

Naval Air Station Whidbey Island Phase II Stormwater Management Program Plan



**Naval Air Station Whidbey Island Ault Field and
Seaplane Base**

March 2022

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Seaplane Base**

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Prepared by



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Executive Summary

In 2021, the U.S. Environmental Protection Agency (EPA) issued a Municipal Separate Storm Sewer Systems Phase II permit that covers the following installations:

- Naval Air Station (NAS) Whidbey Island Ault Field; and
- NAS Whidbey Island Seaplane Base.

This Stormwater Management Program (SWMP) Plan addresses the requirements of the Municipal Separate Storm Sewer System (MS4) Phase II individual permit for NAS Whidbey Island, including requirements for the six Minimum Control Measures (MCMs) listed in the permit, requirements for stormwater retrofitting, and monitoring requirements. This Plan includes installation-specific MCMs, as well as guidance for construction sites, and a stormwater structure operations and maintenance manual.

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RECORD OF REVIEW AND AMENDMENTS

All reviews and amendments to this Plan shall be summarized below.

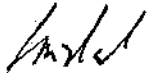
Date	Description of the Modification	Name	Signature

Note: Refer to Appendix A Record of Review and Amendments table for more detail of changes and documentation of annual review.

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Certification and Signature

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained 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."



(Signature)

21 MAR 22

(Date)

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List of Acronyms

AEC	Activity Environmental Coordinators
AFFF	aqueous film forming foam
BMP	best management practice
BOSC	Base Operating Services Contract
CBSM	Community Based Social Marketing
CESCL	Certified Erosion and Sediment Control Lead
CFR	Code of Federal Regulations
CGP	General Permit for Stormwater from Construction Activity
CNIC	Commander, Naval Installations Command
CWA	Clean Water Act
DC	Design and Construction Business Line
DON	Department of the Navy
E&SC	erosion and sediment control
EAP	Early Action Projects
ECATTS	Environmental Compliance, Assessment, Training, and Tracking System
EISA	Energy Independence and Security Act
EPA	U.S. Environmental Protection Agency
EV1	Environmental Compliance & Services Product Line
FEAD	Facilities, Engineering, and Acquisition Division
GIS	Geographic Information System
IDDE	Illicit Discharge Detection and Elimination
ICP	Integrated Contingency Plan
LID	Low Impact Development
MCM	minimum control measures
METF	maximum extent technically feasible
MR	minimum requirements
MS4	Municipal Separate Storm Sewer System
MSGP	Multi-Sector General Permit
MWR	Morale, Welfare, and Recreation Facilities
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Systems Command
NMFS	National Marine Fisheries Service
NOI	Notices of Intent
NOT	Notices of Termination
NPDES	National Pollutant Discharge Elimination System
O&M	operation and maintenance
OJT	on-the-job training
ORI	Outfall Reconnaissance Inventory
PAO	Public Affairs Office
PFAS	Per- and polyfluoroalkyl substances
PNC	Pacific Northwest Communities
ppm	parts per million
PPV	Public Private Venture
PWD	Public Works Department
SAM	Stormwater Action Monitoring
SIIP	Stormwater Infrastructure Investment Plan
SWMMWW	Stormwater Management Manual of Western Washington
SWMP	Stormwater Management Program

SWPPP *Stormwater Pollution Prevention Plans*
U.S. FWS *United States Fish and Wildlife Service*
UFC *Unified Facilities Criteria*
UFGS *Unified Facilities Guide Specifications*

1 Introduction

Stormwater is the surface runoff that results from rain and snow melt. Urban development alters the land's natural hydrology, and human activity generates a host of pollutants that can accumulate on paved surfaces. Uncontrolled stormwater discharges from urban areas can negatively impact water quality.

Naval Air Station Whidbey Island (NAS Whidbey Island) is immediately adjacent to the City of Oak Harbor and discharge pollutants of concern through the MS4 to impaired receiving waters. These discharges contribute to violations of the State of Washington's water quality standards specifically for dissolved oxygen and fecal coliform. Therefore, pursuant to 40 CFR § 122.26(a)(9)(i)(D), the EPA designated NAS Whidbey Island as a small MS4. In 2021, the EPA issued a permit for stormwater discharges from the MS4 to provide specific environmental compliance criteria for certain activities that could potentially pollute surface waters. This permit is in compliance with the provisions in the Clean Water Act (CWA) and is an authorization to discharge under the National Pollutant Discharge Elimination System (NPDES). The NAS Whidbey Island MS4 permit can be found on the EPA website: <https://www.epa.gov/npdes-permits/npdes-stormwater-permit-naval-air-station-whidbey-island-ms4-washington>.

Regulated industrial stormwater discharges defined in 40 CFR 122.26(b)(14) and which originate from NAS Whidbey Island operations within the permit area are currently authorized under the EPA's NPDES Multi-Sector General Permit (MSGP) for Stormwater Discharges Associated with Industrial Activity, WAR05F005. In addition, regulated construction stormwater discharges within areas operated by NAS Whidbey Island are authorized, as necessary, under the EPA's NPDES General Permit for Stormwater from Construction Activity (the Construction General Permit or CGP), permit WAR10F000. These activities may discharge directly to water of the United States, or through the MS4 to waters of the United States. These separate NPDES permits for the control of pollutants in industrial and construction stormwater discharges must be maintained by the Permittee.

All areas not already covered under the MSGP and discharging to the MS4 are covered by the MS4 permit. As required, areas covered under the MSGP may also be covered under the MS4 permit, as determined by the Permittee.

The permit covers the following Department of the Navy (DON) properties:

- NAS Whidbey Island Ault Field; and
- NAS Whidbey Island Seaplane Base.

1.1 Purpose and Scope

This document describes NAS Whidbey Island Stormwater Management Program (SWMP) Plan (or this Plan) as required under Section 1.4.3 of the NAS Whidbey Island MS4 NPDES permit number WAS026611. The SWMP is designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable and to protect the water quality of local streams and water bodies that receive stormwater runoff from the MS4.

The permit requires the creation and implementation of a SWMP Plan which address six required program elements, minimum control measures (MCMs). The MCMs are:

- MCM# 1 Education and Outreach on Stormwater Impacts;
- MCM# 2 Public Involvement/Participation;
- MCM#3 Illicit Discharge Detection and Elimination (IDDE);
- MCM#4/5 New Development, Redevelopment, and Construction Site Runoff Control; and
- MCM#6 Pollution Prevention and Good Housekeeping for Municipal Operations & Maintenance.

This Plan will ensure the implementation of management programs and controls are in place to comply with the above measures.

1.2 Regulatory Authority

The federal CWA of 1972 established water quality goals for the surface waters of the United States. In 1987, Congress amended the CWA to address stormwater. One of the mechanisms for achieving the goals of the act is the NPDES permit program, which is administered by the EPA. The agency delegated responsibility to administer the NPDES permit program to most states, including the State of Washington Department of Ecology.

As part of the NPDES program, the MS4 program targets areas not covered by industrial NPDES stormwater permits. In 1990, EPA began issuing Phase I permits that covered medium to large populations (cities or certain counties with populations of 100,000 or more). In 1999, the Phase II regulation went into effect. This regulation requires small MS4s in urbanized areas, as well as small MS4s outside the urbanized areas that are designated by the permitting authority, to obtain permit coverage.

1.3 Coordination with Other Programs and Other Applicable Environmental Regulations

The Phase II MS4 permit covers all nonindustrial developed areas at the installation. This Plan works hand-in-hand with the MSGP for industrial areas, and certain activities (such as construction requirements and stormwater retrofitting projects) may overlap. The installation Stormwater Pollution Prevention Plan (SWPPP) addresses stormwater best management practices (BMPs) as required by the MSGP. SWPPP BMPs must be followed to prevent pollution and meet compliance with the MSGP. Each encounter of conflicting permit requirements will be reviewed by the PW Environmental Division to provide guidance and recommendation to follow the more stringent permit requirement, as applicable.

There are a number of Federal and State regulatory requirements that serve to protect the environment and waters in and around NAS Whidbey Island. These federal environmental regulations are addressed in EPA's Fact Sheet for the MS4 permit. Refer to the list of references in Section 12 of this Plan for additional relevant documents.

The most current Executive Order (EO), EO 14008 (27 January 2021), addresses the importance of climate resiliency. It has three overarching objectives: 1) promote safe global temperature, 2) increase climate resilience, and 3) support a financial pathway toward low greenhouse gas emissions and climate-resilient development. The importance of climate resilient stormwater design and construction practices is a key component for achieving this federal directive, as well as similar Department of Defense and Navy directives and policies.

1.4 Site Description

NAS Whidbey Island’s Phase II permit covers two distinct operational areas under the same Command, as identified in Table 1-1. This section provides a brief overview of the different properties, including activities performed at the sites and waterbodies that could potentially be affected by pollutants produced during these activities.

Table 1-1 Areas covered under MS4 permit

U.S. Navy Property	City/County	Receiving Waters
Ault Field	Oak Harbor/Island	Strait of Juan de Fuca, Clover Valley Creek, Dugualla Bay
Seaplane Base	Oak Harbor/Island	Oak Harbor, Crescent Harbor, Crescent Harbor Creek

NAS Whidbey Island is located on Whidbey Island in Island County, Washington. The narrow 64-mile-long island is oriented north-south and is at the confluence of Puget Sound and the Strait of Juan de Fuca. NAS Whidbey Island is located in the northern portion of Whidbey Island.

The station is composed of two areas located five (5) miles apart: the Naval Airfield (also known as Ault Field) and the Seaplane Base. Outlying Landing Field is outside and south of the City of Coupeville approximately eighteen (18) miles and is not covered under this MS4 permit. Ault Field is on the western shore of Whidbey Island and contains most of the station's military activities. The Seaplane Base, located south of Ault Field and east of the City of Oak Harbor, contains mainly retail business, residential properties and some light-industrial and commercial facilities. It is also the location of the fuel pier where jet fuel is transferred from a barge via pipeline to the fuel facility at Ault Field.

NAS Whidbey Island was established in 1942. Before this period the area was woodlands and agricultural lands. The station was originally built as a base for seaplane patrol operations, rocket firing training, torpedo overhaul, and recruit and petty officer training. NAS Whidbey Island is home to the Navy’s Electronic Attack Warfare and Maritime Patrol and Reconnaissance communities, a Search and Rescue (SAR) Unit and a Naval Ocean Processing Facility. The station is the center for regional Navy and Marine Air Reserve training activities. The base SAR also provides search and rescue operations in support of civil authorities in western Washington State.

Stormwater drainage facilities at NAS Whidbey Island include natural drainage conveyances such as streams, creeks, and ditches; man-made drainage conveyances such as engineered swales/ditches; and storm drain systems including catch basin inlets, manholes, pipelines, outlets, and treatment devices such as oil/water separators (OWS). A total of fifty (50) outfalls were identified in these drainage basins at NAS Whidbey Island. Industrial facilities discharge through twenty-two (22) of the fifty (50) outfalls. Ten (10) of these industrial discharge outfalls are located on Ault Field and twelve (12) are located on Seaplane Base.

1.4.1 NAS Whidbey Island Ault Field

Ault Field consists of a combination of lowlands and hills. The runways, aprons, and taxiways are built on a lowland consisting of scattered wetlands that crosses Whidbey Island from Skagit Bay to the east to the Strait of Juan de Fuca to the west. The southern portion of Ault Field consists of hills that rise to an elevation of approximately 100 feet.



Ault Field consists of industrial and municipal areas, and the industrial activities on Ault Field are regulated under the MSGP. Activities at Ault Field include aircraft maintenance activity, boiler plant activity, painting, sandblasting, vehicle washing, fuel storage and fueling activities, aircraft rinsing, paint storage, recycling, fire training, and administrative work in office buildings. The watershed is about 15% impervious. Potential pollutants include: petroleum, oils and lubricants; steam condensate; cleaners; solvents; metals; aqueous film forming foam (AFFF); and paint.

Stormwater runoff from areas of Ault Field may infiltrate into soils, enter the storm drain system, and/or drain via engineered open channels. In the southwestern portion of Ault Field, runoff is conveyed primarily overland and within open channels, ultimately entering into wetlands, draining to the Strait of Juan de Fuca, or flowing off base to the south. In the central, southern, and eastern portions of Ault Field, stormwater runoff enters the storm drain system or is conveyed via swales or ditches into a network of engineered open channels located within the flight line (runways and taxiways). Runoff flowing through this series of open channels infiltrates into the large marshy wetland areas within the flight line or continues to flow east to the lower Clover Valley Creek and Clover Valley Lake.

1.4.2 NAS Whidbey Island – Seaplane Base

Seaplane Base is located on a hilly extension of the island between Crescent Harbor to the east and Oak Harbor to the west. The crest of the hill extends north to south with elevations reaching approximately 190 feet to the north and 90 feet to the south. Seaplane Base contains multiple residential communities and recreation areas. Activities include fuel transfer, vehicle fueling, residential and light industrial activities (i.e. auto body shop, Commissary, Navy Exchange, and office buildings), and road maintenance. Potential pollutions include gasoline; petroleum; oils and lubricants; steam condensate; solvents and paint.



NAS Whidbey Island – Seaplane Base (Source www.mapio.net)

Stormwater runoff from portions of Seaplane Base may infiltrate or enter the storm drain system. The majority of the developed industrial area is located in the central portion of the base and is covered by impervious surfaces. The majority of the runoff enters the storm drain system. Runoff entering the system in the eastern and western portions of the developed area is routed to several outfalls draining to Oak Harbor and Crescent Harbor, respectively. In the southern portion of Seaplane Base, runoff is conveyed primarily via natural swales/ditches to Oak Harbor and Crescent Harbor. Some localized storm drain systems exist within a housing development, from which stormwater reemerges to swales/ditches. Within the housing development immediately north of the industrial area, stormwater is conveyed via storm drains, where it is routed both southwest to Oak Harbor and southeast to Crescent Harbor. From Torpedo Road to the east, runoff is conveyed via swales/ditches and ultimately discharges to Crescent Harbor. Some localized storm drains also exist within a housing development that discharge to grassy swales/ditches before flowing through pipes to Crescent Harbor. There are no known discharges directly to Crescent Harbor Creek or the marsh areas.

Stormwater drainage facilities at Seaplane Base include natural drainage conveyances such as streams, a creek, and ditches; man-made drainage conveyances such as engineered swales/ditches; and storm drain systems including catch basin inlets, manholes, pipelines, and outlets. A number of OWS are also incorporated into the storm drain systems (e.g., at select Petroleum, Oil and Lubricant (POL) sources/facilities or within the storm drain system).

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2 Stormwater Management Program General Requirements

2.1 Program Implementation

This section provides an overview of the SWMP implemented at Navy facilities covered under the Phase II permit. For the purpose of this SWMP, the term “public” extends to personnel working and/or living on the areas included in Table 1-1.

The purpose of this SWMP is to reduce the discharge of pollutants from the MS4 to the maximum extent practicable and to protect water quality in receiving waters. To comply with this Plan, the following must occur:

- Discharges of pollutants are controlled to the maximum extent practicable;
- SWMP Plan is kept up-to-date, and all documentation is kept with the Plan; and
- MCMs are implemented and documented in the Plan. Documentation also includes projected cost to implement these measures, as applicable.

The SWMP is an on-going means for gathering, tracking, maintaining, and using information to evaluate SWMP development and implementation, permit compliance and to set priorities.

2.1.1 Stormwater Team

Implementation of the SWMP is performed by a core stormwater team made up of members from Naval Facilities Engineering Systems Command (NAVFAC) Northwest.

Implementing stormwater management requires active participation from several stakeholders. The stormwater team must meet annually at a minimum to discuss compliance with permit conditions, current and future issues, explore ways to strengthen the program, apply lessons learned, and conduct strategic planning for future program implementation.

2.1.2 Responsibility for Program Implementation

2.1.2.1 NAVFAC Northwest EV1

NAVFAC Northwest Environmental Compliance & Services Product Line (EV1) oversees implementation of the permit, which includes:

- Oversee the MS4 program to ensure regulatory compliance;
- Develop the SWMP and coordinate with the installation to develop the MCMs outlined in the SWMP Plan;
- Provide the SWMP Plan to the installation and ensure the SWMP Plan is available on a public website;
- Assist in implementing the SWMP;
- Assist in compiling the annual report;
- Identify and submit for MS4 annual program funding; and
- Act as the direct point of contact for consulting with EPA and other state regulatory agencies regarding general questions or clarification of the MS4 permit including permit updates,

changes, available EPA or State training, or other necessary consultations which benefits, aligns and promotes efficiency across NW Region installations.

2.1.2.2 NAS Whidbey Island Public Works Department Environmental Division

NAS Whidbey Island Public Works Department (PWD) Environmental Division implements the SWMP at their installation, which includes:

- Identify and submit for funding of non-recurring projects required to bring stormwater systems into compliance with applicable existing regulations and requirements;
- Implement MS4 BMPs;
- Maintain records required in the SWMP Plan;
- Coordinate and lead stormwater team meetings with stakeholders to ensure the SWMP functions smoothly and complies with the permit; and
- Compile and submit the annual report to the EPA.
- Compile and submit other documents to the EPA, as applicable.

2.1.2.3 Design and Construction Authorities

NAVFAC NW, including the Design and Construction (DC) Business Line and Facilities, Engineering and Acquisition Division (FEAD), are primarily responsible for planning and design of engineering projects, including buildings, at NAS Whidbey Island. In some instances, tenants may have some level of design and construction authority for facility projects. These requirements apply to any entity performing facility design and construction work at NAS Whidbey Island. These entities, including DC Business Line and FEAD, must:

- Ensure compliance with the Construction General Permit;
- Follow the current Stormwater Management Manual for Western Washington (2019) minimum requirements;
- Ensure Low Impact Development (LID) structures are incorporated into all sites disturbing >2,000 s.f.;
- Ensure LID waiver processes are followed correctly, and all steps are correctly documented;
- Incorporate proper construction site erosion and sediment control (E&SC) and stormwater management language into contracts;
- Ensure contractors provide and follow proper E&SC plans and construction SWPPP;
- Ensure the correct permits and plans are in place before construction commences;
- Coordinate with PWD Environmental Division to complete inspections in accordance with Section 6 of this Plan; and
- Inspects construction sites to ensure that contractors are following their E&SC and construction SWPPPs.

2.1.2.4 Utilities and Facilities Management

The Utilities and Facilities Management departments are responsible for maintenance of stormwater infrastructure. Facilities and maintenance activities must be completed in accordance with this Plan to protect water quality.

2.1.2.5 Morale, Welfare, and Recreation Facilities (MWR)

MWR must follow procedures defined in this Plan at all MWR facilities.

2.1.2.6 Family Housing Contractor, Pacific Northwest Communities, LLC / Unaccompanied Housing

Family housing is managed through Pacific Northwest Communities (PNC) LLC by a ground lease with Hunt Military Housing Ownership, LLC., (referred to as Hunt Military Communities) a partner in PNC LLC with NAVFAC Public Private Venture (PPV). This company leases and operates housing areas at NAS Whidbey Island. Any company that may take over future operations of the same ground lease, the MS4 permit requirements still apply.

NAVFAC Housing Operations manages the unaccompanied bachelor's quarters housing on NAS Whidbey Island. PNC, LLC and NAVFAC Housing Operations will complete the following:

- Follow procedures defined in this Plan, including maintenance of stormwater structures and construction procedures.
- Provide educational materials to housing residents.

2.1.2.7 Public Affairs Office (PAO)

The PAO will aid in public communications as necessary.

2.1.2.8 All Personnel

When performing activities that could have a detrimental effect on the stormwater system, personnel will:

- Follow procedures defined in this Plan; and
- Follow any associated procedures found in this Plan or the installation SWPPP.

2.1.3 SWMP Modification

The requirements in this Plan are reviewed annually and revised or updated as appropriate. Modification of requirements will be maintained in the form Record of Amendments at the beginning of this Plan and described in the annual report. Annual reviews will be tracked in Appendix A, Record of Review and Amendments form.

2.2 Unauthorized Stormwater Discharges

The permit specifies the following unauthorized stormwater discharges.

2.2.1 Discharges Threatening Water Quality

Installations must not discharge stormwater that will cause or have the reasonable potential to cause or contribute to an exceedance above the Washington State water quality standards. Before any discharge to the MS4 occurs, PWD Environmental Division must be contacted unless previous arrangement have been made with PWD Environmental Division approval. Further

guidance for allowable and conditionally allowable discharges is discussed in Sections 2.2.4 and 5.2 of this Plan.

2.2.2 Snow Disposal to Receiving Waters

Under the permit conditions, snow shall not be directly disposed of in waters of the United States or directly to the MS4(s) unless certain BMPs are followed (see Part 2.5 of the permit).

Annually, NAS Whidbey Island receives approximately 3.8 inches of snowfall. During periods of snowfall, the snow is left to naturally melt and will not be piled or disposed of in waters of the United States. Snow should not be piled directly on top of storm drains to prevent sand or debris from directly entering the MS4.

2.2.3 Stormwater Discharges Associated with Industrial or Construction Activity

Stormwater associated with construction and/or industrial activities are not allowable discharges unless these discharges are authorized under the NPDES CGP, the NPDES MSGP for Stormwater Associated with Industrial Activities, or another appropriate NPDES permit.

2.2.4 Non-Stormwater Discharges

Non-stormwater is not an allowable discharge unless the discharge satisfy at least one of the following conditions and written approval is obtained from the PWD Environmental Division as discussed within this Plan:

- The discharges comply with a separate NPDES permit;
- The discharges originate from and during emergency firefighting activities that either do not involve Per- and polyfluoroalkyl substances (PFAS)-containing AFFFs, or that involve PFAS-containing AFFFs and are consistent with Part 2.5.8 of this Permit. After the emergency has ceased, non-stormwater discharges (e.g., discharges associated with cleanup) to the MS4 are prohibited. Determination of cessation of the emergency is at the discretion of the emergency on-scene coordinator.
- The discharges result from a spill and are the result of an unusual and severe weather event where reasonable and prudent measures have been taken to minimize the impact of such discharge;
- The discharges result from a spill and consist of emergency discharges required to prevent imminent threat to human health or severe property damage, provided that reasonable and prudent measures have been taken to minimize the impact of such discharges; or
- The discharges consist of one or more flows listed below, and such flows are managed in accordance with Parts 2.3 and 2.5 of the permit:
 - Potable water sources, including but not limited to: water line flushing, hyperchlorinated water line flushing, fire hydrant flushing, and pipeline hydrostatic test water;
 - Landscape watering and other irrigation runoff;
 - Dechlorinated swimming pool, spa, and hot tub discharges;
 - Street and sidewalk wash water, water used to control dust, and routine external building wash down that does not use detergents;

- Diverted stream flows;
- Rising ground waters;
- Uncontaminated ground water infiltration (as defined at 40 CFR paragraph 35.2005(20));
- Uncontaminated pumped ground water;
- Foundation drains;
- Air conditioning condensate;
- Irrigation water from agricultural sources that is comingled with urban stormwater;
- Springs;
- Uncontaminated water from crawl space pumps;
- Footing drains; and/or
- Flows from riparian habitats and wetlands.

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3 MCM #1 Education and Outreach on Stormwater Impacts

The primary goal of the education and outreach program is to reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts and encourage the public to participate in stewardship activities. Establishing an education and outreach program helps to accomplish this goal. A strong education and outreach program helps the general population understand the importance of clean stormwater and motivates them to actively participate in maintaining clean stormwater. An effective program provides a trackable behavioral change for the population served.

Changes are being made to provide virtual trainings to maximize outreach efforts while following COVID protocols. NAS Whidbey Island will continue to provide training to the best extent possible while meeting COVID-19 safety requirements.

3.1 Target Audiences

NAS Whidbey Island will target its education and outreach program activities to reach a combination of the following on base audiences:

- Project managers;
- Contractors and civilian personnel;
- Active duty military personnel;
- Tenants;
- Residents; and
- Environmental staff.

3.2 Stormwater Outreach and Education

Training will be provided in a variety of formats including in-person, classroom, online, and on-the-job (OJT). Training success will be measured by the number of persons completing each session. Training topics and the number of persons attending each will be tracked. Surveys may also be provided to obtain voluntary feedback about the training courses.

The preferred method of training will be in-person, installation specific training. Applicable personnel listed in the permit who must receive training includes:

- IDDE – personnel responsible for identification and investigation of suspected illicit discharges;
- Construction – personnel whose primary job duties are implementing the program to control stormwater runoff from new development, redevelopment, and construction sites including Plan review, construction site inspections, and enforcement;
- Operations and Maintenance – maintenance staff, contracted companies, environmental project officers, and other personnel whose construction, operations or maintenance job functions may impact water quality; and

- Personnel who work directly with stormwater management issues, including the Stormwater Program Manager with PWD Environmental Division, NAVFAC EV1, and other environmental staff, as applicable.

For new employees, this training must be accomplished within the first 6 months of employment for staff who work directly on stormwater management issues as identified in the categories above. Follow-up training will be provided as necessary.

3.2.1 Summary of Training Methods

PWD Environmental Division will provide training directly to base Activity Environmental Coordinators (AECs) on an annual basis via a site-specific environmental training class. Installation and tenant commands at NAS Whidbey Island assign AECs to represent their activity centers on environmental matters and for coordination with PWD Environmental. The AECs are then required to give stormwater awareness training to their own activity or relevant parties, also on an annual basis. AEC training will include the necessary information from Sections 3.2.2, 3.2.4, 3.2.5, and 3.2.6 of this Plan. These training records must then be stored in each activity's Environmental Compliance Handbook, NAS Whidbey Island Instruction 5090.11B. PWD Environmental Division will request total numbers of personnel trained annually.

Environmental Compliance, Assessment, Training, and Tracking System (ECATTS) is an online electronic training system and can be accessed here: <https://ecatts.com/>. The education modules focus on various elements of stormwater, including requirements from Section 3.2.2, 3.2.3, 3.2.4, 3.2.5 and 3.2.6 in this Plan, and are considered an alternative equivalent method to the required annual training given to operational personnel by AECs. Site specific installation training is the preferred method of training. If questions arise, contact PWD Environmental Division who will determine the best method for training efficiency. Table 3-1 lists a summary of stormwater trainings and audiences who are required to be trained. The audiences discussed in Section 3.2 must be trained and training must be documented, however multiple options for completing trainings are available.

