediment accumulation and ensure surface porosity. Do not use washing stems or compressed air units for surface cleaning.
			Use only non-toxic and organic deicers in moderation and apply as either calcium magnesium acetate or pretreated salt.
			Plow snow carefully with blades set one-inch higher than normal. Do not direct plowed snow piles or snowmelt to permeable pavement.
Reinforced Turf	Seasonally (and after a major storm)	Prevent trucks and other heavy vehicles from driving on turf.	Mow regularly and remove clippings from application area.
Rainwater Harvesting (Cisterns and	Seasonally (and after a major storm)	Disconnect, drain, and clean above ground systems at the start of winter.	Check underground connections during winter for frozen lines and ice blockages.
			Clean leaf screens, gutters, and downspouts to prevent clogging. Clean storage tank lids and mosquito screens.
			Replace damaged components as necessary.
Submerged Gravel Wetlands	Seasonally (and after a major storm)		
Plant Composition and Health			Remove any dead or dying vegetation and revegetate. Remove accumulated sediment from pretreatment areas.
			Clean inlets and outlets of sediment, debris, and trash.
			Repair erosion at inflow points.
			Check that flow splitters are functioning as designed.
			Signs of uneven flow distribution may indicate that the gravel or underdrain is clogged. Remove, clean, and replace gravel.
Landscape Infiltration	Seasonally (and after a major storm)		Provide periodic irrigation, weeding, and in-fill planting, as needed.

*For all BMPs, inspect piping/plumbing/drainage fixtures. Clean associated drainage pipes, inlets, stone edge drains, and other structures draining to/from BMP.

Maintenance of Stormwater Management Structures
Environmental Site Design (ESD)

Inspection Item	Frequency of Inspection	Inspection Requirements	Remedial Action*
Plant Composition and Health		If specific plants are not surviving, replace with more appropriate species (e.g., salt tolerant, deer resistant, etc.).	Remove any dead or dying vegetation and revegetate. Prune vegetation occasionally.
Plant Composition and Health	Monthly or as needed (During growing season only - April through October)	Evaluate watering requirements.	Irrigate the landscaped area in the morning hours during dry, hot periods, particularly when plants are being established. Evaluate plant health as a result of drought.
			Remove accumulated sediment from pretreatment areas. Replace top 2 to 3 inches of surface layer, as needed.
			If water ponds for more than 48 hours or there is algal growth on the surface, remove and replace the top few inches of planting soil.
			If standing water persists after filter media has been maintained, the gravel, soil, and sand may need to be cleaned and/or replaced.
Infiltration Berms	Seasonally (and after a major storm)		Maintain a dense mat of vegetation. Remove any dead or dying vegetation and revegetate.
			Regrade any areas showing signs of concentrated flow to promote sheetflow. Repair erosion.
Dry Wells	Annually		If water ponds for more than 48 hours or more than 6 inches of sediment has accumulated, excavate and replace the gravel media.
Micro-Bioretenention and Rain Gardens			Provide periodic irrigation, weeding, and in-fill planting, as needed. Do not use heavy equipment in bioretention or rain garden to minimize compaction of soil.
Debris and Trash	Monthly	Check for trash and/or debris clogging all openings.	Dispose of trash and debris in an acceptable manner.
Plant Composition and Health	Seasonally	Inspect plants for viability, check for invasive plant species, and weeds.	Remove any dead or dying vegetation and revegetate. If specific plants are not surviving, replace with more appropriate species (e.g., salt tolerant, deer resistant, etc.). Weed out invasive species.
Plant Composition and Health	Seasonally	Inspect for growth of invasive woody plants, invasives, etc.	Prune woody matter, remove invasive plants, and manage vegetative growth to maintain landscape.

*For all BMPs, inspect piping/plumbing/drainage fixtures. Clean associated drainage pipes, inlets, stone edge drains, and other structures draining to/from BMP.

Maintenance of Stormwater Management Structures
Environmental Site Design (ESD)

Inspection Item	Frequency of Inspection	Inspection Requirements	Remedial Action*
Vegetative Cover	Monthly or as needed (During growing season only - April through October)	Check for channelizing and bare spots. Check for vegetation blocking inlet and outlet.	Add reinforcement planting to maintain desired vegetation density and to ensure that weeds and other invasive plant species do not overtake basin. Re-seed or replant in accordance with approved landscaping plans. Remove or cut back vegetation around inlet and outlet structures. Mow side slopes when necessary, but do not mow filter bed.
Mulch Layer	Monthly or as needed (During growing season only - April through October)	Check mulch for adequate cover, sediment accumulation, or discoloration.	Replace and remove old mulch and excess sediment. Provide adequate mulch cover according to approved design.
Dewatering	Quarterly (and after major storm)	Check ponding level. Surface storage must dewater within 48 hours of rainfall. Noticeable odors, stained water on the filter surface or at the outlet, or the presence of algae or aquatic vegetation are indicators of anaerobic conditions and inadequate dewatering of the facility.	Remove and replace top few inches of media. Follow up inspections must confirm adequate dewatering. If the facility does not function as intended after the above action, the entire system including the underdrain may need refurbishing.
Erosion	Quarterly (and after major storm)	Check inlets, filter bed, outlets, and side slopes for erosion, rills, gullies, and runoff channelization.	Re-grading may be required when concentrated flow causes rills or gully through the facility. Grade, vegetate, and/or armor to provide stable conveyance in accordance with approved plans.
Sediment Accumulation	Quarterly (and after major storm)	Check for accumulated sediment on filter bed and clogging openings.	When sediment accumulates to 1 inch depth, remove and dispose of in an acceptable location.
Underdrain and Overflow Structures	Quarterly (and after major storm)	Check for misalignments, broken pipes, and blockages. Check observation well for water levels.	Repair any broken or faulty piping. Clear out any blockages.
Maintenance Access	Annually	Check for accessibility to the facility.	Prevent excessive vegetative growth, erosion, and obstructions on access way.
Structural Components	Annually	Check for evidence of structural deterioration, spalling, or cracking. Inlet and outlet structures as well as rip rap outfalls must be in good condition.	Repair to good condition according to specifications on the approved plans.
Overall Function of Facility	Annually	Check that any flow splitters are functioning as designed and that bypass is operating as designed.	Repair to good condition according to specifications on the approved plans.
Structural Components	Every 5 years	Verify that the system is being adequately maintained and operating as designed.	Implement corrective actions, as needed.
Swales	Biannually		
			Mow grass swales at least twice per year.

*For all BMPs, inspect piping/plumbing/drainage failures. Clean associated drainage pipes, inlets, stone edge drains, and other structures draining to/from BMP.

Maintenance of Stormwater Management Structures
 Environmental Site Design (ESD)

Inspection Item	Frequency of Inspection	Inspection Requirements	Remedial Action*
			Irrigate during prolonged dry periods.
			Remove sediment, debris, and trash.
			Re-seed sparsely vegetated areas to maintain dense coverage.
			Repair erosion on bottom, side slopes, and inlets. Stabilize.
			If water ponds for more than 48 hours, till bottom soil and revegetate.
			Assess performance of facility and maintain the following as necessary: slope integrity, vegetative health, soil stability, compaction, erosion, ponding, and sedimentation.
Enhanced Filters	Annually		Implement maintenance requirements of primary practice.
			If the observation well holds water for more than 48 hours, remove and clean or replace media.

*For all BMPs, inspect piping/plumbing/drainage fixtures. Clean associated drainage pipes, inlets, stone edge drains, and other structures draining to/from BMP.