Table 3-1: Stormwater Training Modules

Course Title	Project Managers	Construction Contractors*	O&M Contractors	Operations and Maintenance Personnel	Tenants/Military & Civilian Workers w/ direct potential to impact stormwater	Tenants/Military & Civilian Workers General Awareness	Environmental Staff	Housing Personnel, General	Housing Personnel, Construction	Housing Personnel, IDDE, O&M	Residential Personnel
Installation/Regional Trainings											
NAS Whidbey Island AEC Training (specific installation training)			X	X	X						
Design and Construction Day - Stormwater Construction Training (FEAD Training) (specific region training)	X	X							X		
IDDE Awareness Training (specific region training)							X			X	
General Awareness Campaign (specific region/installation awareness)						X		X			X
ECATTS Training - equivalent option to trainings listed above, contact PWD Environmental Division for questions.											
Navy PPV Environmental Training: Water								X	X	X	
Stormwater –Basic Information: Washington	X	X			X		X	X	X	X	
Stormwater—Comprehensive Overview: Washington							X				
Stormwater Pollution Prevention for MS4s Video Training	X	X	X	X	X		X	X	X	X	
Sediment and Stormwater Construction Training (all parts)	X	X									
Water Quality: Washington	X				X		X				
General Environmental Compliance	X				X		X				
Environmental Compliance and Enforcement					X		X				
Wetlands: Washington	X				X						
Pest Management – Stormwater		X									
Pest Management – Pollution Prevention			X								
NAVFAC Construction Contractor Prime- Stormwater	X	X									

*Trainings are dependent on the type of contractor; ECATTS NAS Whidbey Island website should be consulted. Contractor trainings are based on the applicable contract. This list is not all inclusive of required contractor training.

3.2.2 IDDE and Improper Waste Disposal

NAS Whidbey Island must list and publicize means for installation personnel, including housing residents, to report spills and other illicit discharges for investigation. NAS Whidbey Island will inform these target audiences of environmental impacts associated with illicit discharges and improper disposal of waste. Overwatering and discharges from lawn watering and other irrigation will be addressed, as applicable in the IDDE training, per Section 2.3.2.2.2 of the MS4 permit.

Spill reporting measures are additionally covered under the Spill Response Program managed by the PWD Environmental Division. These spill response awareness requirements are a part of the required training for base AECs and their corresponding personnel. In addition to their required spill awareness training, activities at NAS Whidbey Island are required to have some form of spill awareness poster posted in the area relating to that operation or area's potential pollutants. Posters used to illustrate IDDE reporting are located in Appendix B.

The process to report illicit discharges and improper disposal of waste is included in MCM #3 IDDE of this document. Reporting of oil, sewage, and hazardous substance spills should follow NAS Whidbey Island spill response procedures.

Training in accordance with Section 2.3.5 of the MS4 permit will be completed through online and/or classroom training for staff responsible for the identification and investigation of stormwater IDDE issues.

3.2.3 Construction

Staff responsible for Plan review, hydrologic modeling, site inspections, and enforcement necessary to implement the programs in this section must be trained to conduct these activities. Follow-up training must also be provided as necessary to address changes in procedures, techniques, or staffing.

Annually, DC holds a training day where EV1 will present training incorporating proper construction site E&SC, Stormwater Management Manual of Western Washington (SWMMWW) minimum requirements, proper procedure for street and sidewalk wash water usage to control dust (as stated in Section 2.3.2.2.4 of the MS4 permit) and MS4 permit requirements. Additional training is available for FEAD and will be provided by PWD Environmental Division upon request or when needed as deemed by PWD Environmental Division. Table 3-2 summarizes the training necessary for personnel involved in the construction process.

Construction personnel are responsible for ensuring training is completed and notifying PWD Environmental when training is needed. The SWMMWW requires a Certified Erosion and Sediment Control Lead (CESCL) to oversee the construction project, which is the responsibility of FEAD or DC to ensure the contractor meets this requirement.

Table 3-2: New Development, Redevelopment, and Construction Site Runoff Training Requirement

Staff	Responsible for:	Training Needed
Contracting/DC/Planning/FEAD	LID incorporation into designs	Training on LID
FEAD/construction contractors	Construction/Erosion and Sediment Control Inspections	FEAD: E&SC training Contractors: Must have a CESCL qualified inspector
Environmental Staff	Oversight of MS4 Program	LID training, E&SC Awareness/CESCL encouraged.
Maintenance workers	Maintenance of stormwater structures	General training on proper maintenance of stormwater structures

3.2.4 Operations and Maintenance

An on-going training program will be developed for facility maintenance staff, contracted companies, environmental project officers, or other staff whose construction, operations, or maintenance job functions may impact stormwater quality. Currently, training as described below is included within the AEC training provided by PWD Environmental Division.

Training will include the various industrial operations listed in the MSGP SWPPP, including flight line operations and all supporting facilities well as recreational operations such as the golf course and Naval Exchange that engage in maintenance activities.

The training will consist of:

- Importance of protecting water quality;
- Requirements of this permit;
- Street and sidewalk wash water control, and routine external building wash down requirements per the MS4 permit;
- Operation and maintenance standards;
- Inspection procedures;
- Selection of appropriate BMPs;
- Ways to perform job activities to prevent or minimize impacts to water quality; and
- Procedures for reporting water quality concerns, including potential illicit discharges.

Follow-up training will be provided as needed to address changes in procedures, techniques, or requirements.

PWD Environmental Division will also take measure to ensure NAS Whidbey Island barracks personnel do not engage in vehicle maintenance outdoors. This knowledge will be spread via promotional materials (see Appendix B for an example) and a presentation at the barracks resident indoctrination, and will be enforced via inspections in the barracks parking lot at a minimal monthly basis.

3.2.5 Behavioral Change Topics

A list of topics to effect behavioral change is contained in the MS4 permit Section 2.1.1.3 and listed below in Table 3-3. The list of topics will be reviewed annually. Topics will be chosen based on both the MS4 stormwater program manager input and applicable behavioral change measurement data collected throughout the previous year.

Year one will focus on topic #6 in bold font, appropriate spill prevention practices. Objectives for this topic will include:

- Increased awareness of IDDE program and pollution impact;
- Increased awareness of spill reporting procedures; and
- Increased general awareness of spill prevention.

Table 3-3: Topics to Build General Awareness and Effect Behavioral Changes

Topic #	Topic Description
1	Proper use, storage and disposal of household hazardous waste
2	Proper recycling
3	Appropriate stormwater management practices for commercial, food service, and automotive activities, including carpet cleaners, home-based or mobile businesses
4	Appropriate yard care techniques for protecting water quality, including proper timing and use of fertilizers
5	Proper pet waste management
6	Appropriate spill prevention practices
7	Proper management of street, parking lot, sidewalk, and building wash water
8	Proper methods for using water for dust control
9	Proper design and use of LID techniques
10	Impacts of stormwater on endangered species in Puget Sound, in particular on Southern Resident Killer Whales
11	Other topics that focus on facility-specific sources or causes of water quality degradation.

Annual training presentations and information will be developed and implemented focusing on the chosen topic from Table 3-3. These training modules will be available to targeted audiences based on the topic selected and incorporated into existing trainings as applicable. Training methods will include classroom training, informational newsletters, educational displays, social media posts, mass emails and posters.

As applicable, Community Based Social Marketing (CBSM) methods will be used to develop training plans for the chosen behavioral change topic by NAVFAC EV1. CBSM is a

methodology developed to combine knowledge from social marketing and psychology to enact sustainable behavior change in communities.

3.2.6 General Awareness

A general training module, entitled “Stormwater – Comprehensive Overview: Washington” is located on ECATTS and is designed for military and civilian employees, and construction contractors working at NAS Whidbey Island. The module covers both industrial and municipal stormwater topics. Site specific general awareness training will include aspects from Sections 3.2.2, 3.2.4, 3.2.5, and 3.2.8, as applicable. PWD Environmental Division will track efforts to complete general awareness training.

An outreach campaign will be provided to various audiences through one or a combination of newsletters, posters, brochures, social media posts and mass email communications. The approximate number of individuals reached by outreach efforts will be documented, along with the number of posters and brochures distributed. In 2020, a stormwater education video was developed by NAVFAC EV1 and distributed via social media. The video can be found at: <https://www.dvidshub.net/video/773352/navys-part-maintaining-stormwater>. Efforts for the outreach campaign will be track jointly by NAVFAC EV1 and PWD Environmental Division.

In person outreach events will be used as opportunities for education as applicable. Events may include, but are not limited to:

- Earth Day;
- NAS Whidbey Island Open House;
- America Recycles Day; and
- Residential Town Hall events.

3.2.7 Southern Resident Killer Whale Outreach and Education

In coordination with National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (U.S. FWS), and in conjunction with other appropriate partners (which may include other MS4 permitted Naval facilities), an educational program on stormwater threats to Southern Resident Killer Whales will be developed and implemented. Target audience is Navy MS4 stormwater program managers in Western Washington and other invited Navy personnel who influence the quality of stormwater discharges. The completed training will be documented, including a roster of attendees. The program may be delivered electronically or in a traditional manner and will include:

- Raising awareness of the threats;
- Identifying known and likely sources and causes; and
- Identifying and facilitating robust implementable solutions.

Efforts to develop a training program began in early 2020 with NMFS, Protected Resources Division. Due to safety concerns during COVID-19 the training will be conducted virtually in January 2022. Training will be provided by experts at NMFS.

3.2.8 Bacterial Pollution Education and Outreach

NAS Whidbey Island will conduct public education and outreach activities to increase awareness of bacterial pollution problems and promote proper pet waste management behavior. The initial approach includes additional pet waste stations and educational materials. Target audiences for pet waste education are on-base housing residents, in coordination with PNC LLC to maximize outreach. A brochure for use in housing areas is in Appendix B.

3.3 Assessment

The installation will measure and document the understanding and adoption of the targeted behavior for at least one targeted audience and at least one topic in Section 3.2.5. Each year the list of target audiences (listed in Section 3.1 of this Plan) and topics (listed in Table 3-3 of this Plan) will be reviewed to determine which topic and audience is most applicable. Available data and knowledge will be used to effectively evaluate and make a decision. Data will then be tracked and used to evaluate the effectiveness of the behavior change and direct education and outreach resources most effectively through the remainder of the permit term.

3.4 Reporting

In the annual report, the education and outreach activities completed during the reporting period will be summarized, along with examples of successful educational and outreach activities. Table 10-1 Implementation Schedule summarizes the implementation of MCMs and Table 11-1, BMP Metrics Table summarizes efforts to meet the MCMs and metrics.

4 MCM #2 – Public Involvement and Participation

The Public Involvement and Participation MCM addresses how NAS Whidbey Island encourages public participation and involvement in the MS4 program. The goal of MCM #2 is to provide contractors, tenants, residents, and other audience opportunities to:

1. View the SWMP;
2. Engage in meetings to coordinate SWMP implementation; and
3. Participate in volunteer activities to better understand their impacts on stormwater quality.

4.1 Federal Public Notice Requirements

As applicable, NAS Whidbey Island will comply with applicable federal notice requirements when conducting public involvement and participation activities.

4.2 Meetings

Meetings will be held at least annually to coordinate among appropriate staff and management which may include PNC LLC, FEAD, DC, and others, to ensure effective implementation of the SWMP.

Regional meetings (composed of representatives from Western Washington Navy installations covered under EPA MS4 permits) will be held quarterly to discuss issues and updates.

If stormwater management activities and decisions affect NAS Whidbey Island neighbors and nearby activities and operations, public engagement should be used to help establish priorities for implementation activities with significant effects on those people and organizations. If concerns about NAS Whidbey Island activities arise, please contact the installation PAO. NAS Whidbey Island will contact neighbors and nearby activities and operations if the MS4 is impacted by off-site non-Navy operations and to facilitate correcting any potential concerns.

4.3 Website

NAS Whidbey Island will publish this SWMP Plan at the following public website:
https://www.cnic.navy.mil/regions/cnrnw/om/environmental_support.html.

4.4 Volunteer Activities

At least twice during the permit cycle, NAS Whidbey Island will sponsor one or more volunteer activities designed to actively engage residents and employees to better understand how stormwater can become polluted and how their activities can affect stormwater quality. These public involvement volunteer activities will complement the educational topics determined by NAS Whidbey Island Section 3.2.5.

Example activities include but are not limited to:

- Adopt a Storm Drain program;
- Clean up projects – trail clean-up;
- Adopt a stream program;

- Reforestation programs; and/or
- Beach clean-up.

4.5 Reporting

In each annual report, NAS Whidbey Island will summarize its public involvement and participation activities during the reporting period and provide one or more examples of successful public involvement/engagement activities. Table 10-1, Implementation Schedule, summarizes the implementation of MCMs and Table 11-1, BMP Metrics Table, summarizes efforts to meet the MCMs and metrics.

5 MCM #3 – Illicit Discharge Detection and Elimination

Illicit discharges and connections have the potential to degrade receiving water quality and threaten aquatic, wildlife, and human health. This section outlines the IDDE program.

The MS4 permit includes the following definitions:

- *Illicit Connection* means any man-made conveyance connecting an illicit discharge directly to a municipal separate storm sewer; and
- *Illicit Discharge* is defined at 40 CFR §122.26(b)(2) and means any discharge to a municipal separate storm sewer that is not entirely composed of stormwater, except discharges authorized under an NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire-fighting activities.

The objective of the IDDE program is to detect, eliminate, and prevent illicit discharges and includes five parts:

1. Create and regularly update a map of the storm drain system.
2. Enforce a policy to prohibit illicit discharges.
3. Detect and prevent any illicit connections and discharges from the storm drain system.
4. Initiate action to eliminate illicit discharges through investigations and notifications.
5. Educate staff conducting IDDE activities on the IDDE process.

Spills resulting from oil and or hazardous substances will be responded to in accordance with established practices for protecting human health and the environment. *Navy Region Northwest Oil and Hazardous Substance Integrated Contingency Plan (ICP)* provides details of the spill response procedures.

5.1 Maps

During the first year of the permit, the process of updating maps to reflect current conditions began. An 18 month contract action commenced in July 2021 to verify and update geographic Information System (GIS) data at Navy installations in the Northwest. Existing and new data will be used along with ground verification and GPS information to validate. Maps will be accessible in both hardcopy and as an electronic version using the Navy's GeoReadiness Explorer, referred to as GRX.

Finalized maps will contain information required in Section 2.3.1 of the permit, and may also be used to identify priority areas where the risk of illicit discharges or spills is higher than normal. Maps will be used for yearly dry weather surveys and to assist whenever investigations are opened regarding illicit connections or discharges. Maps will be continuously utilized and reviewed. Maps will be updated as conditions change and no later than 180 days prior to the date of permit expiration.

5.2 Policy

A draft policy has been prepared and will be signed by all responsible parties for enforcement and inclusion in applicable installation instructions. The policy will enforce non-stormwater discharges as illicit discharges and the following as allowable and conditionally allowable discharges.

5.2.1 Allowable Discharges

- Diverted stream flows;
- Rising groundwater;
- Uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005[20]);
- Uncontaminated pumped groundwater;
- Foundation drains;
- Air conditioning condensation;
- Irrigation water from agricultural sources that is commingled with urban stormwater;
- Springs;
- Uncontaminated water from crawl space pumps;
- Footing drains;
- Flows from riparian habitats and wetlands;
- Non-stormwater discharges covered by another NPDES permit; and/or
- Discharges from emergency firefighting activities.

While these are allowable discharges, they will be noted in documentation (Illicit Discharge Report Form, see Appendix C) if discovered, and as applicable.

5.2.2 Conditionally Allowable Discharges

The discharges below are allowed by the permit under the following conditions:

- MS4 Permit Section 2.3.2.2.1 “Discharges from potable water sources, including water line flushing, hyperchlorinated water line flushing, fire hydrant system flushing, and pipeline hydrostatic test water: Planned discharges must be dechlorinated to a total residual chlorine concentration of 0.1 parts per million (ppm) or less, pH-adjusted, if necessary, and volumetrically and velocity controlled to prevent resuspension of sediment.”
 - To meet this permit requirement, entities that may have planned or historical discharges of this type will be contacted and made aware of this requirement. Entities may include the Fire Department, construction activities, and Utilities Management.

- MS4 Permit Section 2.3.2.2.2 “Discharges from lawn watering and other irrigation runoff: These discharges will be minimized through, at a minimum, public education activities and water conservation efforts.”
 - To meet this permit requirement, these discharges will be addressed in IDDE, maintenance and general awareness outreach efforts. Educational efforts are discussed in Section 3 of this Plan.
- MS4 Permit Section 2.3.2.2.3 “Dechlorinated swimming pool discharges: The discharges must be dechlorinated to a concentration of 0.1 ppm or less, pH-adjusted and reoxygenized if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments in the MS4. Discharges must be thermally controlled to prevent an increase in temperature of the receiving waters. Swimming pool cleaning wastewater and filter backwash must be discharged to the sanitary sewer.”
 - To meet this permit requirement, entities that may have planned or historical discharges of this type will be contacted and made aware of this requirement. PNC LLC prevent pools in residential areas. MWR pools are located and maintained indoors.
- MS4 Permit Section 2.3.2.2.4 “Street and sidewalk wash water, water used to control dust, and routine external building wash down that does not use detergents: These discharges are reduced through, at a minimum, public education activities and/or water conservation efforts. To avoid washing pollutants into the MS4, the amount of street wash and dust control water must be minimized. At active construction sites, street sweeping must be performed prior to washing the street.”
 - To meet this permit requirement, these discharges will be addressed in construction runoff outreach efforts and operation and maintenance efforts. Educational efforts are discussed in Section 3 of this Plan. Language will be added to the Unified Facilities Guidance Specifications (UFGS) to direct construction contractors to street sweep prior to washing the street. Specific construction information can be found in Section 6 of this Plan.
- MS4 Permit Section 2.3.2.2.5 “Stormwater accumulating in utility vaults: Following a one-time sampling of accumulated stormwater for any pollutant that might reasonably be expected to occur based on current or legacy activities, and verification that no pollutants occur at concentrations that would cause or contribute to water quality impairments, accumulated stormwater in utility vaults may be discharged into the MS4 following a visual inspection that verifies that no sheens or accumulated solids are present in the discharge. If at any time a spill in or into the vault occurs, this provision is suspended until additional sampling confirms that pollutants will not cause or contribute to water quality impairments.”
 - To meet this permit requirement, accumulated stormwater pumped from utility vaults must be evaluated using the Vault Inspection Form in Appendix C. Baseline sampling can be completed to be prepared for future utility vault work. Contact PWD Environmental Division staff.
- MS4 Permit Section 2.3.2.2.6 “Stormwater accumulating in secondary containment structures. Following sampling of accumulated stormwater for any pollutant that might

reasonably be expected to occur based on current or legacy activities, and verification that no pollutants occur at concentrations that would cause or contribute to water quality impairments, accumulated stormwater in secondary containment structures may be discharged to the MS4 following a visual inspection that verifies that no sheens or accumulated solids are present in the discharge. Stormwater sampling must be repeated after any incident in which pollutants have collected in the secondary containment structure and the same assessment procedures followed.”

- To meet this permit requirement, before discharging from secondary containment for a non-oil container, an acknowledgement form or training from PWD Environmental Division must be completed. The acknowledgement form ensures discharges are made from secondary containment structures in accordance with the MS4 permit. For discharges from secondary containment for oil containers, procedures in the SPCC plan will be followed.

5.3 Detection, Characterization, Actions to Eliminate

IDDE is dependent upon several factors, including available resources, size of staff, and degree and character of the illicit discharges. To complete the objectives of this section there are three keys steps: detection of illicit connections and discharges, characterization, and the actions to eliminate the detected concern. The steps of a recommended plan are outlined below, using the applicable reference materials.

5.3.1 Priority Areas

Priority areas will be identified on a continuous basis for detailed IDDE screening based on the likelihood of illicit connections or discharges, storage areas of large quantities of materials that could result in spills and spills history (e.g., areas with older sanitary sewer lines or with no IDDE activity in the past). Methods that aid in determining priority areas include identifying priority areas on stormwater maps, visual screening, stormwater sampling, the use of video equipment and public input. Procedures for identifying priority areas are:

1. Identify areas with a likelihood of illicit connections or discharges using data from dry weather survey data (as dry weather surveys are completed);
2. Identify areas with large quantities of materials that could result in spills; and
3. Coordinate with the Installation Restoration Program (EV3) at NAVFAC NW to identify any potential historical areas.

5.3.2 Detection

The primary method for detection will be visual observations by personnel with appropriate training. This method for detection is partially supported by a commitment to continually educate the public to report illicit spills/connections through the appropriate channels. Spills should be reported by following the current NAS Whidbey Island spill response procedures, call 257-3333. Types of emergency spills include:

1. Is a threat to human health or the environment; or
2. Is a material not known to you; or
3. Is more than 10 gallons; or

4. Is more than 42 gallons to the soil; or
5. Has the immediate potential to enter or has entered a drain or waterway; or
6. Requires assistance or resources from other departments for mitigation or cleanup; or
7. Is outside Navy property.

If the answer is “yes” to any of the above, follow the actions outlined on the Emergency Procedures Poster, located strategically in work areas throughout the base. For non-emergency suspected illicit discharges, an online reporting form will be publicized for the public and installation personnel to utilize. Reports will be sent to navfac_nw_stormw.fct@navy.mil and documented/tracked from detection to characterization to elimination with the Illicit Discharge Reporting Form. Suspected non-emergency illicit discharges can also be reported to PWD Environmental Division. Non-emergency spills include petroleum products of 10 gallons or less that:

1. Can be cleaned up by the personnel who discovered the spill, or within the established time frame of the work process; and
2. Do not pose an immediate threat to human health or the environment; and
3. Are not released outside of Navy property or into any waterway inlet (including storm drains, sewer drains, etc.). The illicit discharge reports will be analyzed annually for patterns to aid in the effectiveness of the IDDE program.

Dry weather discharge surveys will be started no later than 2 years from the permit effective date by PWD Environmental Division and EV1. Dry weather surveys will be completed using field test kits for characterization (see Section 5.3.3 Characterizing). See also Appendix C for a Field List of Supplies. These surveys should be conducted at least 48 hours after a rain event and preferably in the summer months during dry periods of little to no rainfall. Findings are recorded using an Illicit Discharge Reporting Form (Appendix C) and summarized in a yearly Outfall Reconnaissance Inventory (ORI) sheet. A Master ORI has been prepared for NAS Whidbey Island in Appendix C, which catalogs outfalls at Ault Field and Seaplane Base.

Where outfalls are submerged, the first manhole upstream or associated catch basins of the outfall may be inspected. During yearly surveys, personnel will inspect at least 25% of identified MS4 outfalls and rotate every year so that at least 75% of all MS4 outfalls are inspected no later than 180 days prior to permit expiration.

If discharges are identified during annual dry weather surveys, inspection teams will conduct discharge characterization per Section 5.3.3. If the discharge is determined to be illicit, action will be initiated to eliminate the discharge. Immediate response actions and investigation will be completed for spills and recurring discharges which are potentially a threat to human health or the environment. Investigations following any complaints, reports, or monitoring information that indicates a potential illicit discharge will be completed within 7 calendar days.

5.3.3 Characterization

Illicit discharge characterization involves evaluating whether discharges must be immediately contained and the steps to be taken for containment of the discharge. Characterization should be completed using guidance from the *Illicit Connection and Illicit Discharge Field Screening and*

Source Tracing Guidance Manual (King County, Washington Storm Center, & Herrera Consultants).

Once a potential illicit discharge is identified or reported, testing the water in the associated stormwater system will help determine whether any pollutants are in the discharge, aid in determining whether the discharge is illicit or not, and determine whether the discharge must be immediately contained. Investigation (or referral to the appropriate agency) should occur immediately for spills, and should follow installation spill response procedures. Any complaints or reports of illicit discharges must be investigated within 7 calendar days.

Characterization also helps with tracing the source of the discharge. For dry weather survey characterization, the purpose of the testing is to distinguish the discharge type, which can fall into six categories:

- Sewage or sanitary wastewater flow;
- Washwater flow;
- Landscape irrigation flows;
- Natural, groundwater, spring water flows;
- Tap water flows;
- Liquid wastes (oil, paint, etc.); and
- Industrial.

5.3.3.1 Indicators

For stormwater system discharges found during dry weather discharge surveys or other means, primary and follow-up indicators will be used for characterizing the discharge. To characterize the flow, Figure 4.1 from the *Illicit Connection and Illicit Discharge Field Screening and Source Tracing Guidance Manual* (King County, Washington Storm Center, & Herrera Consultants) may be used, see Appendix C. Results for these indicators should be noted on the Illicit Discharge Report Form. Indicators will be tested in the field with testing strips where dedicated testing meters or lab analytical is not available.

Primary Indicators:

- pH;
- Temperature;
- Field testing strips or field testing using portable spectrophotometer;
 - Ammonia;
 - Total/Free Chlorine;
 - Nitrate/nitrite;
 - Phosphate;
 - Hardness;
 - Alkalinity;

- Odor;
- Visual Assessment;
 - Color;
 - Turbidity;
 - Particulates; and
 - Sheen.

If additional characterization is necessary, sampling will be done for follow-up indicators.

Follow-Up Indicators:

- Fecal coliform bacteria; and
- Other parameters as determined by primary results.

If primary and/or follow-up indicators indicate an illicit discharge which has been determined to constitute a threat to human health or the environment, spill response actions will be initiated in accordance with *Navy Region Northwest Oil and Hazardous Substance Integrated Contingency Plan* (Commander Region Northwest) to include immediately containing the discharge and Section 5.3.5 to notify affected parties and actions to eliminate discharge. If indicators do not suggest a threat, then the source will be traced to the extent possible and the finding documented. Table 5-1 below summarizes how findings of varying priorities will be addressed.

Table 5-1 Prioritization & Summary of IDDE Procedures

Discharge Characterization Level	Description of Findings	Actions	Elimination
0 - No discharge	Outfall is dry	1. Fill out Illicit Discharge Reporting Form for Outfall Description (outfall damage, submerged, vegetation, etc)	N/A
1 - Discharge not harmful	Flowing, but indicators are within acceptable range (see Indicator Sampling Flow Chart in Appendix C) and/or other indications exist that discharge is not harmful	1. Fill out Illicit Discharge Reporting Form for Outfall Description & Flow Characterization (outfall damage, submerged, vegetation, etc; flow odor, color, floatables, etc). 2. Trace source to extent possible and document finding(s).	N/A
2 - Discharge potentially harmful	Flowing, indicators are NOT within acceptable range (see Indicator Sampling Flow Chart in Appendix C) and/or other indications exist that discharge is potentially harmful	1. Fill out Illicit Discharge Reporting Form for Outfall Description & Flow Characterization. 2. Begin source tracing (see 5.3.4. of SWMP) and initiate actions to eliminate (see 5.3.5. of SWMP). 3. If applicable, initiate spill response procedures.	1. Notify downstream operators 2. Notify appropriate agencies, if applicable 3. Follow spill response procedures, if applicable 4. Complete root cause assessment, if applicable. 5. Provide education/training to prevent future discharges, if applicable 6. If discharge cannot be eliminated, document findings as completely as possible, and escalate as needed.
3 - Discharge harmful to human health and the environment	Flowing, indicators are NOT within acceptable range (see Indicator Sampling Flow Chart), other indications exist that discharge is harmful, and/or discharge is a oil/hazardous substance	1. Initiate spill response procedures. 2. Fill out Illicit Discharge Reporting Form for Outfall Description & Flow Characterization. 3. Begin source tracing (see 5.3.4. of SWMP) and initiate actions to eliminate (see 5.3.5. of SWMP).	1. Follow spill response procedures 2. Notify appropriate agencies, if applicable 3. Notify downstream operators 4. Complete root cause assessment, if applicable 5. Provide education/training to prevent future discharges, if applicable 6. If discharge cannot be eliminated, document findings as completely as possible, and escalate as needed.

5.3.4 Tracing the Source of an Illicit Discharge

Sources of illicit discharges can be found through an upstream catch basin/manhole investigation. See the *Illicit Connection and Illicit Discharge Field Screening and Source Tracing Guidance Manual* for more information and procedures on field/source-tracing methodologies. Steps below are a general procedure:

1. Ensure the area is safe for catch basin/manhole inspections (assess traffic, potential hazards, safety equipment);
2. If entering a manhole is necessary, contact the safety office. A manhole is considered a confined space and should not be entered unless proper training is completed and the area is authorized as safe for entry by authorized personnel;
3. Begin inspecting upstream catch basins/manholes to determine the flow path and extent of the discharge;
4. Sample using field test strips and/or sample bottles. Follow flow chart logic, Appendix C, to determine source types as necessary;
5. Use area maps to determine suspect buildings likely to discharge the flow in question; and
6. Document findings on the Illicit Discharge Reporting Form.

Other methods that can identify the source of the stormwater discharge include stormwater/sanitary sewer dye-testing, smoke-testing, employing a certification program that shows which buildings have been checked for illicit connections, implementing an inspection program of existing septic systems, and using video to inspect the storm sewers.

Findings from source tracing will be noted on the Illicit Discharge Reporting Form.

5.3.4.1 Intermittent Flows

If illicit discharge is suspected but no flow is present, the discharge may be intermittent. Sand bags can be used to block flow from draining to the storm system while allowing the discharge to collect and be sampled at a later time. Sand bags are typically placed at junctions. If no flow is captured, this could help eliminate suspected storm branches from further investigation. Other materials may be used instead of sand bags such as caulk dams.

General procedures for sand bagging are as follows:

1. Ensure the area is safe for opening the manhole (assess traffic, potential hazards, safety equipment).
2. A manhole is considered a confined space and should not be entered unless proper training is completed and the area is authorized as safe for entry by authorized personnel.
3. If manhole conditions are unsafe, such as the suspicion of explosive or toxic gases, emergency actions should be taken.
4. Lower sand bags on a rope through the manhole to form a dam at the bottom of the storm sewer. Ensure a complete seal is in place.
5. Leave sand bags in place until the next intermittent discharge has occurred.
6. Return to the site and inspect each sand bag for accumulation of water on the upstream side. If no flow was captured, the discharge was likely transitory and it may not be

possible to determine its source. If the sand bag has captured flow, there may be a potential illicit discharge upstream of its respective storm drainage pipe.

7. Document using Illicit Discharge Reporting Form.

5.3.5 Notifying Affected Parties and Initiating Action to Eliminate Discharge

When an illicit discharge is identified, appropriate authorities will be notified and spill response procedures followed. In general, this would include following procedures in the *Navy Region Northwest Oil and Hazardous Substance Integrated Contingency Plan* such as immediately reporting spills to the Regional Dispatch (360) 257-3333. Downstream MS4s, shellfish beds/fisheries, agricultural/livestock operations and drinking water systems (public or private) shall be notified through PAO of spills or other non-stormwater discharges that may impact those systems. For illicit discharges that cannot be immediately abated and that have the potential to adversely affect human health, or the systems listed in part 2.3.3.4.1 of the permit, the parties shall be informed of the status of elimination activities and provided other information and data, as appropriate, on potential impacts. Established processes for spill notification will be followed and PAO may lead any off site communications.

Follow-up inspections may be needed to ensure repeating discharges do not occur.

Per the permit, actions to eliminate should include the following:

- Initiating an investigation within 21 days of a report or discovery of a suspected illicit connection to determine the source, nature, and volume of discharge through the connection and party responsible for the connection; and
- Upon confirmation of the illicit nature of a storm drain connection, initiate action within 45 days in a documented effort to eliminate the illicit connection.

Due to the complexity of illicit discharges, procedures for investigations vary. In general, actions should be noted on the Illicit Discharge Reporting Form. In the event the discharge is not eliminated, EV1 and PWD Environmental Division personnel will elevate the issue up the chain-of-command and document the process and actions taken. See the Prioritization & Summary of IDDE Procedures Table 5-1.

In some cases, sources of illicit discharges are addressed by other installation projects. If this is the case, document the project addressing the illicit discharge in the Illicit Discharge Reporting Form.

5.4 Training

Training will be provided to staff responsible for the identification and investigation of illicit discharges. For new employees working directly on stormwater management, training will be provided within the first 6 months of employment. Required training or compliance with the MS4 permit is summarized in, MCM #1 Education and Outreach. See below for general information about IDDE-specific training methods:

- Navy online training modules in ECATTS will be used to provide a general level of training for a wide stormwater audience including installation personnel and contractors.
- IDDE training DVDs are available to the general public and/or employees.
- Integrating IDDE-specific training into general training slides.

- Providing on-the-job training at specific sites requiring additional attention.
- For residents, IDDE awareness will be distributed through social media campaigns, newsletters, and other methods.

5.5 Reporting

Illicit Discharge Reporting Forms completed during dry weather surveys are used to update the ORI spreadsheet to evaluate and assess illicit discharges (tracking total number, type, and actions to eliminate) and for tracking other identified illicit discharges. IDDE data from these forms and efforts to correct identified illicit discharges are summarized in the Annual Report.

The Annual Report will also include examples of successful IDDE activities and a summary of IDDE training efforts. Table 10-1, Implementation Schedule, summarizes the implementation of MCMs and Table 11-1, BMP Metrics Table, summarizes efforts to meet the MCMs and metrics.

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6 MCM #4 & #5 – New Development, Redevelopment, and Construction Site Runoff Control

Construction site stormwater runoff control minimum control measure (MCM #4/5) addresses how NAS Whidbey Island reduces pollutant in stormwater runoff from construction activities. Whenever applicable, future stormwater infrastructure and management efforts will focus on reducing the impact of runoff to Clover Valley Creek. This program includes the development and implementation of:

1. Mechanisms to provide adequate direction and oversight to “regulated construction activities” and “regulated industrial activities” as defined in Section 7 of the permit;
2. Mechanisms to enforce runoff from new development, redevelopment and construction site projects by implementing the thresholds, definitions, and minimum requirements within the Stormwater Management Manual of Western Washington (2019);
3. A program to address site plan review, inspection and corrective actions; and
4. A plan to identify Early Action Projects (EAP) and a Stormwater Infrastructure Investment Plan (SIIP).

6.1 Oversight

NAS Whidbey Island follows the CGP, MSGP, and MS4 permit requirements. Various stakeholders including NAVFAC EV1, PWD Environmental Division, FEAD, and DC participate in the process to ensure construction requirements of the CGP and MSGP are met in addition to those in the MS4 permit. Each encounter of conflicting permit requirements will be reviewed by the PWD Environmental Division to provide guidance and recommendation to follow the more stringent permit requirement, as applicable.

6.2 Enforcement Mechanisms: Established Policies and Procedures

The following policies and procedures must be utilized in the preparation of construction projects to ensure stormwater compliance is met. Contract specifications language is maintained in the Unified Field Guide Specifications. Construction projects must follow the Stormwater Management Manual for Western Washington (2019) definitions, minimum requirements, and thresholds including site planning requirements, BMP selection criteria, BMP design criteria, BMP infeasibility criteria, LID competing needs criteria, and BMP limitations.

Construction Roles and Responsibilities for Stormwater Requirements Policy

This policy clarifies responsibilities and stands as an enforceable mechanism between DC, Public Works, FEAD, EV1, and PWD Environmental Division in order to meet the requirements of the MS4 permit. This document was prepared by NAVFAC NW EV1.

Energy Independence and Security Act

In December 2007, Congress enacted the Energy Independence and Security Act (EISA). This legislation established stormwater design requirements for federal agencies. EISA requires federal agencies to develop and redevelop facilities in a manner that maintains or restores stormwater runoff to the maximum extent technically feasible (METF) with regard to the temperature, rate, volume, and duration of flow.

Unified Facilities Guide Specifications

In August 2021, the Unified Facilities Guide Specifications (UFGS) were most recently updated by NAVFAC. The UFGS include temporary and supplemental temporary environmental controls for use in contracts specifying construction for military services. The UFGS will be updated to address additional requirements from the MS4 permit. Specific details can be found at <https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs>.

Unified Facilities Criteria

In June 2015, the Unified Facilities Criteria (UFC) for Low Impact Development (UFC 3-210-10) was issued, the most current version should be used. This UFC provides planning, design, construction, sustainment, restoration, and modernization criteria. Any applicable UFC should be followed including, but not limited to UFC 3-360-02, Pavement Design for Airfields. The UFC must be used for all Department of Defense projects where appropriate. Specific details can be found at <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc>.

Navy LID Memorandum

The 2007 memorandum signed by the Assistant Secretary of the Navy (also known as the “Penn Memo”) direct Navy facilities to plan, program, and budget to meet LID requirements. The memorandum also establishes a waiver process for areas where LID is technically infeasible. A copy of this memo is at Appendix D.

Stormwater Management Manual for Western Washington (2019)

The SWMMWW must be used in the site planning process to ensure correct LID criteria are incorporated into all applicable projects. The SWMMWW can be found here: <https://fortress.wa.gov/ecy/ezshare/wq/Permits/Flare/2019SWMMWW/2019SWMMWW.htm>

Predevelopment conditions are defined by the SWMMWW, as “the native vegetation and soils that existed at a site prior to the influence of Euro-American settlement”. This definition supersedes the definition of predevelopment conditions stated in UFC 3-210-10.

All minimum requirements (MR) in the SWMMWW must be followed as they apply, including MR 1 through 9 which are defined below. Flow charts and thresholds from the SWMMWW are included in Appendix D. The flow charts and thresholds included in this Plan must be used when determining the MRs which apply to a project. The MRs include:

- MR#1 Preparation of Stormwater Site Plans;
- MR#2 Construction SWPPP;
 - For projects triggering CGP requirements, the construction SWPPP should meet both CGP and MS4 permit requirements. A modified EPA construction SWPPP template is available for use, please request from EV1 or PWD Environmental Division.
- MR#3 Source Control of Pollution;
- MR#4 Preservation of Natural Drainage Systems and Outfalls;

- MR#5 On-Site Stormwater Management;
- MR#6 Runoff Treatment;
- MR#7 Flow Control;
- MR#8 Wetlands Protection; and
- MR#9 Operation and Maintenance.

For site plans being prepared in airport operation areas the Aviation Stormwater Design Manual (WSDOT, 2008) should be used. If the project is for roadways, the Highway Runoff Manual (WSDOT, 2019) should be used, if applicable.

***NAVFAC Endorsement of CI Stormwater Construction Permitting Policy Ser 05007 ENQ/FP
(Commander, Naval Facilities Engineering Command, 2005)***

This document establishes the process for signing and submitting Notices of Intent (NOIs) and Notices of Termination (NOTs) for Commander, Navy Installations Command (CNIC)-owned installations. (CI is the previous name for Design and Construction.)

6.3 Site Plan Review, Inspection, and Corrective Action

For all new development and redevelopment project sites disturbing 2,000 sf or more, the following project site planning process must be followed, in accordance with the SWMMWW. This process includes criteria for BMP selection and design in order to protect water quality and reduce the discharge of pollutants to the maximum extent practicable.

6.3.1 Preparation of a Stormwater Site Plan

For all new development and redevelopment project sites, project-specific Stormwater Site Plans must be prepared as outlined in Volume III of Chapter 3 of the SWMMWW and Chapter 3 of the Low Impact Development Technical Guidance Manual for the Puget Sound (2005).

All stormwater site plans for proposed development activities must be reviewed and approved by the PWD Environmental Division or EV1. DC, FEAD, and PPV construction managers must send site plans to the PWD Environmental Division for review with assistance from NAVFAC EV1 as needed. A checklist to use when evaluating site plans is being created by EV1 and will be used in the future to document site plan reviews.

6.3.2 Preparation of a Construction SWPPP

A construction SWPPP is required in MR#2 of the SWMMWW and by the CGP to address minimizing stormwater pollution for construction sites that disturb one (1) or more acres of land, or less than one acre of land if part of a common plan of development or sale that will ultimately disturb one or more acres of land. A construction SWPPP must be completed if the project is required to meet MR#2, regardless if the CGP applies. The SWPPP should follow the EPA template with modifications to meet the MS4 requirements. The template can be requested from FEAD, DC, or EV1. This document is generated by the contractor and is reviewed, approved, and managed by EV1 and PWD Environmental Division.

6.3.3 Inspections

Inspections required under the MS4 permit are separate and distinct from those required by the CGP SWPPP. The responsible party to conduct these inspections will be PWD Environmental Division, with support from NAVFAC EV1, upon receiving a request from the Contracting Officer Representative (COR), DC, or FEAD. COR, DC or FEAD must keep PWD Environmental aware of inspection needs in order to timely schedule inspections.

Before construction starts DC, FEAD, or the COR must meet with PWD Environmental Division to discuss inspection requirements.

Environmental will work with FEAD to conduct recurring environmental inspections at each construction site. These inspections will involve enforcement of E&SC and all applicable stormwater BMPs, which are elaborated in an Environmental Protection Plan (EPP) written by the construction company in the pre-construction phase. The inspector will inform the project manager of any violations so they can coordinate corrective action among the contractors.

Inspections on construction sites will be conducted as follows:

- Prior to clearing and construction, all developmental sites that have a high potential for sediment transport (as determined through plan review based on definitions and requirements in Appendix C of the MS4 permit) must be inspected and evaluated. If not evaluated based on the appendix, all developmental sites must be inspected.
- All development sites must be inspected during construction to verify proper installation and maintenance of required erosion and sediment controls. All deficiencies identified during inspections must be documented and promptly corrected.
- All development sites will be inspected upon completion of construction and prior to final approval or occupancy to ensure proper installation of permanent stormwater facilities.
- For permanent stormwater treatment and flow control facilities and catch basins in new developments, inspections will occur every six months until 90% of the common plan of development is constructed, or when construction is stopped and the site is fully stabilized.

Inspections will be documented using the Stormwater Construction Site Inspection Form, Appendix D. To comply with the permit, at least 80% of scheduled inspections must be achieved. The Construction Site Inspection Tracker spreadsheet will be used to document compliance.

6.4 Operations and Maintenance

Long-term operation and maintenance (O&M) of permanent stormwater treatment and flow control facilities is imperative for optimal function of the facilities. Annual inspections and maintenance standards are addressed in Section 7, MCM #6, of this Plan.

6.4.1 Responsible Parties for Maintenance

For maintenance to be completed, DC and FEAD must enter the structure into the applicable databases, including Maximo for maintenance and Asset Management, iNFADS, for property identification numbers. During the design phase, maintenance requirements and adequate future funding should be planned.

6.5 Early Action Plan

Not later than the 1st Annual Report, NAS Whidbey Island must submit a written plan to EPA that documents future investments and upgrades operational and maintenance processes to improve stormwater discharge quality. The plan must outline feasible and effective operational and maintenance controls, studies, and monitoring efforts for addressing Table 2.4.4 Pollutants of Concern in the MS4 permit.

The EAP report will be completed by NAVFAC EV1 with significant input from PWD Environmental Division. Specific requirements for developing the report are outlined in the MS4 permit Section 2.4.4. During permit year 2-5, NAS Whidbey Island will work toward planning and implementing the identified EAPs. Progress will be summarized in the annual report.

6.6 Stormwater Infrastructure Investment Plan

Not later than the 4th Annual Report, NAS Whidbey Island must submit a written plan to EPA that documents future investments and upgrades in stormwater infrastructure designed to improve MS4 discharge quality. The plan must outline both operational and structural controls that will be both feasible and effective and developed as outlined in the MS4 permit Section 2.4.4.

6.7 Training

Staff responsible for plan review, hydrologic modeling, site inspections, and enforcement must be adequately trained to conduct these activities. Follow-up training must also be provided as necessary to address changes in procedures, techniques, or staffing. Detailed training requirements are addressed in MCM #1, Education and Outreach.

Training records shall be kept at staff offices and must be provided to PWD Environmental Division to include in the Annual Report.

6.8 Reporting

Table 10-1 Implementation Schedule summarizes the implementation of MCMs and Table 11-1, BMP Metrics Table summarizes efforts to meet the MCMs and metrics. In each annual report, NAS Whidbey Island must provide:

- Any corrective actions taken at construction sites during the previous reporting period;
- Number of site plans reviewed;
- Site inspections conducted, including the location and total number of such inspections and results/response;
- One or more example of major follow-up action(s), any subsequent enforcement actions, and/or any referrals to different departments or agencies;
- Summary of all EAP planned and implemented and the status of the SIIP; and
- Summary of relevant training and staff members trained.

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7 MCM #6 – Pollution Prevention and Good Housekeeping for Municipal Operations and Maintenance

This section provides an O&M program intended to prevent or reduce pollutant runoff from the installation's MS4 and operations. The O&M program consists of the following components:

- Maintenance standards for permanent stormwater facilities;
- Inspection of permanent stormwater facilities;
- Spot check of inspection of permanent stormwater facilities;
- Inspections of catch basins;
- Compliance;
- Maintenance practices;
- Animal waste management;
- PFAS management;
- Training;
- SWPPP for Equipment Maintenance/Material Storage Yards; and
- Reporting.

7.1 Maintenance Standards for Permanent Stormwater Facilities

Appendix E contains the maintenance standard for each type of stormwater structure installed at NAS Whidbey Island. Examples of stormwater structures at NAS Whidbey Island include but are not limited to:

- Open channels;
- Culverts;
- Energy dissipater;
- Inlet and outlet structures;
- Fabric filters;
- Basins;
- Oil water separators;
- Permeable pavement; and
- Stormwater pipes.

The purpose of a maintenance standard is to determine if maintenance of a structural stormwater treatment facility or flow control facility is required, as required in Section 2.5.1 of the MS4 permit. The maintenance standard is a baseline for optimum performance of the facility under the precipitation and runoff conditions for which it was designed. Maintenance standards are not

a measure of the facility's required condition at all times between inspections, and exceeding the maintenance standard between inspections is not a permit violation.

Frequency of inspections are noted on the maintenance standard found in Appendix E. Guidance for identifying a defect and what to do to meet the acceptable standard is provided on each stormwater facility maintenance checklist.

Unless there are circumstances beyond the installation's control, if an inspection required in Section 7.4 of this Plan identifies that a facility's maintenance standard is not being met, the installation must perform appropriate maintenance as follows:

- Within one (1) year for most facilities, except catch basins;
- Within six (6) months for catch basins;
- Within two (2) years for maintenance that requires capital construction of less than \$25,000; and/or
- Report to PWD Environmental Division for inclusion in the Annual Report any schedule for maintenance that requires capital construction of \$25,000 or more.

Where circumstances beyond the installation's control prevent maintenance activity from occurring, the installation must document the circumstances and provide to PWD Environmental for inclusion in the corresponding annual report.

7.2 Responsible Parties for Maintenance

Stormwater infrastructure is designated as a utility system and in fiscal year 2022, stormwater maintenance responsibilities will be delineated to Utilities Management. The Base Operating Services Contract (BOSC) contractor performs inspection and maintenance as required by the current contract.

7.3 Annual Inspections

Annual inspections, using inspection sheets provided at Appendix E of this Plan, will be conducted for all permanent stormwater treatment and flow facilities other than catch basins. A readily available database, maintained by PWD Environmental Division, contains a summary of all facility inspections. The responsible party for conducting the annual inspections and maintaining the spreadsheet is PWD Environmental Division, with support from NAVFAC EV1. If supported by maintenance and inspection reports, the inspection frequency may be reduced but may not exceed two years. Reduction in inspection frequency must be documented and signed by the Commanding Officer (or signature authority). Records of frequency reduction will be kept in Appendix E of this Plan.

7.3.1 Spot-Check Inspection of Structural Stormwater Facilities

NAS Whidbey Island must conduct spot checks of potentially damaged treatment and flow control facilities (other than catch basins) after major storm events using inspection sheets provided in Appendix E of this Plan. A major storm event is defined as rainfall greater than 24-hour, 10-year recurrence interval. At a minimum, a visual inspection must be completed. The inspector should ensure the drain is clear and valves are functioning, and evaluate the depth of solids accumulation. The installation must conduct repairs or take appropriate maintenance

action in accordance with maintenance standards established above, based on the results of the spot check inspections.

7.3.2 Inspections of Catch Basins

Installations must inspect all catch basins and inlets at least once before the end of the permit term. Catch basin inspections are conducted by BOSC contractors and PWD Environmental. Catch basins must be cleaned if inspection indicates cleaning is needed. The MSGP provides required maintenance standards for catch basins covered under the MSGP. Each year the areas and number of catch basins to be inspected will be evaluated and planned to ensure progress is made annually.

NAS Whidbey Island has approximately 3,000 catch basins, and to meet permit compliance, must inspect 750 annually.

All collected screenings, grit, solids, sludge, filter backwash water, decant water, and/or other pollutants removed in the course of maintenance and/or treatment or control of stormwater and other wastewaters must be managed and disposed of in a manner such as to prevent such pollutants from entering the waters of the U.S. Appendix D of the MS4 Permit describes requirements for street waste disposal.

7.3.3 Compliance

To comply with Parts 2.5.2 and 2.5.4 of the Permit, 95% of all catch basins, and 95% of all permanent stormwater facilities used for flow control and treatment must be inspected by the permit expiration date.

7.4 Maintenance Practices

Several maintenance practices can be implemented to reduce stormwater impacts associated with runoff from streets, parking lots, roads or highways, and from road maintenance activities. The installation SWPPP provides requirements for many of the activities listed below and the corresponding BMPs. The following activities must be conducted in a manner that is protective of receiving water quality:

- Pipe cleaning;
- Cleaning of culverts that convey stormwater in ditch systems;
- Ditch maintenance;
- Street cleaning;
- Runway/airfield including firefighting clean up;
- Road repair and resurfacing, including pavement grinding;
- Snow and ice control;
- Utility installation;
- Pavement striping maintenance;
- Maintaining roadside areas, including vegetation management;
- Dust control;

- Application of fertilizer, pesticides, and herbicides, including the development of nutrient management and integrated pest management plans;
- Sediment and erosion control;
- Landscape maintenance and vegetation disposal;
- Trash management; and
- Building exterior cleaning and maintenance.

7.5 Animal Waste Management

Two waterbodies, Oak Harbor Creek and Oak Harbor, are impaired for bacteria. Public education and outreach activities are required at NAS Whidbey Island Seaplane Base to increase awareness of bacterial pollution problems and promote proper pet waste management behavior.

Housing areas at NAS Whidbey Island are managed by Hunt Properties, Inc. and have established pet waste stations in place. Hunt Properties issues a monthly newsletter to residents with routine discussion of the importance of proper pet waste management. Recreation areas within Seaplane Base and Ault Field have pet waste stations managed by MWR.

MWR has placed pet waste stations strategically throughout NAS Whidbey Island parks and green spaces. Stations are stocked with plastic liners and a trash can lined for waste disposal. They are checked regularly and waste is disposed as necessary. Pet waste management policies for residential areas are included within the *Whidbey Island Hunt Military Community Handbook*.

Appendix E provides a list of pet waste stations.

7.6 PFAS Management at NAS Whidbey Island – Ault Field

The MS4 permit requires NAS Whidbey Island to implement measures to minimize the discharge of PFAS via the MS4 during emergency firefighting activities. The MS4 permit does expect NAS Whidbey Island to deploy control measures during an emergency. The MS4 does require the implementation of measures to minimize discharges of PFAS via the MS4 during post-emergency activities, including clean-up.

NAS Whidbey Island must establish specific protocols for minimizing the resuspension, conveyance and discharge of PFAS already in the MS4, both during normal operations and during all maintenance and remediation activities.

PWD Environmental Division must provide written approval prior to discharging accumulated wastewaters that contain, or are likely to contain, PFAS. A construction dewatering procedure is being developed for use by DC and FEAD for areas known to be impacted by PFAS. Until the procedure is completed, all construction dewatering requests must be sent to PWD Environmental as stated above. No stormwater system cleaning and assessment projects may be completed unless specific procedures are followed and approved by PWD Environmental Division in accordance with Section 2.5.8.2 of the MS4 permit.

7.7 Training

An on-going training program will be developed for facility maintenance staff, contracted companies, environmental project officers, or other staff whose construction, operations, or

maintenance job functions may impact stormwater quality. The training program addresses the following:

- Importance of protecting water quality;
- Requirements of this permit;
- Operation and maintenance standards;
- Inspection procedures;
- Selection of appropriate BMPs;
- Ways to perform job activities to prevent or minimize impacts to water quality; and
- Procedures for reporting water quality concerns, including potential illicit discharges.

Follow-up training will be provided as needed to address changes in procedures, techniques, or requirements. Training program specific information can be found in MCM #1, Section 1 of this SWMP.

7.8 SWPPPs for Equipment Maintenance/ Material Storage Yards

A SWPPP for all heavy equipment maintenance or storage yards and/or material storage facilities owned or operated by installations within the permit area that are not already regulated under a NPDES permit shall be developed within 2 years of permit issuance. Implementation of nonstructural BMPs shall begin immediately after the SWPPP is developed. A schedule for installation of any necessary structural BMPs shall be included in the SWPPP. The SWPPP shall include a summary of BMPs expected to be utilized at the site and periodic visual observation of discharges from the facility by responsible staff to verify the effectiveness of BMPs used to reduce pollutants in runoff. As applicable, the SWPPP must include provisions to minimize discharges from the use and clean-up of PFAS-containing AFFFs consistent with Section 2.5.8 of the MS4 permit.

Currently, all such maintenance and storage yards are covered under the installation SWPPP. If any permanent equipment maintenance/material storage yards are established at NAS Whidbey Island facilities and are not already part of the installation SWPPP, they will be incorporated into the installation SWPPP instead of implementing a stand-alone SWPPP.

7.9 Reporting

Table 10-1 Implementation Schedule summarizes the implementation of MCMs and Table 11-1, BMP Metrics Table summarizes efforts to meet the MCMs and metrics. NAS Whidbey Island must provide the following with the annual report:

- First Year: Provide total number of permittee-owned or operated permanent stormwater facilities used for flow control and treatment to be inspected. Subsequent Years: Summarize inspection and maintenance of these facilities;
- First Year: Provide total number of catch basins to be inspected annually. Subsequent Years: Reports must document NAS Whidbey Island's progress toward inspecting and maintaining all catch basins prior to the permit expiration date;

- All activities undertaken to fulfill Section 7.8 above (Parts 2.5.8.1 and 2.5.8.2 of the permit);
and
- Summary of training records and staff members trained.

8 Monitoring, Recordkeeping and Reporting

Evaluation of compliance with permit conditions will be performed annually and documented through each Annual Report.

Two monitoring strategy options are described in the permit. One must be implemented in accordance with MS4 permit section 3.2. Option 1, developing a monitoring plan and completing monitoring described in section 3.3 of the MS4 permit is not the preferred option selected.

8.1 Monitoring Option 2

Participation in the regional Stormwater Action Monitoring (SAM) program, in accordance with permit section 3.4 is Option 2 and the preferred choice for NAS Whidbey Island. NAS Whidbey Island submitted an intent to join the SAM program to the EPA on 12 March 2021. Negotiations with the Washington Department of Ecology SAM program resulted in NAS Whidbey Island being a fully participating member as defined in the letter *Navy on joining Stormwater Action Monitoring Program* in Appendix F. NAS Whidbey Island became a fully participating member of SAM on 28 June 2021.

8.2 Recordkeeping

All records documenting the implementation of the SWMP control measures required by the permit will be submitted to EPA as requested. Records will be retained for a minimum of five years in accordance with Section 3.6 of the MS4 permit.

8.3 Reporting Requirements

Records will be submitted with the annual report and maintained in accordance with sections 3.5 and 3.7 of the MS4 permit. The Annual Report must be uploaded to the public website containing the SWMP within 30 days of the Annual Report due date of 31 March. The reporting period is 1 February – 31 January.

8.4 Monitoring Reports

All monitoring data collected will be submitted as an attachment to the Annual Report in accordance with Section 3.7.3 of the MS4 permit.

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9 Annual Report

Annual reports are submitted to the EPA beginning 1 year after the permit start date. The report shall be completed using Appendix B of the MS4 permit and will include:

Component	Description
General	<ul style="list-style-type: none">• Any signed agreements between co-permittees, if applicable (1st Year Report only – any changes to the agreement with subsequent reports); and• A summary of estimated SWMP implementation costs for the relevant reporting period.
MCM 1	<ul style="list-style-type: none">• Summary of education and outreach activities, and provide one or more examples of successful education/outreach activities.
MCM 2	<ul style="list-style-type: none">• Summarize public involvement and participation activities, and provide one or more examples of successful public involvement/engagement activities.
MCM 3	<ul style="list-style-type: none">• Record of input received and follow-up actions for IDDE calls;• Provide examples of successful IDDE activities; and• Summarize relevant training provided and staff members trained.
MCM 4-5	<ul style="list-style-type: none">• Any corrective/enforcement actions taken at construction sites;• Number of site plans reviewed;• Construction site inspections, including the location and total number of such inspections and result/response;• One or more examples of major follow-up action(s) at construction sites, if applicable;• A summary of trainings attended or conducted;• A summary of all Early Action Projects planned and implemented and the status of the Stormwater Infrastructure Investment Plan; and• A summary of facility maintenance activity accomplished during the previous operating period.• 1st Year Annual Report: summary of Early Action Projects.• 4th Year Annual Report: Stormwater Infrastructure Investment Plan.
MCM 6	<ul style="list-style-type: none">• Where circumstances beyond the installation control prevent maintenance activity from occurring, document the circumstances;• Summary of all permanent stormwater facility inspections, catch basin inspections, maintenance, or repair activities conducted;

Component	Description
	<ul style="list-style-type: none">• Total number of permanent stormwater facilities used for flow control (1st Annual Report). Subsequent Annual Reports must summarize inspection and maintenance of those facilities;• Total number of catch basins to be inspected annually (1st Year Report). Subsequent reports must document progress toward inspecting and maintaining all catch basins; and• Summary of training.
Monitoring	<ul style="list-style-type: none">• All monitoring data for the previous year; and• Proof of membership with SAM.

All annual reports will be made available on the Navy's public website listed in MCM #2.

10 Implementation Schedule

Table 10-1 provides the implementation schedule for activities to be performed during the permit timeframe.

Table 10-1: MS4 Phase II Timeline

Timeframe	Requirement
6 months	Prepare and submit monitoring assessment plans and QAPPs or submit letter of intent for SAM
	Convene meetings annually (MCM-2)
1 year	Prepare the SWMP Plan (including O&M for maintenance)
	Initial training for stormwater maintenance, P2, and general awareness
	Publish SWMP Plans on publicly available website.
	Submit 1 st Year Annual Report. First year report must also document total number of permanent stormwater facilities and total # of catch basins to be inspected annually.
2 years	Policy must be adopted to prohibit all illicit discharges into the MS4 (MCM-3)
	Initial training for IDDE
	Begin IDDE dry weather field screening for non stormwater flows from stormwater outfalls.
	Develop and implement SWPPPs for all heavy equipment maintenance or storage yards, and/or material storage facilities owned or operated by the Permittee within the Permit Area, which are not already regulated under NPDES MSGP.
	Submit 2 nd Year Annual Report
3 rd Year	Submit 3 rd Year Annual Report
4 th Year	NAS Whidbey Island must submit a written plan that documents future investments and upgrades (Stormwater Infrastructure Plan)
	Submit 4 th Year Annual Report
180 days prior to permit expiration date	Complete field screening of at least 75% of all MS4 outfalls located within the permit area.
	Update and maintain maps of the MS4 located within the permit area
	Reapply for new permit
	Complete required mapping and submit maps with permit renewal application.

Timeframe	Requirement
Twice before the end of the permit	Provide two volunteer activities (MCM-2)
Before the end of the permit term	Inspect 95% of all catch basins and inlets (MCM-6)
	Must inspect at least at least 95% of the total universe of identified permanent stormwater facilities used for flow control and treatment.
5 th Year	Submit 5 th Year Annual Report

11 BMP Metrics Table

Table 11-1. SWMP BMP Metrics Table

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
MCM #1- Training	Awareness efforts to address IDDE, improper disposal of waste, impacts of illicit discharges and dumping on stormwater, and the Stormwater Management Plan.	Training records, the number of attendees completing the training and number of materials provided to attendees. The number of OJT follow up trainings.	2.1.1.	3.2.2	Year 1-5	AEC training covers this topic. PNC LLC IDDE and O&M training covers this topic. Groups to be trained: all personnel responsible for identification and investigation.	PWD Environmental Division, EVI, PNC LLC
	Online and/or classroom training for IDDE.	Training records for attendees.	2.3.4	3.2.2	Year 2-5	Groups to be trained: all personnel responsible for identification and investigation.	PWD Environmental Division
	Online and/or classroom training and awareness efforts to address construction runoff and the Stormwater Management Plan.	Training records, the number of attendees completing the training and number of materials provided to attendees. The number of OJT follow up trainings.	2.4.5	3.2.3	Year 1-5	Design and Construction Day training covers this topic. Groups to be trained: all personnel whose primary job duties are implementing the program to control stormwater runoff from new development, redevelopment, and construction sites including plan review, construction site inspections, and enforcement. Year 1: Ensure all current employees are trained. Year 2-5: Ensure all new employees receive training within the first 6 months of employment.	PWD Environmental Division, EVI, PNC LLC, FEAD, DC

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
MCM #1- Training	Online and/or classroom training and awareness efforts to address operation and maintenance and the Stormwater Management Plan.	Training records, the number of attendees completing the training and number of materials provided to attendees. The number of OJT follow up trainings.	2.5.9	3.2.4	Year 1-5	AEC training covers this topic. PNC LLC IDDE and O&M training covers this topic. Groups to be trained: all maintenance staff, contracted companies, environmental project officers, and other personnel whose construction, operations or maintenance job functions may impact water quality.	PWD Environmental Division, EVI, PNC LLC, Utilities Management
	Implementation of behavioral change campaign using Community Based Social Marketing strategies to impact spill response at the installation.	Flyers posted, brochures distributed, CBSM plan completion Review of behavioral change topic annually, to determine if changes are necessary, document determination.	2.1.1.3	3.2.5	Years 1-5	Focus on spill procedures, pet waste management, illicit discharge identification, proper waste disposal	PWD Environmental Division, EVI
	General Awareness training	Number of personnel and job titles of positions which complete the training	2.1.1	3.2.6	Year 1-5	Groups to be trained: personnel whose job functions may impact water quality.	PWD Environmental Division

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
MCM #1- Training	Awareness campaign to address general stormwater quality concerns and the Stormwater Management Plan.	Number of newsletters, posters, brochures distributed to personnel. Articles and number of resident who receive the newsletter. The number of stormwater related social media posts and articles published. Estimated attendance of in person outreach events.	2.1.1	3.2.6	Year 1-5	Groups to be trained: all personnel. Combination of region stormwater information and base specific stormwater requirements.	PWD Environmental Division, EVI
	Participate in base events such as Earth Day, town halls, America Recycles Day, etc.	Number of materials distributed and summary of activity.	2.1.1	3.2.6	Years 1-5	Will coordinate with applicable parties to maximize efforts. Year 1, there will be a delay with in-person events due to COVID-19.	PWD Environmental Division, EVI
	Southern Resident Killer Whale Outreach and Education	Number of attendees at the training provided by NOAA. Number of general educational materials with SRKW related information.	2.1.2	3.2.7	Years 1-5	NOAA (NMFS) Protected Resources Division has developed a training presentation and will serve as the experts for this training.	NOAA, EVI
	Bacterial Pollution Education and Outreach	Number of signs posted, number of brochures and materials provided to target audiences. Number of posters put up.	2.5.7	3.2.8	Years 1-5	A robust system of pet waste stations exist on NAS Whidbey Island.	PWD Environmental Division, EVI, PNC LLC, MWR

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
MCM #2- Outreach	Engage annually among appropriate staff and management	Keep records of the number of meetings with Navy personnel and meeting notes. Keep records of the number of public engagement discussions completed.	2.2.2	4.2	Yearly / as needed	Internal Navy meetings are actively being completed.	PWD Environmental Division, EVI, PAO
	Provide the SWMP to the public and make revisions (if applicable) annually.	Date of when SWMP was posted to the public website. Number of modifications.	2.2.3	4.3	Year 1, updates Year 2-5	Update version on website as updates are made.	PWD Environmental Division, EVI
MCM #2- Outreach	Organize one or more outreach events	Number of attendees and measurement of the activity (e.g. lbs. of waste collected, miles of trail built/cleaned etc.)	2.2.4	4.4	Year 2-4	Will coordinate with applicable parties to maximize efforts. Year 1, there will be a delay with in-person events due to COVID-19.	PWD Environmental Division, EVI, other NAVFAC NW groups
	Progress of map updates	Percentage of completion for base wide updates of stormwater maps.	2.3.1	5.1	Year 1-5	An 18 month effort to update maps started in July 2021, via a contract	PWD Environmental Division, EVI, NAVFAC Region
MCM #3- IDDE	Effectively prohibit non-stormwater discharges into the MS4 (except those authorized in Part 1.3.4 of the permit).	Establishment of policy	2.3.2	5.2	Year 2	Will be incorporated into base instructions as applicable.	PWD Environmental Division, EVI

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
MCM #3- IDDE	Discharges from potable water sources, including water line flushing, hyperchlorinated water line flushing, fire hydrant system flushing, and pipeline hydrostatic test water: Planned discharges must be dechlorinated to a total residual chlorine concentration of 0.1 parts per million (ppm) or less, pH-adjusted, if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments	Number of personnel made aware of requirement and OJT provided.	2.3.2.2.1	5.2.2	Year 1-5		Personnel conducting discharge, PWD Environmental Division
	Minimize discharges from lawn watering and other irrigation runoff, street and sidewalk wash water, water used to control dust and routine external building wash down through public education and water conservation.	Training materials, number of concerns reported.	2.3.2.2.2	5.2.2	Year 1-5	Training will be covered by IDDE specific training. PNC LLC will report any concerns from residents to PWD Environmental.	PWD Environmental Division, EVI

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
MCM #3- IDDE	<p>Dechlorinated swimming pool discharges: The discharges must be dechlorinated to a concentration of 0.1 ppm or less, pH-adjusted and reoxygenized if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments in the MS4. Discharges must be thermally controlled to prevent an increase in temperature of the receiving waters. Swimming pool cleaning wastewater and filter backwash must be discharged to the sanitary sewer.</p>	<p>Number of personnel made aware of requirement and OJT provided.</p>	<p>2.3.2.2.3</p>	<p>5.2.2</p>	<p>Year 1-5</p>		<p>Personnel completing discharge, PWD Environmental Division</p>
	<p>Minimize discharges from street and sidewalk wash water, water used to control dust, and routine external building wash down that does not use detergents through public education and water conservation efforts.</p>	<p>Training materials and trainings provided</p>	<p>2.3.2.2.4</p>	<p>5.2.2</p>	<p>Year 1-5</p>	<p>Language will be added to the UFGS and DC Construction Day annual training.</p>	<p>Personnel completing discharge, PWD Environmental Division</p>

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
MCM #3-IDDE	For any discharges of accumulated stormwater from utility vaults, conduct sampling to verify that no pollutants cause or contribute to water quality impairments, AND visually verify prior to any discharge, that there are no visible sheens or solids in the discharge?	Sampling completed and number of inspection forms completed for applicable discharges.	2.3.2.2.5	5.2.2	Year 1-5		Personnel completing discharge, PWD Environmental Division
	For any discharges of accumulated stormwater from secondary containment structures, conduct sampling to verify that no pollutants cause or contribute to water quality impairments, AND visually verify prior to any discharge, that there are no visible sheens or solids in the discharge.	Sampling completed and number of notifications made about discharges. Number of OJT completed.	2.3.2.2.6	5.2.2	Year 1-5		Personnel completing discharge, PWD Environmental Division
	Dry weather surveys conducted and field screening monitoring to identify non-stormwater flow from stormwater outfalls.	Number of dry weather surveys completed annually. Number and type of illicit connections identified and correction efforts.	2.3.3.2	5.3	Year 5 (unless done Year 1-4)	Complete at least 75% dry weather field screenings by year 5. Dry weather surveys were started in 2020.	PWD Environmental Division, EV1

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
MCM #3- IDDE	Illicit discharge responses, spills and recurring discharges.	Number of responses, referrals, and spills.	2.3.3.3	5.3	Year 1-5		PWD Environmental Division, EV1
MCM #4/5- Construction	Policy - implement enforceable mechanism	Completed policy and review as applicable. Number of BMPs, LID features incorporated in construction projects, reduction in runoff quantity, changes in water quality	2.4.2	6.2	Year 1-5		PWD Environmental Division, EV1, FEAD, DC

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
MCM# 4/5- Construction	Project review, site plan review	Number of reviews completed	2.4.3.1	6.3.1	Year 1-5	Incorporate permanent stormwater quality and/or quantity controls for construction projects in accordance with SWMMWW requirements. Implement long-term O&M of permanent stormwater facilities.	PWD Environmental Division, EV1, DC, FEAD
	Inspections prior to clearing and construction for all sites that have a high potential for sediment transport as determine through plan reviews based on Appendix C of the MS4 permit.	Number of evaluations based on Appendix C in the MS4 permit, and number of inspections completed.	2.4.3.2	6.3.3	Year 1-5	DC, FEAD, and COR must notify PWD Environmental Division to ensure required inspections are completed.	PWD Environmental Division, EV1, DC, FEAD, COR
	Inspections of all development sites during construction to verify proper installation and maintenance of required erosion and sediment controls.	Number of inspections completed, number of corrective actions completed	2.4.3.3	6.3.3	Year 1-5	DC, FEAD, and COR must notify PWD Environmental Division to ensure required inspections are completed.	PWD Environmental Division, EV1, DC, FEAD, COR
	Inspections of permanent stormwater treatment and flow control, BMPs/facilities, and catch basins in new developments every 6 months until 90% completion of project.	Percentage of inspections completed, number of corrective actions completed	2.4.3.4	6.3.3	Year 1-5	DC, FEAD, and COR must notify PWD Environmental Division to ensure required inspections are completed.	PWD Environmental Division, EV1, DC, FEAD, COR

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
MCM #4/5- Construction	Inspect development sites upon completion of construction and prior to final approval or occupancy to ensure proper installation of stormwater facilities.	Number of inspections completed, number of corrective actions completed	2.4.3.5	6.3.3	Year 1-5	DC, FEAD, and COR must notify PWD Environmental Division to ensure required inspections are completed.	PWD Environmental Division, EV1, DC, FEAD, COR
	EAP report and planning and implementation	Progress (%) of EAP implementation	2.4.4	6.8	Year 1-5		EV1, PWD Environmental Division, Utilities Management, DC, other groups as necessary
MCM #6- Operations and Maintenance	Implement enforceable mechanism and maintenance standards	Implementation of policy and standards.	2.5.1	7.2	Year 1-5	Commander, Naval Installations Command (CNIC) HQ OPS Plan (Tab DD, page 126), and the FY20 CNIC-NAVFAC Utilities Standard Operating Procedures	NAVFAC NW
	Required maintenance activities completed	Number of maintenance activities completed	2.5.1	7.1	Year 1-5	Maintain permanent stormwater facilities and catch basins and inlets in accordance with maintenance standards	Utilities Management, BOSC
	Inspection of permanent stormwater facilities	Number of annual inspections of owned or operated permanent stormwater facilities (other than catch basins)	2.5.2	7.3	Year 1-5		PWD Environmental Division, EV1, BOSC

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
	Completion of spot checks	Number of spot checks completed	2.5.3	7.3.1	Year 1-5	Minimum of visual inspection of potentially damaged permanent stormwater control facilities (other than catch basins) after major storm events. Major storm event is rainfall greater than 24-hr, 10 year storm.	PWD Environmental Division, EV1
MCM #6- Operations and Maintenance	Inspect catch basin and inlets, and catch basin cleaning	Number of inspections completed annually, percentage of cumulative inspections since year 1, overall percentage of catch basin and inlet inspections completed. Number of catch basins cleaned.	2.5.4	7.3.2	Year 1-5		PWD Environmental Division, EV1, BOSC
	Animal waste management activities	Number of pet waste stations, signs, posters and other educational activities/materials, number of inspections for pet waste stations and bags used annually.	2.5.7	7.5	Year 1-5		PWD Environmental Division, EV1, MWR, PNC LLC
	Activities and protocols put in place to minimize the resuspension, conveyance and discharge of PFAS in the MS4.	Number of protocols established and activities completed	2.5.8	7.6	Year 1-5		PWD Environmental Division, EV1, DC

BMP	Measurable Goal	Metric	Permit Section	SWMP Section	When	Status/Notes	Responsible Party
	Prepare SWPPPs for Equipment Maintenance/Material Storage Yards	Number of SWPPPs completed, if applicable	2.5.10	7.8	Year 1-5	Current equipment maintenance/material storage yards are captured in the installation MSGP SWPPP.	PWD Environmental Division, EV1,
Monitoring, Recordkeeping, and Reporting	Option 2: Participation in SAM	SAM involvement records, invoice and receipt. Summary of SAM annual report evaluation with installation stormwater management.	3.4	8.1	Year 1-5	Participation has been negotiated and completed for Year 1.	EV1
	Posting of Annual Report on public website with SWMP	Date Annual Report was uploaded	3.7.2	8.3	Year 1-5		PWD Environmental Division, EV1
	Summary of all monitoring data collected.	Monitoring data	3.7.3	8.4	Year 1-5		PWD Environmental Division, EV1

12 List of References

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<https://www.wsdot.wa.gov/publications/manuals/fulltext/M31-16/highwayrunoff.pdf>
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- u. NAVFAC Commander (2005). Endorsement of CI Permitting Ser-05007
- v. FY20 CNIC-NAVFAC Utilities Standard Operating Procedures
- w. Hunt Military Community. Whidbey Island Community Handbook, Version 1.
<https://www.whidbeyislandfamilyhousing.com/current-residents/documents-and-forms>

Supplemental References

- Code of Federal Regulations, 40 CFR 122, and others as applicable
- DoD Directive 4715.21, Climate Change Adaptation and Resilience, Change 1, 31 August 2018
- NAVFAC Climate Change Installation Adaptation and Resilience, January 2017
- NAS Whidbey Island Solid Waste Management Plan
- NAS Whidbey Island Integrated Pest Management Plan

APPENDIX A: ADMINISTRATIVE INFORMATION

Records of Review and Amendments

**APPENDIX B:
EDUCATION AND OUTREACH AND PUBLIC
INVOLVEMENT**

IDDE Poster

Pet Waste Management Brochure

No Vehicle Maintenance Magnet

Prevent Water Pollution



Pouring, leaking or discarding any substance other than rainwater into stormwater system *degrades* our water resources.



Pollutants dumped onto our streets or in our storm drains do not go to a sewage treatment plant to be cleaned. Instead, these pollutants are discharged directly into the storm system which flows into our natural waterways.

If you witness a potential spill or an illegal dumping into a storm drain, the street, a ditch, or a water body, **REPORT IT!**

Naval Air Station Whidbey Island
To report emergency spills call
257-3333

To report non-emergency illicit discharges please email
navfac_nw_stormw.fct@navy.mil, and indicate the location of the concern.



ONLY RAIN DOWN THE DRAIN!

Tips

- Picking up pet waste is no one's favorite job. Hopefully the tips below will make the job a little less icky.
- You can turn pet waste collection baggies inside out over your hand to use the bag as a glove when picking up the waste.
 - Many pet owners prefer to double bag the collected pet waste.
 - After collection, you can tie the baggies onto the leash so that you do not have to hold or put the full baggie in your pocket.
 - Long handled pet waste scoopers are available at pet stores to assist with waste collection.
 - Although you can purchase baggies specifically for pet waste at pet stores, you can also re-use other bags including newspaper bags, bread bags, or sandwich baggies.
 - Pet waste digesters are available for purchase at pet stores.

Additional Information

For more information, contact the Naval Base Kitsap Stormwater Manager at (360) 315-1992 for Keyport, Jackson Park, Bangor or the Naval Air Station Whidbey Island Stormwater Manager at (360) 257-5631. Residents please review pet waste management in you Community Handbook or contact your Neighborhood Management Office. Additional information is available at:

EPA Pet Waste Management:
<https://cfpub.epa.gov/npstbx/files/Pet%20Care%20Fact%20Sheet.pdf>

Washington Department of Ecology: <https://ecology.wa.gov/About-us/Get-involved/What-you-can-do/Washington-Waters-ours-to-protect/Manage-animal-manure>

Kitsap County Stormwater Management:
<https://www.kitsapgov.com/how-do-i/apply-for/pet-waste-bag-station>

Water Environment Federation Pet Waste Management (under Too Cute to Pollute?):
www.wef.org/resources/for-the-public/public-information/fact-sheets/

Pet waste is a health risk to people, other pets, and the environment. Bacteria in pet waste can make people sick. When not disposed of properly, pet waste is washed into storm drains and ends up in our local waterways.

Always bag the pet waste and dispose of it properly.



May 2020



WE ALL LIVE DOWNSTREAM

Preventing Pollution from Pet Waste



The Problem

Pet waste is not only smelly and unsightly, but also is a health risk to pets, people, and our local water bodies.

You may think that pet waste left on a lawn or sidewalk fertilizes the soil. However, in most cases the waste is washed into storm drains that lead directly into nearby waterways **without** being treated first.

The problem is that pet waste contains harmful bacteria such as E. coli and fecal coliform, and parasites. This can make the water unfit for recreation such as swimming, fishing, or tubing and can spread gastrointestinal illnesses in humans such as Giardia and Salmonella.



These pollutants are harmful to the thousands of species of plants and animals (including fish, crabs and shellfish, birds, grasses, mammals, reptiles, and amphibians). **People who eat food from contaminated water can get very sick.**

Additionally, pet waste decays very slowly and the pollutants in pet waste can travel several miles in the water, contaminating the water as it travels.



The Facts

Some of the harmful effects of pet waste include:

- When pet waste decays, it uses up dissolved oxygen and releases compounds that are harmful to fish, shellfish and other aquatic life.
- Each dog produces approximately 0.42 pounds of fecal waste per day, or about 150 pounds per year. Just think how much waste is produced by the pets in your neighborhood!
- A single gram of pet waste contains an average of 23 million fecal coliform bacteria that can cause disease in humans.
- A single day's waste from one large dog can contain 7.8 billion fecal coliform bacteria - **enough to close 15 acres of shellfish beds.**
- EPA estimates that 2 to 3 days of pet waste from a population of 100 dogs would contribute enough bacteria and nutrients to temporarily **close** an entire bay for swimming and shellfishing. *Source: EPA 1993*



The Solution

Be responsible and clean up after your pets. It is as easy as 1-2-3:

1. Bring a bag.



2. Use the bag to pick up the pet waste.



3. Dispose of the bag properly in the trash...



**and not down
the storm drain!**



PREVENT STORMWATER POLLUTION

NO VEHICLE MAINTENANCE IN BASE PARKING LOTS



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APPENDIX C: IDDE
Illicit Discharge Report Form
Master Outfall Inventory
List of Field Supplies
Vault Inspection Form
Indicator Sampling Flow Chart

Illicit Discharge Reporting Form
 Version 2.0 July 2021

This form is to be completed for a) yearly dry weather surveys for the Outfall Reconnaissance Inventory and b) characterization of illicit discharges reported by other means. This form should be completed by stormwater personnel and placed in the folder located here: U:\SITES\EFANW\Enviro\Stormwater\MS4\NASWI\IDDE\Completed Dry Weather Surveys. Please ensure the Date listed in Section 1 covers all dates that were required for completing this form and any investigations.

Section 1: Background Data

Date	Time
Drainage Basin	Outfall ID (if applicable)
Form Completed By (name, phone #)	
Ambient Temp (F)	Last Rainfall
Location	GPS Coordinates
Notes (hotline reporting?)	

Section 2: Outfall Description & Indicators

General description:	Submerged in Water? <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Fully
	Under Sediment? <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Fully
Outfall Damage: <input type="checkbox"/> Cracking, Chipping <input type="checkbox"/> Corrosion <input type="checkbox"/> Other _____	
Vegetation <input type="checkbox"/> Slight overgrowth <input type="checkbox"/> Moderate overgrowth <input type="checkbox"/> Excessive overgrowth <input type="checkbox"/> Other: _____	
Flow Present? <input type="checkbox"/> Yes <input type="checkbox"/> No	If no flow present, then No Further Action. Skip to Section 5. If flow is present, continue to Section 3.

Section 3: Flow Characterization

(continues to pg. 2)

Flow Description: Estimated Volume (L/s): Method of Flow Estimation:	Deposits/Stains <input type="checkbox"/> None <input type="checkbox"/> Oil <input type="checkbox"/> Sewage fuzz <input type="checkbox"/> Other: _____
pH & Temp (F)	Phosphate (ppm)
Ammonia(ppm)	Chlorine (total/free ppm)
Hardness (CaCO3 ppm)	Alkalinity (CaCO3 ppm)
Nitrate/Nitrite (ppm)	
Were samples collected for lab? <input type="checkbox"/> Yes <input type="checkbox"/> No	Sample Notes:

Section 3: Flow Characterization

(continued)

<p>Odor - Description</p> <p><input type="checkbox"/> Sewage <input type="checkbox"/> Rancid/Sour <input type="checkbox"/> Petroleum/Gas</p> <p><input type="checkbox"/> Sulfur <input type="checkbox"/> None</p> <p><input type="checkbox"/> Other _____</p>	<p>Odor - Severity</p> <p><input type="checkbox"/> Faint <input type="checkbox"/> Easily Detectable <input type="checkbox"/> Noticeable from a distance</p> <p><input type="checkbox"/> N/A</p>
<p>Color - Description</p> <p><input type="checkbox"/> Clear, no color</p> <p><input type="checkbox"/> Other _____</p>	<p>Color - Severity</p> <p><input type="checkbox"/> Faint <input type="checkbox"/> Clearly visible in sample container <input type="checkbox"/> Clearly visible in outfall</p> <p><input type="checkbox"/> N/A</p>
<p>Flotables - Description</p> <p><input type="checkbox"/> Sewage (toilet paper) <input type="checkbox"/> Petroleum (oil sheen)</p> <p><input type="checkbox"/> Suds</p> <p><input type="checkbox"/> Other _____</p>	<p>Flotables- Severity</p> <p><input type="checkbox"/> Slight <input type="checkbox"/> Some <input type="checkbox"/> Heavy</p> <p><input type="checkbox"/> N/A</p>
<p>Overall Characterization</p> <p><input type="checkbox"/> Discharge not harmful (skip to Section 5) <input type="checkbox"/> Discharge potentially harmful <input type="checkbox"/> Discharge harmful to human health and/or environment</p>	

Section 4: Response

<p>Nature of Discharge (see Indicator Sampling Flow Chart)</p> <p><input type="checkbox"/> Residential <input type="checkbox"/> Industrial/Commercial <input type="checkbox"/> Industrial/Process Water <input type="checkbox"/> Sanitary Wastewater <input type="checkbox"/> Human/Animal Waste <input type="checkbox"/> Tap Water</p> <p><input type="checkbox"/> Groundwater <input type="checkbox"/> Other _____ <input type="checkbox"/> Unknown/Further Investigation Req</p>
<p>Source of Discharge</p>
<p>Action Taken (downstream facilities/personnel notified? etc)</p>

Section 5: Next Steps

<p><input type="checkbox"/> No Further Action <input type="checkbox"/> Open For Further Investigation</p>	<p>Notes:</p>
---	---------------

Master Outfall Inventory (ORI) List

	FEATURENAME	METANOTES	CREATOR	DATECREATED
1	AFOF27	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
2	AFOF26	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
3	AFOF28	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
4	AFOF29	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
5	AFOF30	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
6	AFOF31	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
7	AFOF34	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
8	AFOF33	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
9	AFOF32	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
10	AFOF4	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
11	AFOF10	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
12	AFOF5	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
13	AFOF1	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
14	AFOF8	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
15	AFOF9	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
16	AFOF2	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
17	AFOF7	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
18	AFOF6	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
19	AFOF3	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
20	AFOF12	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
21	AFOF14	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
22	AFOF13	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
23	AFOF11	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
24	AFOF15	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
25	AFOF24	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
26	AFOF23	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
27	AFOF17	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
28	AFOF25	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
29	AFOF18	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
30	AFOF16	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
31	AFOF19	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
32	AFOF20	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
33	AFOF21	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
34	AFOF22	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
35	SPOF7	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
36	SPOF8	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
37	SPOF1	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
38	SPOF2	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
39	SPOF10	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
40	SPOF11	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
41	SPOF12	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
42	SPOF5	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
43	SPOF6	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
44	SPOF4	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
45	SPOF3	2019 SWPPP	TRIHIDRO	8/28/2019 20:32
46	SPOF9	2019 SWPPP	TRIHIDRO	8/28/2019 20:32

List of Field Supplies

Field List of Supplies

1. Safety gear (reflective vests, steel-toed shoes, cones, first aid kit)
2. Gloves (other PPE as necessary)
3. Field notebook, pens
4. Illicit Discharge Reporting form
5. Indicator Sampling Flow Chart
6. Flashlight/headlamp
7. Extending arm dipper for sampling
8. Manhole puller
9. Sample bottles
10. Primary indicators test strips and/or meters:
 - a. pH
 - b. Ammonia
 - c. Chlorine
11. Follow-up indicators test strips and/or meters:
 - a. Fecal coliform bacteria
 - b. Nitrates
12. Maps, as needed
13. GPS Trimble, as needed
14. Machete/clippers, as needed

Vault Inspection Checklist

Installation: _____ Date: _____ Time: _____

Weather: _____ Inspected By: _____

Vault Address: _____ Vault Ownership: _____

General Location/Bldg. #: _____ Vault ID #: _____

Estimated Volume: _____ Vault Use: _____

Water Quality:

Where will the water be discharged to (circle answer): Storm sewer Grass/Infiltration Sanitary Sewer*

*Prior to discharge to sanitary sewer contact Wastewater Program Manager

Requirements necessary to meet before discharge, based on discharge location:	
Grass/Infiltration	Storm Sewer
No sheen present	No sheen present
No smell present	No smell present
	No accumulated sediments present
	Review of spill history, potential contaminants present and sampling completed to verify no contaminants present. Must contact Installation stormwater manager for verification.

Please complete the required questions based on discharge location.

Sheen present: Yes or No Smell present: Yes or No

Accumulated sediments present: Yes or No History of spills: Yes or No

What pollutants may be reasonably expected to be present? N/A or List below

Has previous sampling ever occurred: Yes or No If yes, when? _____

If yes, were any contaminants found. If yes please list: Yes or No

Vault is satisfactory for discharge to location specified above: Yes or No

Vault Discharge completed under emergency conditions: Yes or No

If so, provide explanation: _____

Inspector Signature: _____ Date: _____

Provide completed form to Installation Stormwater Program Manager for required record keeping per the MS4 permit.

Utility Vault Inspection Form

In accordance with MS4 Permit Section 2.3.2.2.5

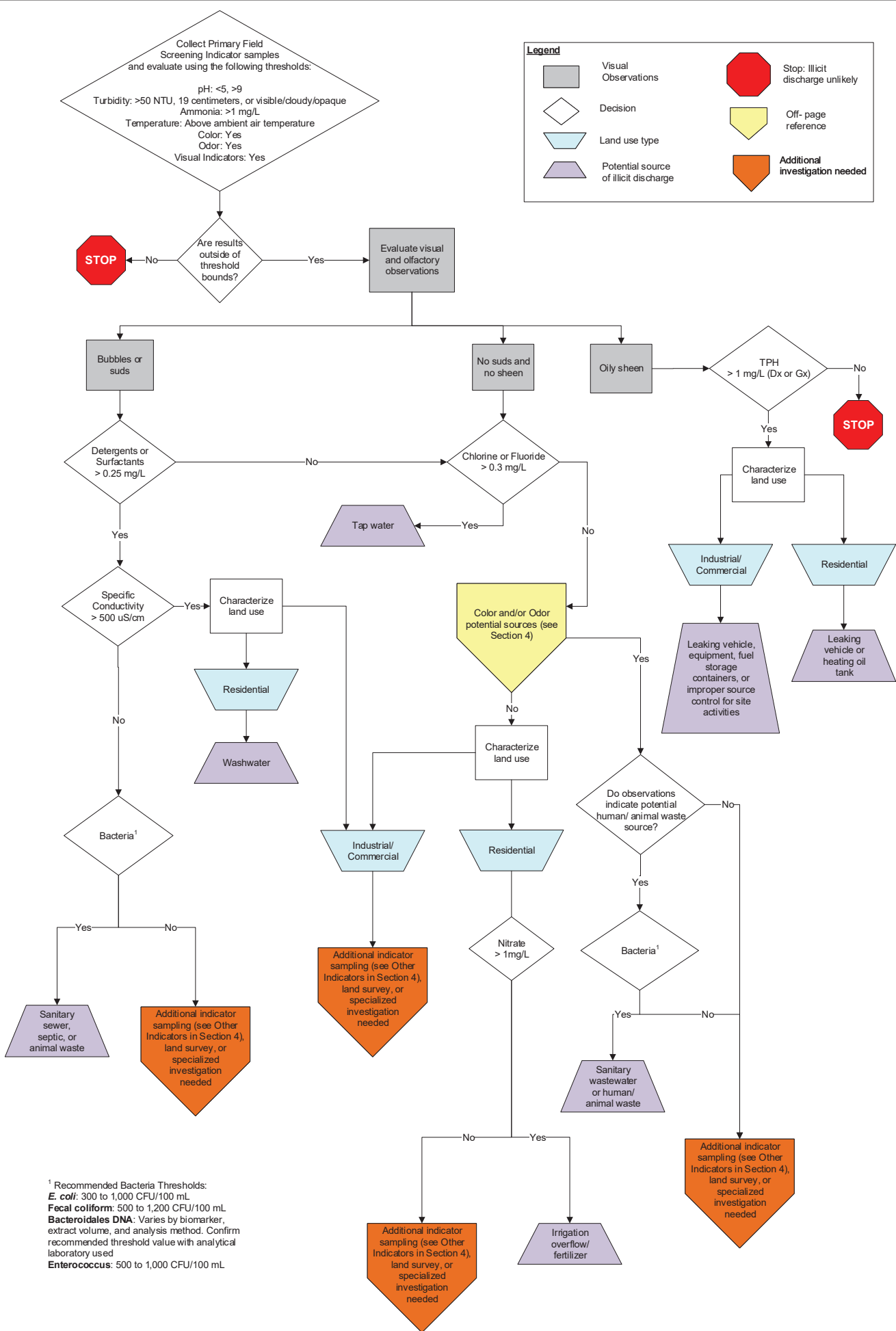


Figure 4.1. Indicator Sampling Flow Chart (Urban Land Use).

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**APPENDIX D: NEW DEVELOPMENT,
REDEVELOPMENT, AND CONSTRUCTION SITE
RUNOFF CONTROL DOCUMENTS**

Navy LID Memo

Construction Site Inspection Form

Flow Charts and Thresholds



DEPARTMENT OF THE NAVY
THE ASSISTANT SECRETARY OF THE NAVY
(INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON, D.C. 20350-1000

NOV 16 2007

MEMORANDUM FOR DEPUTY CHIEF OF NAVAL OPERATIONS
(FLEET READINESS AND LOGISTICS)
DEPUTY COMMANDANT OF THE MARINE CORPS
(INSTALLATIONS AND LOGISTICS)

SUBJECT: Department of the Navy Low Impact Development (LID) Policy for Storm Water Management

- References:
- (a) 33 United States Code 1251 (Clean Water Act)
 - (b) Title 40 Code of Federal Regulations 122, 130
 - (c) Department of Defense Unified Facilities Criteria 3-210-10 Design for Low Impact Development, October 2004
 - (d) Executive Order 13423 "Strengthening Federal Environmental, Energy, and Transportation Management", January 2007
 - (e) OPNAVINST 5090.1C, Clean Water Ashore Requirement, October 2007
 - (f) MCO P5090.2A, Water Quality Management, July 1998

BRAC 05 implementation, Department of Defense (DoD) Grow the Force Initiatives, and ongoing installation sustainment and modernization, have resulted in significant construction activity on Department of the Navy (DON) installations. New construction results in loss of natural vegetation cover and drainage capacity and increased storm water runoff. Conventional storm water collection and conveyance systems and storm water treatment options do not and can not replicate natural systems, thus increasing the volume and flow of storm water as well as sediment and nutrient loadings to streams, wetlands, and other receiving water bodies. Because of continuing water quality problems, States and the US Environmental Protection Agency are considering mandatory treatment and control of storm water. Conversely, low impact development (LID) techniques offer a suite of Best Management Practices that maintain or restore predevelopment hydrology. It mitigates the adverse effects of construction projects on water quality by cost effectively reducing the volume and pollutant loading of storm water before it reaches the receiving water bodies. LID utilizes strategies that infiltrate, filter, store, evaporate, and/or retain runoff close to its source. LID further reduces installation reliance on aging storm water management infrastructure. References (a) thru (f) provide requirements and guidance for LID.

This DON policy sets a goal of no net increase in storm water volume and sediment or nutrient loading from major renovation and construction projects¹. In order to support this goal, as well as reduce reliance on conventional storm water collection systems and treatment options, this policy directs that LID be considered in the design for all projects that have a storm water management element. LID will be implemented where possible to assist DON installations in complying with references (a) and (b), as well as all applicable State and Federal requirements for sustainable development. In those infrequent situations where LID is not appropriate given the characteristics of the site, the Navy and Marine Corps are authorized to establish a waiver process that, if used, would include regional engineer level review and approval.

The Navy and Marine Corps are directed to immediately plan, program, and budget to meet the requirements of this policy starting in FY 2011. All efforts shall be made to incorporate LID practices in the fiscal years 08, 09, and 2010. The services are further directed to submit to my office an annual report that summarizes all projects that have a storm water component and identify how LID was implemented or waived. If waived, the report must identify the approving official. Naval Facilities Engineering Command, as the Department's expert in acquisition, construction, and environmental management, shall assist Navy and Marine Corps installations in meeting these policies. My point of contact for this matter is CAPT Robin Brake, robin.brake@navy.mil, (703) 693-2931.



BJ Penn

¹ Major renovation projects are defined as having a storm water component and exceeding \$5 million when initially approved by DASN (I&F). Major construction projects are defined as those exceeding \$750K.

Stormwater Construction Site Inspection Form

This inspection and form should be completed by qualified stormwater personnel. Upon completion, a copy of this form should be shared onto the folder.

General Information			
Project Name			
NPDES Permit No.		Location	
Date of Inspection		Start/End Time	
Inspector's Name(s) CESCL certified?			
Describe present phase of construction			
Type of Inspection:			
<input type="checkbox"/> Pre-construction <input type="checkbox"/> During construction <input type="checkbox"/> Pre-storm event <input type="checkbox"/> Post-storm event <input type="checkbox"/> Final inspection			
Weather Information			
Weather at time of this inspection?			
<input type="checkbox"/> Clear <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Sleet <input type="checkbox"/> Fog <input type="checkbox"/> Snowing <input type="checkbox"/> High Winds			
<input type="checkbox"/> Other:		Temperature:	Precipitation last 24hrs:
Are there any discharges at the time of inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe:			

Site-specific BMPs				
	BMP	BMP Installed?	Maintenance Required?	Corrective Action Needed and Notes
1		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
13		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
14		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
15		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
16		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
17		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
18		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
19		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
20		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
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22		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
23		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
24		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Overall Site Issues				
	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4	Are discharge points and receiving waters free of any sediment deposits?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6	Is the construction exit preventing sediment from being tracked into the street?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12	(Other)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Non-Compliance

Describe any incidents of non-compliance not described above:

Follow-up Action

For any incidents of non-compliance, what will be the follow-up action?

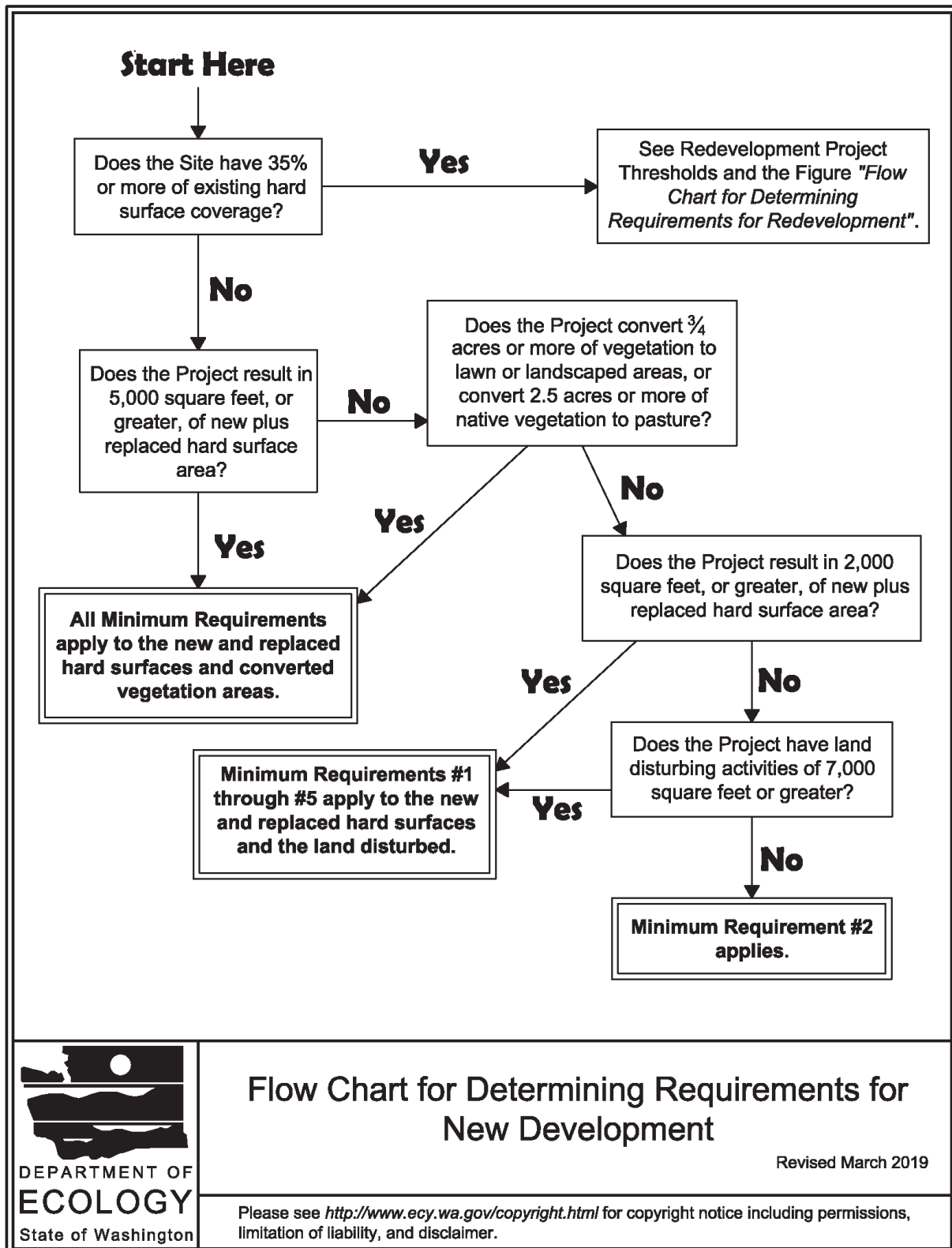
Point of Contact

Signature of Inspector:

Print name and title: _____

Signature: _____ **Date:** _____

Figure I-3.1: Flow Chart for Determining Requirements for New Development

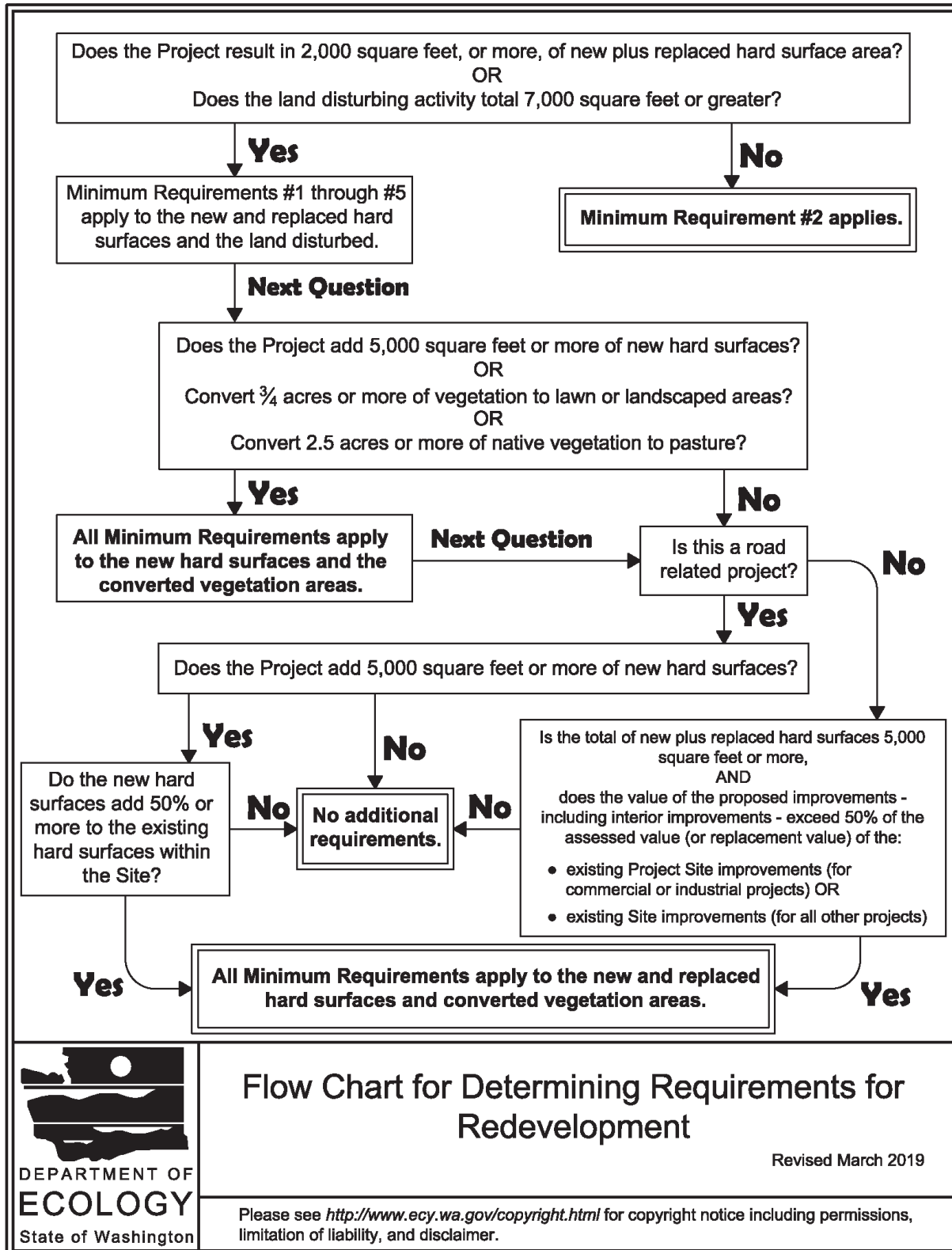


Flow Chart for Determining Requirements for New Development

Revised March 2019

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Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment



Flow Chart for Determining Requirements for Redevelopment

Revised March 2019

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New Development Project Thresholds

All new development shall be required to comply with Minimum Requirement #2.

The following new development shall comply with Minimum Requirements #1 through #5 for the new and replaced hard surfaces and the land disturbed:

- Results in 2,000 square feet, or greater, of new plus replaced hard surface area, or
- Has land disturbing activity of 7,000 square feet or greater.

The following new development shall comply with Minimum Requirements #1 through #9 for the new and replaced hard surfaces and the converted vegetation areas:

- Results in 5,000 square feet, or greater, of new plus replaced hard surface area, or
- Converts $\frac{3}{4}$ acres, or more, of vegetation to lawn or landscaped areas, or
- Converts 2.5 acres, or more, of native vegetation to pasture.



The text in this box originates from one or more of the following Permits:
Appendix 1 of the Phase I / Phase II Municipal Stormwater Permits
Construction Stormwater General Permit

Redevelopment Project Thresholds

All redevelopment shall be required to comply with Minimum Requirement #2.

The following redevelopment shall comply with Minimum Requirements #1 through #5 for the new and replaced hard surfaces and the land disturbed:

- Results in 2,000 square feet or more, of new plus replaced hard surface area, or
- Has land disturbing activity of 7,000 square feet or greater.

The following redevelopment shall comply with Minimum Requirements #1 through #9 for the new hard surfaces and converted vegetation areas:

- Adds 5,000 square feet or more of new hard surfaces or,
- Converts $\frac{3}{4}$ acres, or more, of vegetation to lawn or landscaped areas, or
- Converts 2.5 acres, or more, of native vegetation to pasture.

The local government may allow the Minimum Requirements to be met for an equivalent (flow and pollution characteristics) area. The equivalent area may be within the same TDA. If the equivalent area is outside the TDA, or off-site, the equivalent area must drain to the same receiving water and the guidance for equivalent facilities using in-basin transfers must be followed (see [I-D.6 Regional Facility Area Transfers](#)). The jurisdiction is responsible for maintaining tracking records for all area transfers approved by the jurisdiction.

Additional Requirements for Redevelopment

Road-related projects shall comply with all the Minimum Requirements for the new and replaced hard surfaces (including pavement, shoulders, curbs, and sidewalks) and the converted vegetation areas if the new hard surfaces total 5,000 square feet or more and total 50% or more of the existing hard surfaces within the Site.

Other types of redevelopment projects shall comply with all the Minimum Requirements for the new and replaced hard surfaces and the converted vegetation areas if:

- the total of new plus replaced hard surfaces is 5,000 square feet or more.



***The text in this box originates from one or more of the following Permits:
Appendix 1 of the Phase I / Phase II Municipal Stormwater Permits
Construction Stormwater General Permit***

Objective

Redevelopment projects have the same requirements as new development projects in order to minimize the impacts from new surfaces. To not discourage redevelopment projects, replaced surfaces aren't required to be brought up to new stormwater standards unless the space threshold identified above are exceeded. As long as the replaced surfaces have similar pollution-generating potential to the surfaces that they are replacing, the amount of pollutants discharged shouldn't be significantly different from the existing site conditions. However, if the redevelopment project scope is sufficiently large that the space threshold identified above are exceeded, it is reasonable to require the replaced surfaces to be brought up to current stormwater standards. This is consistent with other utility standards. When a structure or a property undergoes significant remodeling, local governments often require the site to be brought up to new building code requirements (e.g., on-site sewage disposal systems, fire systems).

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APPENDIX E: OPERATIONS AND MAINTENANCE

Maintenance Standards
Annual Inspection Sheets
Records of Frequency Reduction
List of Pet Waste Stations

Maintenance Standards

The following pages outline maintenance standards for each type of stormwater structure located at NAVFAC NW installations. These maintenance standards mirror the SWMMWW 2019 standards. If a specific standard is not found in this appendix refer to the SWMMWW. For more information reference the SWMMWW. This is intended to be conditions for determining if maintenance actions are required as identified through inspection. If defects are found during normal inspections that exceed the maintenance standard, corrections shall be executed as follows:

Unless there are circumstances beyond the installation's control, if an inspection identifies that a facility's maintenance standard is not being met, the installation must perform appropriate maintenance as follows:

- Within 1 year for most facilities, except catch basins,
- Within 6 months for catch basins, and/or
- Within 2 years for maintenance that requires capital construction of less than \$25,000.

Where circumstances beyond the installation's control prevent maintenance activity from occurring, the installation must document the circumstances that are outside its control and include this documentation in the corresponding annual report.

Table 1: Maintenance Standards – Detention Ponds

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic foot per 1,000 square feet. In general, there should be no visual evidence of dumping.	Trash and debris cleared from site
		If less than threshold, all trash and debris will be removed as part of next scheduled maintenance	
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by federal regulations	No danger of poisonous vegetation where maintenance personnel or the public might normally be. Complete eradication of noxious weeds may not be possible.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants.	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired.
	Beaver Dams	Dam results in change of function of the facility.	Facility is returned to design function.
	Insects	When insects such as wasps and hornets interfere with maintenance activities	Insects destroyed or removed from site.
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment improvements). If trees are not interfering with access or maintenance, do not remove. If dead, diseased, or dying trees are identified.	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses.
	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.	Remove hazard trees. Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.
	Slide Slopes of Pond		

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Storage Area	Sediment Liner (if applicable)	Any erosion observed on a compacted berm embankment. Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified, or affects inletting or outletting condition of the facility. Liner is visible and has more than three 1/4-inch holes in it.	If erosion is occurring on compacted berms, a licensed civil engineer should be consulted to resolve source of erosion. Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion. Liner repaired or replaced. Liner is fully covered.
Pond Perms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berms or outlet works. A licensed civil engineer should be consulted to determine this source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.	Piping eliminated. Erosion potential resolved.
Emergency Overflow Spillway and Berms over 4 feet in Height	Tree growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches), the root system may be left in place. Otherwise the roots should be removed and the berm restored.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.	Piping eliminated. Erosion problem resolved.
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.

Table 2: Maintenance Standards – Closed Detention Systems (Tanks/Vaults)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Storage Area	Plugged air vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for ½ length of storage vault or any point depth exceeds 15% of diameter.	All sediment and debris removed from storage area.
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility.	All joint between tank/pipe sections are sealed.
	Tank Pipe Bent out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape.	Tank/pipe repaired or replaced to design.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than ½-inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound. Cracks wider than ½-inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.	Vault replaced or repaired to design specifications and is structurally sound. No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.
Manhole	Cover Not In Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts in frame have less than ½ inch of thread (may not apply to self-locking lids.)	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.	Piping eliminated. Erosion problem resolved.
	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standard.

Table 3: Maintenance Standards – Control Structure/Flow Restrictor

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash & Debris	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall. Structure is not in upright position (allow up to 10% from plumb). Connections to outlet pipe are not watertight and show signs of rust.	Structure securely attached to wall and outlet pipe. Structure in correct position. Connections to outlet pipe are water tight, structure repaired or replaced and works as designed.
Cleanout Gate	Damaged or Missing	Any holes – other than undersigned holes – in the structure.	Structure has no holes other than designed holes.
		Cleanout gate is not watertight or is missing. Gate cannot be moved up and down by one maintenance person. Chain/rod leading to gate is missing or damaged. Gate is rusted over 50% of its surface area.	Gate is watertight and works as designed. Gate moves up and down easily and is watertight. Chain is in place and works as designed. Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
	Cover Not In Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
Manhole	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts in frame have less than ½ inch of thread (may not apply to self-locking lids.)	Cover can be removed and reinstalled by one maintenance person.

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.	Piping eliminated. Erosion problem resolved.
	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standard.

Table 4: Maintenance Standards – Catch Basins

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash & Debris	<p>Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.</p> <p>Trash or debris (in the basin) that exceeds 60[^] of the sump depth as measured from the bottom of basins to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.</p> <p>Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.</p>	<p>No trash or debris located immediately in front of catch basin or on grate opening.</p> <p>No trash or debris in the catch basin.</p> <p>Inlet & outlet pipes free of trash or debris.</p>
	Sediment	<p>Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).</p> <p>Sediment (in the basin) that exceeds 60[^] of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.</p>	<p>No dead animals or vegetation present within the catch basin.</p> <p>No sediment in the catch basin.</p>
	Structure Damage to Frame and/or Top Slab	<p>Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.</p> <p>Frame is not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab. Frame not securely attached.</p>	<p>Top slab is free of holes and cracks.</p> <p>Frame is sitting flush on the riser rings or top slab and firmly attached.</p>
	Fractures or Cracks in Basin Walls/Bottom	<p>Maintenance person judges that structure is unsound.</p> <p>Grout fillet has separated or cracked wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.</p>	<p>Basin replaced or repaired to design standards.</p> <p>Pipe is regouted and secure at basin wall.</p>
	Settlement/Misalignment	<p>If failure of basin has created a safety, function, or design problem.</p>	<p>Basin replaced or repaired to standards.</p>
	Vegetation	<p>Vegetation growing across and blocking more than 10% of the basin opening.</p> <p>Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.</p>	<p>No vegetation blocking open basin.</p> <p>No vegetation or root growth present.</p>

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
	Contamination and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.	No contaminants or pollutants present.
Catch Basin Cover	Cover not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure.	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (if applicable)	Grate Opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate is free of trash and debris.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

Table 5: Maintenance Standards – Debris Barriers (e.g., Trash Racks)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash & Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.	Barrier cleared to design flow capacity.
Metal	Damaged/Missing Bars	Bars are bent out of shape more than 3 inches.	Bars in place with no bends more than ¾ inch.
		Bars are missing or entire barrier missing.	Bars in place according to design.
		Bars are loose and rust is causing 50% deterioration to any part of barrier.	Barrier replaced or repaired to design standard.
	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe.	Barrier firmly attached to pipe.

Table 6: Maintenance Standards – Energy Dissipaters

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
External			
Rock Pad	Missing or Moved Rock	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil.	Rock pad replaced by design standards.
	Erosion	Soil erosion in or adjacent to rock pad.	Rock pad replaced to design standards.
Dispersion Trench	Pipe Plugged with Sediment	Accumulated sediment that exceeds 20% of the design depth.	Pipe cleaned/flushed so that it matches design.
	Not Discharging Water Properly	Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” of water along trench.)	Trench redesigned or rebuilt to standards.
	Perforations Plugged	Over ½ of perforations in pipe are plugged with debris and sediment.	Perforated pipe cleaned or replaced.
	Water Flows Out Top of “Distributor” Catch Basin	Maintenance person observes or receives credible report of water flowing out during any storm less than the design storm or its causing or appears likely to cause damage.	Facility rebuilt or redesigned to standards.
Internal			
Manhole/Chamber	Worn or Damaged Post, Baffles, Side of Chamber	Structure dissipating flow deteriorates to ½ of original size or any concentrated worn spot exceeding one square foot which would make structure unsound.	Structure replaced to design standards.
	Other Defects.	See Table 4: Maintenance Standards – Catch Basins	See Table 4

Table 7: Maintenance Standards – Typical Biofiltration Swale

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.	Remove sediment deposits on grass treatment area of the bioswale. When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased.
	Standing Water	When water stands in the swale between storms and does not drain freely.	Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, remove clogged check dams, add underdrains or convert to a wet biofiltration swale.
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale width.	Level the spreader and clean so that flows are spread evenly over entire swale width.
	Constant Base-flow	When small quantities of water continually flow through the swale, even when it has been dry for weeks, and an eroded, muddy channel has formed in the swale bottom.	Add a low-flow pea-gravel drain the length of the swale or bypass the baseflow around the swale.
	Poor Vegetation Coverage	When grass is sparse or bare or eroded patches occur in more than 10% of the swale bottom.	Determine why grass growth is poor and correct that condition. Replant with plugs of grass from the upper slope; plant in the swale bottom at 8-inch intervals. Or: reseed into loosened, fertile soil.
	Vegetation	When the grass becomes excessively tall (greater than 10 inches), when nuisance weeds and other vegetation starts to take over.	Mow vegetation or remove nuisance vegetation so that flow is not impeded. Grass should be mowed to a height of 3 to 4 inches. Remove grass clippings.
	Excessive Shading	Grass growth is poor because sunlight does not reach swale.	If possible, trim back overhanging limbs and remove brushy vegetation on adjacent slopes.
	Inlet/Outlet	Inlet/outlet areas clogged with sediment and/or debris.	Remove material so that there is no clogging or blockage in the inlet and outlet area.
	Trash and Debris Accumulation	Trash and debris accumulated in the bioswale.	Remove trash and debris from bioswale.
	Erosion/Scouring	Eroded or scoured swale bottom due to flow channelization, or higher flows.	For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. If bare areas are large, generally greater than 12 inches wide, the swale should be regraded and reseeded. For smaller bare areas, overseed when bare spots are evident, or take plugs of grass from the upper slope and plant in the swale bottom at 8-inch intervals.

Table 8: Maintenance Standards – Wet Biofiltration Swale

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches in 1'0% of the swale treatment area.	Remove sediment deposits in treatment area.
	Water Depth	Water not retained to a depth of about 4 inches during the wet season.	Build up or repair outlet berm so that water is retained in the wet season.
	Wetland Vegetation	Vegetation becomes sparse and does not provide adequate filtration, OR vegetation is crowded out by very dense clumps of cattail, which do not allow water to flow through the clumps.	Determine cause of lack of vigor of vegetation and correct. Replant as needed. For excessive cattail growth, cut cattail shoots back and compost off-site. Note: normally wetland vegetation does not need to be harvested unless die-back is causing oxygen depletion in downstream waters.
	Inlet/Outlet	Inlet/outlet areas clogged with sediment and/or debris.	Remove clogging or blockage in the inlet and outlet areas.
	Trash and Debris Accumulation	Any trash and debris which exceed 1 cubic foot per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold, all trash and debris will be removed as part of next scheduled maintenance	Trash and debris cleared from site
	Erosion/Scouring	Swale has eroded or scoured due to flow channelization, or higher flows.	Check design flows to assure swale is large enough to handle flows. Bypass excess flows or enlarge swale. Replant eroded areas with fibrous-rooted plants such as <i>Juncus efusus</i> (soft rush) in wet areas or snowberry (<i>Symphoricarpos albus</i>) in dryer areas.

Table 9: Maintenance Standards – Filter Strips

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.	Remove sediment deposits, re-level so slope is even and flows pass evenly through strip.
	Vegetation	When the grass becomes excessively tall (>10 inches); when nuisance weeds and other vegetation starts to take over.	Mow grass, control nuisance vegetation such that flow is not impeded. Grass should be mowed to a height between 3-4 inches.
	Trash and Debris Accumulation	Trash and debris accumulated on the filter strip.	Remove trash and debris from filter.
	Erosion/Scouring	Eroded or scoured areas due to flow channelization or higher flows.	For ruts or bare areas <12 inches wide, repair the damaged area by filling with crushed gravel. The grass will creep in over the rock in time. If bare areas are large, generally greater than 12 inches wide, the filter strip should be regraded and reseeded. For smaller bare areas, overseed when bare spots are evident.
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire filter width.	Level the spreader and clean so that flows are spread evenly over entire filter width.

Table 10: Maintenance Standards – Wet Ponds

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Water Level	First cell is empty, doesn't hold water.	Line the first cell to maintain at least 4 feet of water. Although the second cell may drain, the first cell must remain full to control turbulence of the incoming flow and reduce sediment resuspension.
	Trash and Debris	Accumulation that exceeds 1 cubic foot per 1000 square feet of pond area.	Trash and debris removed from pond.
	Inlet/Outlet Pipe	Inlet/Outlet pipe clogged with sediment and/or debris material.	No clogging or blockage in the inlet and outlet piping.
	Sediment Accumulation in Pond Bottom	Sediment accumulations in pond bottom that exceeds the depth of sediment zone plus 6-inches, usually in the first cell.	Sediment removed from pond bottom.
	Oil Sheen on Water	Prevalent and visible oil sheen.	Oil removed from water using oil-absorbent pads or vacator truck. Source of oil located and corrected. If chronic low levels of oil persist, plant wetland plants such as Juncus effuses (soft rush) which can uptake small concentrations of oil.
	Erosion	Erosion of the pond's side slopes and/or scouring of the pond bottom, that exceeds 6-inches, or where continued erosion is prevalent.	Slopes stabilized using proper erosion control measures and repair methods.
	Settlement of Pond Dike/Berm	Any part of these components that has settled 4-inches or lower than the design elevation, or inspector determines dike/berm is unsound.	Dike/berm is repaired to specifications.
	Internal Berm	Berm dividing cells should be level.	Berm surface is leveled so that water flows evenly over entire length of berm.
	Overflow Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.	Rocks replaced to specification.

Table 11: Maintenance Standards – Infiltration

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic foot per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold, all trash and debris will be removed as part of next scheduled maintenance	Trash and debris cleared from site
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by federal regulations	No danger of poisonous vegetation where maintenance personnel or the public might normally be. Complete eradication of noxious weeds may not be possible.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants.	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired.
	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events. (A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. Test every 2 to 5 years. If two inches or more sediment is present, remove.)	Sediment is removed and/or facility is cleaned so that infiltration system works according to design.
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than ½ full	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Slide Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.	Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms, a licensed civil engineer should be consulted to resolve source of erosion.
Emergency Overflow Spillway and Berms over 4 feet in Height	Tree growth	Any erosion observed on a compacted berm embankment. Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches), the root system may be left in place. Otherwise the roots should be removed and the berm restored.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.	Piping eliminated. Erosion problem resolved.
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.	Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms, a licensed civil engineer should be consulted to resolve source of erosion.
Pre-settling Ponds and Vaults	Facility or sump filled with sediment and/or debris	Any erosion observed on a compacted berm embankment. 6" or designed sediment trap depth of sediment.	Sediment is removed.

Table 12: Maintenance Standards – Wet Vaults

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash/Debris Accumulation	Trash and debris accumulated in vault, pipe, or inlet/outlet (includes floatables and non-floatables).	Remove trash and debris from vault.
	Sediment Accumulation in Vault	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6-inches.	Remove sediment from vault.
	Damaged Pipes	Inlet/outlet piping damaged or broken and in need of repair.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened or removed, especially by one person.	Cover repaired or replaced to proper working specifications.
	Ventilation	Ventilation area blocked or plugged	Blocking material removed or cleaned from ventilation area. A specified % of the vault surface area must provide ventilation to the vault interior (see design specifications.)
	Vault Structure Damage – Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
	Baffles	Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
		Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection staff.	Baffles repaired or replaced to specifications.
	Access Ladder Damage	Ladder is corroded or deteriorated, not functioning properly, not attached to structure wall, missing rungs, has cracks and/or misaligned. Confined space warning sign missing.	Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel. Replace sign warning of confined space entry requirements. Ladder and entry notification complies with OSHA standards.

Table 13: Maintenance Standards – Sand Filters (Above Ground/Open)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Above Ground (Open Sand Filter)	Sediment Accumulation on Top Layer	Sediment depth exceeds ½-inch.	No sediment deposit on grass layer of sand filter that would impede permeability of the filter section.
	Trash and Debris Accumulations	Trash and debris accumulated on sand filter bed.	Trash and debris removed from sand filter bed.
	Sediment Debris in Clean-Outs	When the clean-outs become full or partially plugged with sediment and/or debris.	Sediment removed from clean-outs.
	Sand Filter Media	Drawdown of water through the sand filter media takes longer than 24-hours, and/or flow through the overflow pipes occurs frequently.	Top several inches of sand are scraped. May require replacement of entire sand filter depth depending on extent of plugging (a sieve analysis is helpful to determine if the lower sand has too high a proportion of fine material).
	Prolonged Flows	Sand is saturated for prolonged periods of time (several weeks) and does not dry out between storms due to continuous base flow or prolonged flows from detention facilities.	Low, continuous flows are limited to a small portion of the facility by using a low wooden divider or slightly depressed sand surface.
	Short Circuiting	When flows become concentrated over one section of the sand filter rather than dispersed.	Flow and percolation of water through sand filter is uniform and dispersed across the entire area.
	Erosion Damage to Slopes	Erosion over 2-inches deep where cause of damage is prevalent or potential for continued erosion is evident.	Slopes stabilized using proper erosion control measures.
	Rock Pad Missing or Out of Place	Soil beneath the rock is visible.	Rock pad replaced or rebuilt to design specifications.
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed across sand filter.	Spreader leveled and cleaned so that flows are spread evenly over sand filter.
	Damage Pipes	Any part of the piping that is crushed or deformed more than 20% or any other failure to the piping.	Pipe repaired or replaced.
Below Ground Vault	Sediment Accumulation on Sand Media Section	Sediment depth exceeds ½-inch.	No sediment deposits on sand filter section that which would impede permeability of the filter section.
	Sediment Accumulation in	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6-inches.	No sediment deposits in first chamber of vault.

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
	Pre-Setting Portion of Vault		
	Trash/Debris Accumulation	Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non-floatables.	Trash and debris removed from vault and inlet/outlet piping.
	Sediment in Drain Pipes/Cleanouts	When drain pipes, cleanouts become full with sediment and/or debris.	Sediment and debris removed.
	Short Circuiting	When seepage/flow occurs along the vault walls and corners. Sand eroding near inflow area.	Sand filter media section re-laid and compacted along perimeter of vault to form a semi-seal. Erosion protection added to dissipate force of incoming flow and curtail erosion.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened, corrosion/deformation of cover. Maintenance person cannot remove cover using normal lifting pressure.	Cover repaired to proper working specifications or replaced.
	Ventilation	Ventilation area blocked or plugged.	Blocking material removed or cleared from ventilation area. A specified % of the vault surface area must provide ventilation to the vault interior (see design specifications).
	Vault Structure Damaged; Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structures through the cracks, or maintenance/inspection personnel determine that the vault is not structurally safe.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
	Baffles/Internal Walls	Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. Baffles or walls corroding, cracking, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the installation pipe. Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel.

Table 14: Maintenance Standards – Manufactured Media Filters

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Below Ground Vault	Sediment Accumulation on Media	Sediment depth exceeds 0.25-inches.	No sediment deposits which would impede permeability of media.
	Sediment Accumulation in Vault	Sediment depth exceeds 6-inches in first chamber.	No sediment deposits in vault bottom of first chamber.
	Trash/Debris Accumulation	Trash and debris accumulated on compost filter bed.	Trash and debris removed from the compost filter bed.
	Sediment in Drain Pipes/Clean-Outs	When drain pipes, clean-outs, become full with sediment and/or debris.	Sediment and debris removed.
	Damaged Pipes	Any part of the pipes that are crushed or damaged due to corrosion and/or settlement.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened; one person cannot open the cover using normal lifting pressure, corrosion/deformation of cover.	Cover repaired to proper working specifications or replaced.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
	Baffles	Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Access Ladder Damaged	Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Media	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired as meets specifications, and is safe to use as determined by inspection personnel.
Below Ground Cartridge Type	Media	Drawdown of water through the media takes longer than 1 hour, and/or inflow occurs frequently.	Media cartridge replaced.
	Short Circuiting	Flows do not properly enter filter cartridges.	Filter cartridges replaced

Table 15: Maintenance Standards – Baffle Oil/Water Separators (API Type)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Monitoring	Inspection of discharge water for obvious signs of poor water quality.	Effluent discharge from vault should be clear without thick visible sheen.
	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth.	No sediment deposits on vault bottom that would impede flow through the vault and reduce separation efficiency.
	Trash and Debris Accumulation	Trash and debris accumulation in vault, or pipe inlet/outlet, floatables and non-floatables.	Trash and debris removed from vault, and inlet/outlet piping.
	Oil Accumulation	Oil accumulation that exceed 1-inch at the surface of the water.	Extract oil from vault by vactoring. Disposal in accordance with regulations.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened, corrosion/deformation of cover.	Cover repaired to proper working specifications or replaced.
	Vault Structure Damaged – Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than ¼ inch. Frame is not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab. Frame not securely attached.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
	Baffles	Cracks wider than ½-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person.	Vault repaired so that no cracks exist wider than ¼-inch at the joint of the inlet/outlet pipe. Baffles repaired or replaced to specifications.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel.
	Baffles/Internal Walls	Baffles or walls corroding, cracking, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Baffles replaced or repaired to specifications.

Table 16: Maintenance Standards – Coalescing Plate Oil/Water Separators

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Monitoring	Inspection of discharge water for obvious signs of poor water quality.	Effluent discharge from vault should be clear without thick visible sheen.
	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth and/or visible signs of sediment on plates.	No sediment deposits on vault bottom and plate media would impede flow through the vault and reduce separation efficiency.
	Trash and Debris Accumulation	Trash and debris accumulation in vault, or pipe inlet/outlet, floatables and non-floatables.	Trash and debris removed from vault, and inlet/outlet piping.
	Oil Accumulation	Oil accumulation that exceed 1-inch at the surface of the water.	Extract oil from vault by vactoring. Disposal in accordance with regulations.
	Damaged Coalescing Plates	Plate media broken, deformed, cracked, and/or showing signs of failure.	A portion of the media pack or the entire plate pack is replaced depending upon severity of failure.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired or replaced.
	Vault Structure Damaged – Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.	Vault repaired or repairs made so that vault meets design specifications and is structurally sound.
	Baffles	Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Access Ladder Damaged	Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person. Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Baffles repaired or replaced to specifications. Baffles repaired or replaced to specifications.

Table 17: Maintenance Standards – Catch Basin Inserts

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation	When sediment forms a cap over the insert media of the insert and/or unit.	No sediment cap on the insert media and its unit.
	Trash and Debris Accumulation	Trash and debris accumulation on insert unit creating a blockage/restriction.	Trash and debris removed from insert unit. Runoff freely flows into catch basin.
	Media Insert Not Removing Oil	Effluent water from media insert has a visible sheen.	Effluent water from media insert is free of oils and has no visible sheen.
	Media Insert Water Saturated	Catch basin insert is saturated with water and no longer has the capacity to absorb.	Remove and replace media insert.
	Media Insert Oil Saturated	Media oil saturated due to petroleum spill that drains into catch basin.	Remove and replace media insert.
	Media Insert Use Beyond Product Life	Media has been used beyond the typical average life of media insert product.	Remove and replace media at regular intervals, depending on insert product.

Table 18: Maintenance Standards – Media Filter Drain (MFD)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation on Grass Filter Strip	Sediment depth exceeds 2 inches or creates uneven grading that interferes with sheet flow.	Remove sediment deposits on grass treatment area of the embankment. When finished, embankment should be level from side to side and drain freely toward the toe of the embankment slope. There should be no standing water once inflow has increased.
	No Vegetation Zone/Flow Spreader	Flow spreader is uneven or clogged so that flows are not uniformly distributed over entire embankment width.	Level the spreader and clean to spread flows evenly over entire embankment width.
	Poor Vegetation Coverage	Grass is sparse or bare, or eroded patches are observed in more than 10% of the grass strip surface area.	Determine why grass growth is poor and correct the offending condition. Reseed into loosened, fertile soil or compost; or, replant with plugs of grass from the upper slope.
	Vegetation	Grass becomes excessively tall (>10 inches); nuisance weeds and other vegetation start to take over.	Mow vegetation or remove nuisance vegetation to not impede flow. Mow grass to a height of 6 inches.
	Media Filter Drain Mix Replacement	Water is seen on the surface of the media filter drain mix long after the storms have ceased. Typically, the 6-month, 24-hour precipitation event should drain within 48 hours. More common storms should drain within 24 hours. Maintenance also needed on a 10-year cycle and during a preservation project	Excavate and replace all of the media filter drain mix contained within the media filter drain.
	Excessive Shading	Grass growth is poor because sunlight does not reach embankment.	If possible, trim back overhanging limbs and remove brushy vegetation on adjacent slopes.
	Trash and Debris	Trash and debris have accumulated on embankment.	Remove trash and debris from embankment.
	Flooding of Media Filter Drain	When media filter drain is inundated by flood water.	Evaluate media filter drain material for acceptable infiltration rate and replace if media filter drain does not meet long-term infiltration rate standards.

Table 19: Maintenance Standards – Bioretention Facilities

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Earthen Side Slopes and Berms	Facility Footprint			<ul style="list-style-type: none"> Eliminate cause of erosion and stabilize damaged area (regrade, rock, vegetation, erosion control matting). For deep channels or cuts (over 3 inches in ponding depth), temporary erosion control measures should be put in place until permanent repairs can be made. Properly designed, constructed, and established facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems persist, the following should be reassessed: (1) flow volumes from contributing areas and bioretention facility sizing; (2) flow velocities and gradients within the facility; and (3) flow dissipation and erosion protection strategies at the facility inlet.
	B,S		Erosion (gullies/rills) greater than 2 inches deep around inlets, outlet, and alongside slopes.	
	A		Erosion of sides causes slope to become a hazard.	
	A,S		Sediment greater than 3 inches (relative to undisturbed sections of berm).	
	A,S		Downstream face of berm wet, seeps or leaks evident.	
Concrete Sidewalls	A		Any evidence of rodent holes or water piping in berm.	<ul style="list-style-type: none"> Eradicate rodents Fill holes and compact
	A		Cracks or failure of concrete sidewalls.	<ul style="list-style-type: none"> Repair/seal cracks Replace if repair is insufficient
Rockery Sidewalls	A		Rockery sidewalls are insecure.	Stabilize rockery sidewalls (may require consultation with engineer, particularly for walls 4 feet or greater in height).
Facility Area		All maintenance visits (biannually)	Trash and debris present.	Clean out trash and debris.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Facility Bottom Area	A,S		Accumulated sediment to extend that infiltration rate is reduced or surface storage capacity significantly impacted.	<ul style="list-style-type: none"> Remove excess sediment Replace any vegetation damaged or destroyed by sediment accumulation and removal Mulch newly planted vegetation Identify and control the sediment source (if feasible) If accumulated sediment is recurrent, consider adding presettlement or installing berms to create a forebay at the inlet.
		During/After Fall Leaf Drop	Accumulated leaves in facility	Remove leaves if there is a risk to clogging outlet structure or water flow is impeded. Clear the blockage
	A,S		Sediment, vegetation, or debris accumulated at or blocking (or having the potential to block) check dam, flow control weir, or orifice.	
	A,S		Erosion and/or undercutting present.	Repair and take preventative measures to prevent future erosion and/or undercutting. Restore to level position.
	A		Grade board on top of weir damaged or not level.	
Ponded Water	B,S		Expressive ponding water: Water overflows during storms smaller than the design event or ponded water remains in the basin 48 hours or longer after the end of a storm.	<p>Determine cause and resolve in the following order:</p> <ol style="list-style-type: none"> Confirm leaf or debris buildup in the bottom of the facility is not impeding infiltration. If necessary, remove leaf litter/debris. Ensure that underdrain (if present) is not clogged. If necessary, clear underdrain. Check for other water inputs (e.g., groundwater, illicit connections). Verify that the facility is sized appropriate for the contributing area. Confirm that the contributing area has not increased. If steps #1-4 do not solve the problem, the bioretention soil is likely clogged by sediment accumulation at the surface or has become overly compacted. Dig a small hole to observe soil profile and identify compaction depth or clogging front to help determine the soil depth to be removed or otherwise rehabilitated (e.g., tilled). Consultation with engineer.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Bioretention Soil Mix	As needed		Bioretention soil mix protection is needed when performing maintenance requiring entrance into the facility footprint. <ul style="list-style-type: none"> Minimize all loading in the facility footprint (foot traffic and other loads) to the degree feasible in order to prevent compaction of bioretention soils. Never drive equipment or apply heavy loads in facility footprint. Because the risk of compaction is higher during saturated soil conditions, any type of loading in the cell (including foot traffic) should be minimized during wet conditions. Consider measures to distribute loading if heavy foot traffic is required or equipment must be placed in facility. (ex: boards) If compaction occurs, soil must be loosened or otherwise rehabilitated to original design state. 	
Inlets/Outlets/Pipes				
Splash Block Inlet	A		Water is not being directed properly to the facility and away from the inlet structure.	Reconfigure/repair blocks to direct water to facility and away from structure.
Curb Cut Inlet/Outlet	M during the wet season and before severe storm is forecasted	Weekly during fall leaf drop	Accumulated leaves at curb cuts.	Clear leaves (particularly important for key inlets and low points along long, linear facilities).
Pipe Inlet/Outlet	A		Pipe is damaged.	Repair/replace.
	W		Pipe is clogged	Remove roots or debris.
	A, S		Sediment, debris, trash, or mulch reducing capacity of inlet/outlet.	<ul style="list-style-type: none"> Clear the blockage. Identify the source of the blockage and take actions to prevent future blockages.
		Weekly during fall leaf drop	Accumulated leaves at inlets/outlets	Clear leaves (particularly important for key inlets and low points along long, linear facilities).
		A	Maintain access for inspections.	<ul style="list-style-type: none"> Clear vegetation (transplant vegetation when possible) within 1 foot of inlets and outlets, maintain access pathways. Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Erosion Control at Inlet	A		Concentrated flows are causing erosion.	Maintain a cover of rock or cobbles or other erosion protection measure (e.g., matting) to protect the ground where concentrated water enters the facility (e.g., a pipe, curb cut, or swale). Remove/dispose. Repair/replace.
Trash Rack	S A		Trash or other debris present on trash rack. Bar screen damaged or missing.	Remove sediment or debris/dispose.
Overflow	A,S		Capacity reduced by sediment in debris.	
Underdrain Pipe	Clean pipe as needed	Clean orifice at least biannually (may need more frequent cleaning during wet season)	<ul style="list-style-type: none"> Plant roots, sediment, or debris reducing capacity of underdrain Prolonged surface ponding 	<ul style="list-style-type: none"> Jet clean or rotary cut debris/roots from underdrain(s) If underdrains are equipped with a flow restrictor (e.g, orifice) to attenuate flows, the orifice must be cleaned regularly.
Vegetation				
Facility Bottom Area and Upland Slope Vegetation	Fall and Spring		Vegetation survival rate falls below 75% within first two years of establishment..	<ul style="list-style-type: none"> Determine cause of poor vegetation growth and correct condition. Replant as necessary to obtain 75% survival rate or greater. Confirm that plant selection is appropriate for site growing conditions. Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants.
Vegetation (General)	As Needed		Presence of diseased plants and plant material.	<ul style="list-style-type: none"> Remove any diseased plants or plant parts and dispose of in an approved location to avoid risk of spreading the disease to other plants. Disinfect gardening tools after pruning to prevent spread of the disease. Replant as necessary.
Trees and Shrubs		All pruning seasons (timing varies by species)	Pruning as needed.	<ul style="list-style-type: none"> Prune trees and shrubs in a manner appropriate for each species.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
	A		Large trees and shrubs interfere with operation of the facility or access for maintenance.	<ul style="list-style-type: none"> Prune trees and shrubs using most current standards. Remove trees and shrubs, if necessary.
	Fall and Spring		Standing dead vegetation is present.	<ul style="list-style-type: none"> Remove standing dead vegetation. Replace dead vegetation within 30 days of reported dead and dying plants (as practical depending on weather/planting season). If vegetation replacement is not feasible within 30 days, and absence of vegetation may result in erosion problems, temporary erosion control measures should be put into place immediately. Determine cause of dead vegetation and address issue, if possible. If specific plants have a high mortality rate, assess the cause and replace with appropriate species. Consult with a landscape architect.
	Fall and Spring		Planting beneath mature trees.	<ul style="list-style-type: none"> When working around and below mature trees, take care to minimize any damage to tree roots and avoid compaction of soil. Planting of small shrubs or groundcovers beneath mature trees may be desirable in some cases. Such plantings should use mainly plants that come as bulbs, bare root or in 4-inch pots. Plants should be in no larger than 1-gallon containers.
	Fall and Spring		Presence of or need for stakes and guys (tree growth, maturation, and support needs).	<ul style="list-style-type: none"> Verify location of facility liners and underdrain (if any) prior to stake installation in order to prevent liner puncture or pipe damage. Monitor tree support systems: Repair and adjust as needed to provide support and prevent damage to tree. Remove tree supports (stakes, guys, etc.) after one growing season or maximum of 1 year. Backfill stake holes after removal.
Trees and Shrubs Adjacent to Vehicle	A		Vegetation causes some visibility (line of sight) or driver safety issues.	<ul style="list-style-type: none"> Maintain appropriate height for sight clearance. When continued, regular pruning is required to maintain visual sight lines for safety or clearance

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Travel Areas (or areas where visibility needs to be maintained)				<ul style="list-style-type: none"> along a walk or drive, consider relocating the plant to a more appropriate location. Remove or transplant if continual safety hazard. Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants.
Flowering Plants		A	Dead or spent flowers present.	Remove spent flowers (deadhead)
Perennials		Fall	Spent plants.	Cut back dying or dead and fallen foliage and stems.
Emergent Vegetation		Spring	Vegetation compromises conveyance.	Hand rake sedges and rushes with a small rake or fingers to remove dead foliage before new growth emerges in spring or earlier only if the foliage is blocking water flow (sedges and rushes do not respond well to pruning).
Ornamental Grasses (perennial)		Winter and Spring	Dead material from previous year's growing cycle or dead collapsed foliage.	<ul style="list-style-type: none"> Leave dry foliage for winter interest. Hand rake with a small rake or fingers to remove dead foliage back to within several inches from the soil before new growth emerges in spring or earlier if the foliage collapses and is blocking water flow.
Ornamental Grasses (evergreen)		Fall and Spring	Dead growth present in spring.	<ul style="list-style-type: none"> Hand rake with a small rake or fingers to remove dead growth before new growth emerges in spring. Clean, rake, and comb grasses when they become too tall. Cut back to ground or thin every 2-3 years as needed.
Noxious Weeds		M (March – October, preceding seed dispersal)	Listed noxious vegetation is present (refer to current county noxious weed list) Kitsap County – Attached Island County – Attached Snohomish County - https://snohomishcountywa.gov/750/Noxious-Weeds-List	<ul style="list-style-type: none"> Class A & B noxious weeds should be removed, bagged, and disposed as garbage immediately. Reasonable attempts must be made to remove and dispose of Class C noxious weeds. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. Apply mulch after weed removal.
Weeds		M (March – October, preceding seed dispersal)	Weeds are present.	Remove weeds with their roots manually with pincer-type weeding tools, flame weeders, or hot water weeders as appropriate.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Excessive Vegetation		Once in early to mid-May and once in early to mid-September	Low-lying vegetation growing beyond facility edge onto sidewalks, paths, or street edge poses pedestrian safety hazard or may clog adjacent permeable pavement surfaces due to associated leaf litter, mulch, and soil.	<ul style="list-style-type: none"> Edge or trim groundcovers and shrubs at facility edge. Avoid mechanical blade-type edger and do not use edger or trimmer within 2 feet of tree trunks. While some clippings can be left in the facility to replenish organic material in the soil, excessive leaf litter can cause surface soil clogging.
	As Needed		Excessive vegetation density inhibits stormwater flow beyond design ponding or becomes a hazard for pedestrian and vehicular circulation and safety.	<ul style="list-style-type: none"> Determine whether pruning or other routine maintenance is adequate to maintain proper plant density and aesthetics. Determine if planting type should be replaced to avoid ongoing maintenance issues. Remove plants that are weak, broken, or not true to form; replace in-kind. Thin grass or plants impacting facility function without leaving visual holes or bare soil areas. Consult with a landscape architect, when needed, for removal, transplant, or substitution of plants.
	As Needed		Vegetation blocking curb cuts, causing excessive sediment buildup and flow bypass.	Remove vegetation and sediment buildup.
Mulch			Mulch	
		Following weeding	Bare spots (without mulch cover) are present or mulch depth less than 2 inches.	<ul style="list-style-type: none"> Supplement mulch with hand tools to a depth of 2 to 3 inches. Replenish mulch. Often course compost is used in the bottom of the facility and arborist wood chips are used on side slopes and rim (above typical water levels). Keep all mulch away from woody stems.
Irrigation system (if any)			Watering	
		Based on manufacturer's instructions	Irrigation system present	Follow manufacturer's instructions for O&M
	A		Sprinklers or drip irrigation not directed/located to properly water plants.	Redirect sprinklers or move drip irrigation to desired areas.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Summer Watering (1 st Year)		Once every 1-2 weeks or as needed during prolonged dry periods.	Trees, shrubs, and groundcovers in first year of establishment period.	<ul style="list-style-type: none"> • 10-15 gallons per tree • 3-5 gallons per shrub • 2 gallons water per square foot for groundcover areas • Water deeply, but infrequently, so that the top 6 to 12 inches of the root zone is moist. • Use soaker hoses or spot water with a shower type wand when irrigation system is not present. -Pulse water to enhance soil absorption, when feasible -Pre-moisten soil to break surface tension of dry or hydrophobic soils/mulch, followed by more water to infiltration prior to runoff. • Add a tree bag or slow-release watering device (e.g., bucket with a perforated bottom) for watering newly installed trees when irrigation system is not present.
Summer Watering (2 nd and 3 rd Year)		Once every 2-4 weeks or as needed during prolonged dry periods	Trees, shrubs, and groundcovers in second or third year of establishment period.	<ul style="list-style-type: none"> • 10-15 gallons per tree • 3-5 gallons per shrub • 2 gallons water per square foot for groundcover areas • Water deeply, but infrequently, so that the top 6 to 12 inches of the root zone is moist. • Use soaker hoses or spot water with a shower type wand when irrigation system is not present. -Pulse water to enhance soil absorption, when feasible -Pre-moisten soil to break surface tension of dry or hydrophobic soils/mulch, followed by more water to infiltration prior to runoff.
Summer Watering (after establishment)		As needed	Established vegetation (after 3 years)	<ul style="list-style-type: none"> • Plants are typically selected to be drought tolerant and not require regular watering after establishment; however, trees may take up to 5 years of watering to become fully established. • Identify trigger mechanisms for drought-stress (e.g., leaf wilt, leaf senescence, etc.) of different species

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Pest Control				
Mosquitoes	B, S		Standing water remains for more than 3 days after the end of a storm.	<ul style="list-style-type: none"> and water immediately after initial signs of stress appear. Water during drought conditions or more often if necessary to maintain plant cover. Identify the cause of the standing water and take appropriate actions to address the problem. To facilitate maintenance, manually remove standing water and direct to the storm drain system (if runoff is from non-pollution-generating surfaces) or sanitary sewer system (if runoff is from pollution-generating surfaces). Use of pesticides may be considered only as a temporary measure when addressing the standing water cause.
Nuisance Animals	As Needed		Nuisance animals causing erosion, damaging plants, or depositing large volumes of feces.	<ul style="list-style-type: none"> Reduce site conditions that attract nuisance species where possible (e.g. plant shrubs and tall grasses to reduce open areas for geese, etc.) Place predator decoys Follow developed protocols for specific nuisance animal issues. Remove pet waste regularly. For public and right-of-way sites, consider adding garbage cans with dog bags for picking up pet waste.
Insect Pests	Every site visit associated with vegetation management		Signs of pests, such as wilting leaves, chewed leaves and bark, spotting, or other indicators.	<ul style="list-style-type: none"> Reduce hiding places for pests by removing diseased and dead plants. For infestations, follow local procedures.
FREQUENCY: A = Annually; B = Biannually (twice per year); M = Monthly; W = At least one visit should occur during the wet season; S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval)				

Table 20: Maintenance Standards – Permeable Pavement

Maintenance Components	Recommended Frequency	Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection		
Surface/Wearing Course			
Permeable Pavements, All	A, S	Runoff from adjacent pervious areas deposits soil, mulch, or sediment on paving.	<ul style="list-style-type: none"> • Clean deposited soil or other materials from permeable pavement or other adjacent surfacing. • Check if surface elevation of planted area is too high, or slopes towards pavement, and can be regraded (prior to regrading, protect permeable pavement by covering with temporary plastic and secure covering in place). • Mulch and/or plant all exposed soils that may erode to pavement surface.
Porous Asphalt or Pervious Concrete	A or B	None (routine maintenance)	<p>Clean surface debris from pavement surface using one or a combination of the following methods:</p> <ul style="list-style-type: none"> • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement. • Vacuum/sweep permeable paving installation using: <ul style="list-style-type: none"> - Walk-behind vacuum (sidewalks) - High-efficiency regenerative air or vacuum sweeper (roadways, parking lots) - ShopVac or brush brooms (small areas) • Hand-held pressure washer or power washer with rotating brushes: Follow equipment manufacturer guidelines for when equipment is most effective for cleaning permeable pavement. Dry weather is more effective for some equipment.
	A (during rain event)	Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	<ul style="list-style-type: none"> • Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility) • Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 sf. Perform an additional test for each additional 2,500 s.f. (up to

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
				<p>15,000 s.f. total). Above 15,000 s.f., add one test for every 10,000 s.f.</p> <ul style="list-style-type: none"> If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. To clean clogged pavement surfaces, use one or a combination of the following methods: <ul style="list-style-type: none"> - Combined pressure washer and vacuum system calibrated not to dislodge wearing course aggregate. - Hand-held pressure washer or power washer with rotating brushes. - Pure vacuum sweepers. <p>Note: if the annual/biannual routine maintenance standard to clean the pavement surface is conducted using equipment from the list above, corrective maintenance may not be needed.</p>
	A		Sediment present at the surface of the pavement.	<ul style="list-style-type: none"> Assess the overall performance of the pavement system during a rain event. If water runs off the pavement and/or there is ponding, then see above. Determine source of sediment loading and evaluate whether or not the source can be reduced/eliminated. If the source cannot be addressed, consider increasing frequency of routine cleaning.
	Summer		Moss growth inhibits infiltration or poses slip safety hazard.	<ul style="list-style-type: none"> Sidewalks: Use a stiff broom to remove moss in the summer when it is dry. Parking lots and roadways: Pressure wash, vacuum sweep, or use a combination of the two for cleaning moss from pavement surface.
	A		Major cracks or trip hazards and concrete spalling and raveling.	<ul style="list-style-type: none"> Fill potholes or small cracks with patching mixes. Large cracks and settlement may require cutting and replacing the pavement section. Replace in-kind where feasible. Replacing porous asphalt with conventional asphalt is acceptable if it is a small percentage of the total facility area and does not impact the overall facility function.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Interlocking Concrete Paver Blocks and Aggregate Pavers		A or B	None (routine maintenance)	<ul style="list-style-type: none"> Take appropriate precautions during pavement repair and replacement efforts to prevent clogging of adjacent porous materials. <p>Clean surface debris from pavement surface using one or a combination of the following methods:</p> <ul style="list-style-type: none"> Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves). Vacuum/sweep permeable paving installation using: <ul style="list-style-type: none"> Walk-behind vacuum (sidewalks) High-efficiency regenerative air or vacuum sweeper (roadways, parking lots) ShopVac or brush brooms (small areas) <p>Note: Vacuum settings may have to be adjusted to prevent excess uptake of aggregate from paver openings or joints. Vacuum surface openings in dry weather to remove dry, encrusted sediment.</p>
	A (during rain event)		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate).	<ul style="list-style-type: none"> Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility). Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 sf. Perform an additional test for each additional 2,500 s.f. (up to 15,000 s.f. total). Above 15,000 s.f., add one test for every 10,000 s.f. If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. Clogging is usually an issue in the upper 2 to 3 centimeters of aggregate. Remove the upper layer of encrusted sediment, and fines, and/or vegetation from openings and joints between the pavers by mechanical means and/or suction equipment (e.g., pure vacuum sweeper).

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Open-celled paving grid with gravel	A		Sediment present at the surface of the pavement.	<ul style="list-style-type: none"> Replace aggregate in paver cells, joints, or openings per manufacturer's recommendation. Assess the overall performance of the pavement system during a rain event. If water runs off the pavement and/or there is ponding, then see above. Determine source of sediment loading and evaluate whether or not the source can be reduced/eliminated. If the source cannot be addressed, consider increasing frequency of routine clearing.
	Summer		Moss growth inhibits infiltration or poses slip safety hazard.	<ul style="list-style-type: none"> Sidewalks: Use a stiff broom to remove moss in the summer when it is dry. Parking lots and roadways: Pressure wash, vacuum sweep, or use a combination of the two for cleaning moss from pavement surface.
	A		Paver block missing or damaged.	Remove individual damaged paver blocks by hand and replace or repair per manufacturer's recommendations.
	A		Loss of aggregate material between paver blocks.	Refill per manufacturer's recommendations for interlocking paver sections.
	A		Settlement of surface	May require resetting.
	A or B		None (routine maintenance)	<ul style="list-style-type: none"> Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) Follow equipment manufacturer guidelines for cleaning surface.
	A (during rain event)		Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate).	<ul style="list-style-type: none"> Use vacuum truck to remove and replace top course aggregate. Replace aggregate in paving grid per manufacturer's recommendations.
	A		Paving grid missing or damaged.	<ul style="list-style-type: none"> Remove pins, pry up grid segments, and replace gravel. Replace grid segments when three or more adjacent rings are broken or damaged. Follow manufacturer guidelines for repairing surface.
	A		Settlement of surface	May require resetting

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Open-celled Paving Grid with Grass	A		Loss of aggregate material in paving grid.	Replenish aggregate material by spreading gravel with a rake (gravel level should be maintained at the same level as the plastic rings or no more than ¼ inch above the top of rings). See manufacturer's recommendations. <ul style="list-style-type: none"> Manually remove weeds. Presence of weeds may indicate that too many fines are present (refer to Actions Needed under "Aggregate is clogged" to address this issue). Remove sediment, debris trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves). Follow equipment manufacturer guidelines for cleaning surface.
		A	Weeds present.	
		A or B	None (routine maintenance)	
	A (rain event)		Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate).	Rehabilitate per manufacturer's recommendations.
	A		Paving grid missing or damaged.	<ul style="list-style-type: none"> Remove pins, pry up grid segments, and replace grass. Replace grid segments when three or more adjacent rings are broken or damaged. Follow manufacturer guidelines for repairing surface.
	A		Settlement of surface.	May require resetting.
	A		Poor grass coverage in paving grid.	<ul style="list-style-type: none"> Restore growing medium, reseed or plant, aerate, and/or amend vegetated area as needed. Traffic loading may be inhibiting grass growth; reconsider traffic loading if possible.
		As needed	Routine Maintenance	Use a mulch mower to mow grass.
		A	Routine Maintenance	<ul style="list-style-type: none"> Sprinkle a thin layer of compost on top of grass surface (1/2" top dressing) and sweep it in. Do not use fertilizer.
		A	Weeds present.	<ul style="list-style-type: none"> Manually remove weeds. Mow, torch, or inoculate and replace with preferred vegetation.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Actions Needed (Procedures)
	Inspection	Routine Maintenance		
Inlets/Outlets/Pipes				
Inlet/outlet/pipe	A		Pipe is damaged	Repair/replace. Remove roots or debris.
Underdrain Pipe	A	Clean orifice at least biannually	Pipe is clogged Plant roots, sediment, or debris reducing capacity of underdrain (may cause prolonged drawdown period).	<ul style="list-style-type: none"> • Jet clean or rotary cut debris/roots from underdrain(s). • If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly.
Raised Subsurface Overflow Pipe		Clean orifice at least biannually	Plant roots, sediment, or debris reducing capacity of underdrain	<ul style="list-style-type: none"> • Jet clean or rotary cut debris/roots from underdrain(s). • If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly.
Outlet Structure	A, S		Sediment, vegetation, or debris reducing capacity of outlet structure.	<ul style="list-style-type: none"> • Clean the blockage. • Identify the source of the blockage and take action to prevent future blockages.
Overflow	B		Native soil is exposed or other signs of erosion damage are present at discharge point.	Repair erosion and stabilize surface.
Vegetation				
Adjacent Large Shrubs or Trees		As needed	Vegetation related fallout clogs or will potentially clog voids.	<ul style="list-style-type: none"> • Sweep leaf litter and sediment to prevent surface clogging and ponding. • Prevent large root systems from damaging subsurface structural components.
		Once in May and once in September	Vegetation growing beyond facility edge onto sidewalks, paths, and street edge.	Edging and trimming of planted areas to control groundcovers and shrubs from overreaching the sidewalks, paths, and street edge improves appearance and reduces clogging of permeable pavements by leaf litter, mulch, and soil.
Leaves, Needles, and Organic Debris		In fall (Oct. to Dec.) after leaf drop (1-3 times, depending on canopy cover)	Accumulation of organic debris and leaf litter.	Use leaf blower or vacuum to blow or remove leaves, evergreen needles, and debris (i.e. flowers, blossoms) off of and away from permeable pavement.
FREQUENCY: A = Annually; B = Biannually (twice per year); M = Monthly; W = At least one visit should occur during the wet season; S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval)				

Table 21: Maintenance Standards – Sand Filters (below ground/enclosed)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Below Ground Vault.	Sediment Accumulation on Sand Media Section	Sediment depth exceeds 1/2-inch.	No sediment deposits on sand filter section that which would impede permeability of the filter section.
	Sediment Accumulation in Pre-Settling Portion of Vault	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6-inches.	No sediment deposits in first chamber of vault.
	Trash/Debris Accumulation	Grass is sparse or bare, or eroded patches are observed in more than 10% of the grass strip surface area.	Determine why grass growth is poor and correct the offending condition. Reseed into loosened, fertile soil or compost; or, replant with plugs of grass from the upper slope.
	Sediment in Drain Pipes/Cleanouts	Grass becomes excessively tall (>10 inches); nuisance weeds and other vegetation start to take over.	Mow vegetation or remove nuisance vegetation to not impede flow. Mow grass to a height of 6 inches.
	Short Circuiting	Water is seen on the surface of the media filter drain mix long after the storms have ceased. Typically, the 6-month, 24-hour precipitation event should drain within 48 hours. More common storms should drain within 24 hours. Maintenance also needed on a 10-year cycle and during a preservation project	Excavate and replace all of the media filter drain mix contained within the media filter drain.
	Damaged Pipes	Grass growth is poor because sunlight does not reach embankment.	If possible, trim back overhanging limbs and remove brushy vegetation on adjacent slopes.
	Access Cover Damaged/Not Working	Trash and debris have accumulated on embankment.	Remove trash and debris from embankment.
	Ventilation	When media filter drain is inundated by flood water.	Evaluate media filter drain material for acceptable infiltration rate and replace if media filter drain does not meet long-term infiltration rate standards.
	Vault Structure Damaged; Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab.	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound. Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
	Baffles/Internal walls	Baffles or walls corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel.

Table 22: Maintenance Standards – Compost Amended Vegetated Filter Strip (CAVFS)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment accumulation on grass	Sediment depth exceeds 2 inches.	Remove sediment deposits. Relevel so slope is even and flows pass evenly through strip.
	Vegetation	Grass becomes excessively tall (greater than 10 inches); nuisance weeds and other vegetation start to take over.	Mow grass and control nuisance vegetation so that flow is not impeded. Grass should be mowed to a height of 6 inches.
	Trash and debris	Trash and debris have accumulated on the vegetated filter strip.	Remove trash and debris from filter.
	Erosion/scouring	Areas have eroded or scoured due to flow channelization or high flows.	For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with a 50/50 mixture of crushed gravel and compost. The grass will creep in over the rock in time. If bare areas are large, generally greater than 12 inches wide, the vegetated filter strip should be regraded and reseeded. For smaller bare areas, overseed when bare spots are evident.
	Flow spreader	Flow spreader is uneven or clogged so that flows are not uniformly distributed over entire filter width.	Level the spreader and clean so that flows are spread evenly over entire filter width

Table 23: Vegetated Roofs

Activity	Objective	Schedule	Notes
Structural and Drainage Components			
Clear inlet pipes: Remove soil substrate, vegetation or other debris.	Maintain free drainage of inlet pipes.	Twice annually.	
Inspect drain pipe: Check for cracks settling and proper alignment, and correct and re-compact soils or fill material surrounding pipe, if necessary.	Maintain free drainage of inlet pipes.	Twice annually.	
Inspect fire ventilation points for proper operation	Fire and safety.	Twice annually.	
Maintain egress and ingress: Clear routes of obstructions and maintained to design standards.	Fire and safety.	Twice annually.	
Insects: (see note)			Roof garden design should provide drainage rates that do not allow pooling of water for periods that promote insect larvae development. If standing water is present for extended periods correct drainage problem. Chemical sprays should not be used.
Prevent release of contaminants: Identify activities (mechanical systems maintenance, pet access, etc.) that can potentially release pollutants to the roof garden and establish agreements to prevent release.	Water quality protection.	During construction of roof and then as determined by inspection.	Any cause of pollutant release should be corrected as soon as identified and the pollutant removed.
Vegetation and Growth Medium			
Invasive or nuisance plants: Remove manually and without herbicide applications.	Promote selected plant growth and survival, maintain aesthetics. See note.	Twice annually.	At a minimum, schedule weeding with inspections to coincide with important horticultural cycles (e.g., prior to major weed varieties dispersing seeds). Normally, dead plant material will be recycled on the roof; however specific plants or aesthetic considerations may warrant removing and replacing dead material (see manufacturer's recommendations).
Removing and replacing dead material: (see note)		Once annually.	

Activity	Objective	Schedule	Notes
<p>Fertilization: If necessary apply by hand (see note)</p>	<p>Plant growth and survival.</p>	<p>Determined by inspection.</p>	<p>Extensive roof gardens should be designed to not require fertilization after plant establishment. If fertilization is necessary during plant establishment or for plant health and survivability after establishment, use an encapsulated, slow release fertilizer (excessive fertilization can contribute to increased nutrient loads in the stormwater system and receiving waters).</p>
<p>Mulching: (see note)</p>			<p>Avoid application of mulch on extensive roof gardens. Mulch should be used only in unusual situations and according to the roof garden provider guidelines. In conventional landscaping mulch enhances moisture retention; however, moisture control on a vegetated roof should be through proper soil/growth media design. Mulch will also increase establishment of weeds.</p>
<p>Irrigate: Use subsurface or drip irrigation.</p>		<p>Determined by inspection and only when absolutely necessary for plant survival.</p>	<p>Surface irrigation systems on extensive roof gardens can promote weed establishment, root development near the drier sur-face layer of the soil substrate, and increase plant dependence on irrigation. Accordingly, subsurface irrigation methods are preferred. If surface irrigation is the only method available, use drip irrigation to deliver water to the base of the plant.</p>

Inspection Checklists

The following pages outline inspection checklists for each type of stormwater structure located at NAVFAC NW installations. This is intended to be conditions for determining if maintenance actions are required as identified through inspection. If defects are found during normal inspections that exceed the maintenance standards listed in these checklists, corrections shall be executed as follows:

Unless there are circumstances beyond the installation's control, if an inspection identifies that a facility's maintenance standard is not being met, the installation must perform appropriate maintenance as follows:

- Within 1 year for most facilities, except catch basins,
- Within 6 months for catch basins, and/or
- Within 2 years for maintenance that requires capital construction of less than \$25,000.

Where circumstances beyond the installation's control prevent maintenance activity from occurring, the installation must document the circumstances that are outside its control and include this documentation in the corresponding annual report.

Table 1: Inspection Checklist – Detention Ponds

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Type of Structure

Number and Height of Cartridges

Maintenance Components	Issue	Condition When Maintenance is Needed	Acceptable	Unacceptable	Required Maintenance
General	Trash & Debris	Trash and debris exceeding 1 cubic foot per 1,000 square feet. Any visual evidence of dumping.			Clear trash and debris from site
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which constitutes a hazard to maintenance personnel or the public.			Remove vegetation from areas that constitute a hazard.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants.			Remove contamination, dispose in accordance with regulations.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or evidence of water piping through dam or berm via rodent holes.			Destroy rodents, repair dam.
	Beaver Dams	Dam results in change of function of the facility.			Restore facility to its design function.
	Insects	When insects such as wasps and hornets interfere with maintenance activities			Destroy or remove insects from site.
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance access or interferes with maintenance activity If dead, diseased, or dying trees are identified.			Remove hazard trees.
					Remove hazard trees.
Slide Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.			Stabilize slope using appropriate EC measures e.g., rock reinforcement, planting of grass, compaction..
	Erosion	Any erosion observed on a compacted berm embankment			Licensed civil engineer to be consulted to resolve source of erosion.

Maintenance Components	Issue	Condition When Maintenance is Needed	Acceptable	Unacceptable	Required Maintenance
Storage Area	Sediment	Accumulated sediment exceeds 10% of designed pond depth, or affects inletting or outletting condition of the facility.			Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.
	Liner (if applicable)	Liner is not visible and has no more than three ¼-inch holes in it.			Liner repaired or replaced. Liner is fully covered.
Pond Perms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement.			Dike is built back to the design elevation.
	Piping	No discernable water flow through pond berm. No ongoing erosion with potential for erosion to continue.			Eliminate piping. Resolve erosion potential.
Emergency Overflow Spillway and Berms over 4 feet in Height	Tree growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.			Trees should be removed. If root system is small (base less than 4 inches), the root system may be left in place. Otherwise the roots should be removed and the berm restored.
	Piping	No discernable water flow through pond berm. No ongoing erosion with potential for erosion to continue.			Eliminate piping. Resolve erosion potential.
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway.			Rocks and pad depth are restored to design standards.
COMMENTS:					

Table 2: Inspection Checklist – Closed Detention Systems (Tanks/Vaults)

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
Storage Area	Plugged air vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.			Ensure vents are open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for ½ length of storage vault or any point depth exceeds 15% of diameter.			Remove all sediment and debris from storage area.
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility.			Seal all joint between tank/pipe sections.
	Tank Pipe Bent out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape.			Replace or repair tank/pipe to design.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than ½-inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound.			Replace vault, or repair to design specifications and ensure vault is structurally sound.
		Cracks wider than ½-inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.			Ensure no cracks are more than ¼-inch wide at the joint of the inlet/outlet pipe.
Manhole	Cover Not In Place	Cover is missing or only partially in place. Any open manhole requires maintenance.			Ensure manhole is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts in frame have less than ½ inch of thread (may not apply to self-locking lids.)			Ensure that cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.			Ladder meets design standards. Allows maintenance person safe access.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.			Eliminate piping. Resolve any erosion problems.
	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway. (Rip-rap on inside slopes need not be replaced.)			Restore rocks and pad depth to design standard.

COMMENTS:

Table 3: Inspection Checklist – Control Structure/Flow Restrictor

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Control Structure Flow Restrictor

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Trash & Debris	Material exceeds 25% of sump depth or 1 foot below orifice plate.			Ensure control structure orifice is not blocked. Remove all trash and debris.
	Structural Damage	Structure is not securely attached to manhole wall.			Ensure structure is securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).			Ensure structure is in correct position.
		Connections to outlet pipe are not watertight and show signs of rust.			Ensure connections to outlet pipe are water tight, structure is repaired or replaced and works as designed.
		Any holes – other than undersigned holes – in the structure.			Ensure structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing.			Ensure gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.			Ensure gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.			Chain is in place and works as designed.
		Gate is rusted over 50% of its surface area.			Repair or replace gate to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.			Ensure plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.			Ensure plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.			Ensure pipe is free of all obstructions and works as designed.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
Manhole	Cover Not In Place	Cover is missing or only partially in place. Any open manhole requires maintenance.			Close manhole.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts in frame have less than ½ inch of thread (may not apply to self-locking lids.)			Ensure cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.			Ensure ladder meets design standards and allows maintenance person safe access.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.			Eliminate piping. Resolve erosion problems.
	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway. (Rip-rap on inside slopes need not be replaced.)			Restore rocks and pad depth to design standard.

COMMENTS:

Table 4: Inspection Checklist – Catch Basins/Inlets

Installation _____ Date Inspected _____ Time _____

Inlet # _____ Coordinates: _____

- Grate Top Box Top Curb Inlet Pipe Inlet
 Curb-cut Drop Inlet Dome Inlet

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.			Remove trash or debris located immediately in front of catch basin or on grate opening.
		Trash or debris (in the basin) that exceeds 60% of the sump depth as measured from the bottom of basins to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.			Remove trash or debris from the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.			Ensure inlet & outlet pipes are free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).			Ensure no dead animals or vegetation are present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60% of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.			Remove sediment from the catch basin.
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch.			Ensure top slab is free of holes and cracks.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
		Frame is not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab. Frame not securely attached.			Ensure frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/Bottom	Maintenance person judges that structure is unsound.			Replace or repair basin to design standards.
		Grout fillet has separated or cracked wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.			RegROUT pipe and secure at basin wall.
	Settlement/Misalignment	If failure of basin has created a safety, function, or design problem.			Replace or repair basin to standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.			Ensure no vegetation is blocking open basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.			Ensure there is no vegetation or root growth present.
	Contamination and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.			Ensure no contaminants or pollutants are present.
Catch Basin Cover	Cover not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.			Close catch basin cover.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than ½ inch of thread.			Ensure mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure.			Ensure cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.			Ensure ladder meets design standards and allows maintenance person safe access.
Metal Grates (if applicable)	Grate Opening Unsafe	Grate with opening wider than 7/8 inch.			Ensure grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.			Free grate of trash and debris.
	Damaged or Missing	Grate missing or broken member(s) of the grate.			Ensure grate is in place and meets design standards.
COMMENTS:					

Table 5: Inspection Checklist – Debris Barriers (e.g., Trash Racks)

Installation _____ Date Inspected _____ Time _____

Location _____ Coordinates: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Trash & Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.			Clear barrier to design flow capacity.
Metal	Damaged/Missing Bars	Bars are bent out of shape more than 3 inches.			Ensure bars are in place with no bends more than 3/4 inch.
		Bars are missing or entire barrier missing.			Ensure bars are in place according to design.
		Bars are loose and rust is causing 50% deterioration to any part of barrier.			Replace or repair barriers to design standard.
	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe.			Ensure barrier is firmly attached to pipe.
COMMENTS:					

Table 6: Inspection Checklist – Energy Dissipaters

Installation _____ Date Inspected _____ Time _____

Location _____ Coordinates: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
External					
Rock Pad	Missing or Moved Rock	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil.			Replace rock pad to design standards.
	Erosion	Soil erosion in or adjacent to rock pad.			Replace rock pad to design standards.
Dispersion Trench	Pipe Plugged with Sediment	Accumulated sediment that exceeds 20% of the design depth.			Clean pipe/flushed so that it matches design.
	Not Discharging Water Properly	Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” of water along trench.)			Redesign or rebuild trench to standards.
	Perforations Plugged	Over ½ of perforations in pipe are plugged with debris and sediment.			Clean or replace perforated pipe.
	Water Flows Out Top of “Distributor” Catch Basin	Maintenance person observes or receives credible report of water flowing out during any storm less than the design storm or its causing or appears likely to cause damage.			Rebuild or redesign facility to standards.
Internal					
Manhole/Chamber	Worn or Damaged Post, Baffles, Side of Chamber	Structure dissipating flow deteriorates to ½ of original size or any concentrated worn spot exceeding one square foot which would make structure unsound.			Replace structure to design standards.
	Other Defects.	See Table 4: Maintenance Standards – Catch Basins			See Table 4
COMMENTS:					

Table 7: Inspection Checklist – Typical Biofiltration Swale

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.			Remove sediment deposits on grass treatment area of the bioswale. When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased.
	Standing Water	When water stands in the swale between storms and does not drain freely.			Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, remove clogged check dams, add underdrains or convert to a wet biofiltration swale.
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale width.			Level the spreader and clean so that flows are spread evenly over entire swale width.
	Constant Base-flow	When small quantities of water continually flow through the swale, even when it has been dry for weeks, and an eroded, muddy channel has formed in the swale bottom.			Add a low-flow pea-gravel drain the length of the swale or bypass the baseflow around the swale.
	Poor Vegetation Coverage	When grass is sparse or bare or eroded patches occur in more than 10% of the swale bottom.			Determine why grass growth is poor and correct that condition. Replant with plugs of grass from the upper slope; plant in the swale bottom at 8-inch intervals. Or: reseed into loosened, fertile soil.
	Vegetation	When the grass becomes excessively tall (greater than 10 inches); when nuisance weeds and other vegetation starts to take over.			Mow vegetation or remove nuisance vegetation so that flow is not impeded. Grass should be mowed to a height of 3 to 4 inches. Remove grass clippings.
	Excessive Shading	Grass growth is poor because sunlight does not reach swale.			If possible, trim back overhanging limbs and remove brushy vegetation on adjacent slopes.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
	Inlet/Outlet	Inlet/outlet areas clogged with sediment and/or debris.			Remove material so that there is no clogging or blockage in the inlet and outlet area.
	Trash and Debris Accumulation	Trash and debris accumulated in the bioswale.			Remove trash and debris from bioswale.
	Erosion/Scouring	Eroded or scoured swale bottom due to flow channelization, or higher flows.			For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. If bare areas are large, generally greater than 12 inches wide, the swale should be regraded and reseeded. For smaller bare areas, overseed when bare spots are evident, or take plugs of grass from the upper slope and plant in the swale bottom at 8-inch intervals.

COMMENTS:

Table 8: Inspection Checklist – Wet Biofiltration Swale

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches in 1'0% of the swale treatment area.			Remove sediment deposits in treatment area.
	Water Depth	Water not retained to a depth of about 4 inches during the wet season.			Build up or repair outlet berm so that water is retained in the wet season.
	Wetland Vegetation	Vegetation becomes sparse and does not provide adequate filtration, OR vegetation is crowded out by very dense clumps of cattail, which do not allow water to flow through the clumps.			Determine cause of lack of vigor of vegetation and correct. Replant as needed. For excessive cattail growth, cut cattail shoots back and compost off-site. Note: normally wetland vegetation does not need to be harvested unless die-back is causing oxygen depletion in downstream waters.
	Inlet/Outlet	Inlet/outlet areas clogged with sediment and/or debris.			Remove clogging or blockage in the inlet and outlet areas.
	Trash and Debris Accumulation	Any trash and debris which exceed 1 cubic foot per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold, all trash and debris will be removed as part of next scheduled maintenance			Clear trash and debris from site
	Erosion/Scouring	Swale has eroded or scoured due to flow channelization, or higher flows.			Check design flows to assure swale is large enough to handle flows. Bypass excess flows or enlarge swale. Replant eroded areas with fibrous-rooted plants such as <i>Juncus efusus</i> (soft rush) in wet areas or snowberry (<i>Symphoricarpos albus</i>) in dryer areas.
COMMENTS:					

Table 9: Inspection Checklist – Filter Strips

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.			Remove sediment deposits, re-level so slope is even and flows pass evenly through strip.
	Vegetation	When the grass becomes excessively tall (>10 inches); when nuisance weeds and other vegetation starts to take over.			Mow grass, control nuisance vegetation such that flow is not impeded. Grass should be mowed to a height between 3-4 inches.
	Trash and Debris Accumulation	Trash and debris accumulated on the filter strip.			Remove trash and debris from filter.
	Erosion/Scouring	Eroded or scoured areas due to flow channelization or higher flows.			For ruts or bare areas <12 inches wide, repair the damaged area by filling with crushed gravel. The grass will creep in over the rock in time. If bare areas are large, generally greater than 12 inches wide, the filter strip should be regraded and reseeded. For smaller bare areas, overseed when bare spots are evident.
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire filter width.			Level the spreader and clean so that flows are spread evenly over entire filter width.
COMMENTS:					

Table 10: Inspection Checklist – Wet Ponds

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Water Level	First cell is empty, doesn't hold water.			Line the first cell to maintain at least 4 feet of water. Although the second cell may drain, the first cell must remain full to control turbulence of the incoming flow and reduce sediment resuspension.
	Trash and Debris	Accumulation that exceeds 1 cubic foot per 1000 square feet of pond area.			Remove trash and debris from pond.
	Inlet/Outlet Pipe	Inlet/Outlet pipe clogged with sediment and/or debris material.			Ensure there is no clogging or blockage in the inlet and outlet piping.
	Sediment Accumulation in Pond Bottom	Sediment accumulations in pond bottom that exceeds the depth of sediment zone plus 6-inches, usually in the first cell.			Remove sediment from pond bottom.
	Oil Sheen on Water	Prevalent and visible oil sheen.			Remove oil from water using oil-absorbent pads or vacuor truck. Locate and correct source of oil. If chronic low levels of oil persist, plant wetland plants such as <i>Juncus effusus</i> (soft rush) which can uptake small concentrations of oil.
	Erosion	Erosion of the pond's side slopes and/or scouring of the pond bottom, that exceeds 6-inches, or where continued erosion is prevalent.			Stabilize slopes using proper erosion control measures and repair methods.
	Settlement of Pond Dike/Berm	Any part of these components that has settled 4-inches or lower than the design elevation, or inspector determines dike/berm is unsound.			Repair dike/berm to specifications.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
	Internal Berm	Berm dividing cells should be level.			Level berm surface so that water flows evenly over entire length of berm.
	Overflow Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.			Replace rocks to specification.

COMMENTS:

Table 11: Inspection Checklist – Infiltration

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic foot per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold, all trash and debris will be removed as part of next scheduled maintenance			Clear trash and debris from site
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public.			No danger of poisonous vegetation where maintenance personnel or the public might normally be.
		Any evidence of noxious weeds as defined by federal regulations			Complete eradication of noxious weeds may not be possible.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants.			No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.			Destroy rodents and repair dam or berm.
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events. (A percolation test pit or test of facility indicates facility is only working at 90% of its designed			Remove sediment and/or clean facility so that infiltration system works according to design.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
		capabilities. Test every 2 to 5 years. If two inches or more sediment is present, remove.)			
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than ½ full			Replace filter bag or redesign system is.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.			Replace gravel in rock filter.
Slide Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.			Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.
		Any erosion observed on a compacted berm embankment.			If erosion is occurring on compacted berms, a licensed civil engineer should be consulted to resolve source of erosion.
Emergency Overflow Spillway and Berms over 4 feet in Height	Tree growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.			Trees should be removed. If root system is small (base less than 4 inches), the root system may be left in place. Otherwise the roots should be removed and the berm restored.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.			Eliminate piping. Resolve erosion problem.
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway. (Rip-rap on inside slopes need not be replaced.)			Restore rocks and pad depth to design standards.
	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.			Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
		Any erosion observed on a compacted berm embankment.			If erosion is occurring on compacted berms, a licensed civil engineer should be consulted to resolve source of erosion.
Pre-settling Ponds and Vaults	Facility or sump filled with sediment and/or debris	6" or designed sediment trap depth of sediment.			Remove sediment.

COMMENTS:

Table 12: Inspection Checklist – Wet Vaults

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Trash/Debris Accumulation	Trash and debris accumulated in vault, pipe, or inlet/outlet (includes floatables and non-floatables).			Remove trash and debris from vault.
	Sediment Accumulation in Vault	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6-inches.			Remove sediment from vault.
	Damaged Pipes	Inlet/outlet piping damaged or broken and in need of repair.			Repair and/or replace pipe.
	Access Cover Damaged/Not Working	Cover cannot be opened or removed, especially by one person.			Cover repaired or replaced to proper working specifications.
	Ventilation	Ventilation area blocked or plugged			Remove or clean blocking material from ventilation area. A specified % of the vault surface area must provide ventilation to the vault interior.
	Vault Structure Damage –	Maintenance/inspection personnel determine that the vault is not structurally sound.			Replace or repair vault so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.			Repair vault so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking, warping, and/or showing signs of failure.			Repair or replace baffles to specifications.
Access Ladder Damage	Ladder is corroded or deteriorated, not functioning properly, not attached to structure wall, missing rungs, has cracks and/or misaligned. Confined space warning sign missing.			Replace or repair ladder to specifications, so ladder is safe to use. Replace sign warning of confined space entry requirements. Ladder and entry notification complies with OSHA standards.	
COMMENTS:					

Table 13: Inspection Checklist – Sand Filters (Above Ground/Open)

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
Above Ground (Open Sand Filter)	Sediment Accumulation on Top Layer	Sediment depth exceeds ½-inch.			Remove sediment deposit on grass layer of sand filter that would impede permeability of the filter section.
	Trash and Debris Accumulations	Trash and debris accumulated on sand filter bed.			Remove trash and debris from sand filter bed.
	Sediment Debris in Clean-Outs	When the clean-outs become full or partially plugged with sediment and/or debris.			Remove sediment from clean-outs.
	Sand Filter Media	Drawdown of water through the sand filter media takes longer than 24-hours, and/or flow through the overflow pipes occurs frequently.			Scrape top several inches of sand. May require replacement of entire sand filter depth depending on extent of plugging (a sieve analysis is helpful to determine if the lower sand has too high a proportion of fine material).
	Prolonged Flows	Sand is saturated for prolonged periods of time (several weeks) and does not dry out between storms due to continuous base flow or prolonged flows from detention facilities.			Low, continuous flows are limited to a small portion of the facility by using a low wooden divider or slightly depressed sand surface.
	Short Circuiting	When flows become concentrated over one section of the sand filter rather than dispersed.			Ensure that flow and percolation of water through sand filter is uniform and dispersed across the entire area.
	Erosion Damage to Slopes	Erosion over 2-inches deep where cause of damage is prevalent or potential for continued erosion is evident.			Stabilize slopes using proper erosion control measures.
	Rock Pad Missing or Out of Place	Soil beneath the rock is visible.			Replace or rebuild rock pad to design specifications.
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed across sand filter.			Level and clean spreader so that flows are spread evenly over sand filter.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
	Damage Pipes	Any part of the piping that is crushed or deformed more than 20% or any other failure to the piping.			Repair or replace pipe.
Below Ground Vault	Sediment Accumulation on Sand Media Section	Sediment depth exceeds ½-inch.			Remove sediment deposits on sand filter section which would impede permeability of the filter section.
	Sediment Accumulation in Pre-Setting Portion of Vault	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6-inches.			Remove any sediment deposits in first chamber of vault.
	Trash/Debris Accumulation	Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non-floatables.			Remove trash and debris from vault and inlet/outlet piping.
	Sediment in Drain Pipes/Cleanouts	When drain pipes, cleanouts become full with sediment and/or debris.			Remove sediment and debris.
	Short Circuiting	When seepage/flow occurs along the vault walls and corners. Sand eroding near inflow area.			Relay sand filter media section re-laid and compact along perimeter of vault to form a semi-seal. Add erosion protection to dissipate force of incoming flow and curtail erosion.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.			Repair and/or replace pipe.
	Access Cover Damaged/Not Working	Cover cannot be opened, corrosion/deformation of cover. Maintenance person cannot remove cover using normal lifting pressure.			Repair cover to proper working specifications or replaced.
	Ventilation	Ventilation area blocked or plugged.			Remove or clear blocking material from ventilation area. A specified % of the vault surface area must provide ventilation to the vault interior (see design specifications).
	Vault Structure Damaged; Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Cracks wider than ½-inch or evidence of soil particles entering the structures through the cracks, or maintenance/inspection personnel determine that the vault is not structurally safe.			Replace or repair vault so that vault meets design specifications and is structurally sound.
Cracks wider than ½-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.				Repair vault so no cracks exist wider than ¼-inch at the joint of the installation pipe.	

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
	Baffles/Internal Walls	Baffles or walls corroding, cracking, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.			Replace or repair ladder to specifications, and ensure it is safe to use.

COMMENTS:

Table 14: Inspection Checklist – Manufactured Media Filters

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
Below Ground Vault	Sediment Accumulation on Media	Sediment depth exceeds 0.25-inches.			Remove sediment deposits which would impede permeability of media.
	Sediment Accumulation in Vault	Sediment depth exceeds 6-inches in first chamber.			Remove sediment deposits in vault bottom of first chamber.
	Trash/Debris Accumulation	Trash and debris accumulated on compost filter bed.			Remove trash and debris from the compost filter bed.
	Sediment in Drain Pipes/Clean-Outs	When drain pipes, clean-outs, become full with sediment and/or debris.			Remove sediment and debris.
	Damaged Pipes	Any part of the pipes that are crushed or damaged due to corrosion and/or settlement.			Repair and/or replace pipe.
	Access Cover Damaged/Not Working	Cover cannot be opened; one person cannot open the cover using normal lifting pressure, corrosion/deformation of cover.			Repair cover to proper working specifications, or replace.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than ½-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine vault is not structurally sound.			Replace or repair vault so that vault meets design specifications and is structurally sound.
		Cracks wider than ½-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.			Repair vault so no cracks exist wider than ¼-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person.			Repair or replace baffles to specifications.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.			Repair or replace ladder to meet specifications, and is safe to use as determined by inspection personnel.
Below Ground Cartridge Type	Media	Drawdown of water through the media takes longer than 1 hour, and/or inflow occurs frequently.			Replace media cartridge.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
	Short Circuiting	Flows do not properly enter filter cartridges.			Replace filter cartridge.

COMMENTS:

Table 15: Inspection Checklist – Baffle Oil/Water Separators (API Type)

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Monitoring	Inspection of discharge water for obvious signs of poor water quality.			Ensure that effluent discharge from vault are clear without thick visible sheen.
	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth.			Remove sediment deposits on vault bottom that would impede flow through the vault and reduce separation efficiency.
	Trash and Debris Accumulation	Trash and debris accumulation in vault, or pipe inlet/outlet, floatables and non-floatables.			Remove trash and debris from vault, and inlet/outlet piping.
	Oil Accumulation	Oil accumulation that exceed 1-inch at the surface of the water.			Extract oil from vault by vactoring. Dispose in accordance with regulations.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.			Repair or replace pipe.
	Access Cover Damaged/Not Working	Cover cannot be opened, corrosion/deformation of cover.			Repair cover to proper working specifications or replace.
	Vault Structure Damaged – Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than ¼ inch. Frame is not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab. Frame not securely attached/			Replace or repair vault made so that vault meets design specifications and is structurally sound.
		Cracks wider than ½-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.			Repair vault so that no cracks exist wider than ¼-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person.			Repair or replace baffles to specifications.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.			Replace or repair ladder to specifications, and is safe to use as determined by inspection personnel.
	Baffles/Internal Walls	Baffles or walls corroding, cracking, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.			Repair or replace baffles to specifications.

COMMENTS:

Table 16: Inspection Checklist – Coalescing Plate Oil/Water Separators

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Monitoring	Inspection of discharge water for obvious signs of poor water quality.			Ensure that effluent discharge from vault are clear without thick visible sheen.
	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth and/or visible signs of sediment on plates.			Remove sediment deposits on vault bottom and plate media that would impede flow through the vault and reduce separation efficiency.
	Trash and Debris Accumulation	Trash and debris accumulation in vault, or pipe inlet/outlet, floatables and non-floatables.			Remove trash and debris from vault, and inlet/outlet piping.
	Oil Accumulation	Oil accumulation that exceed 1-inch at the surface of the water.			Extract oil from vault by vactoring. Dispose in accordance with regulations.
	Damaged Coalescing Plates	Plate media broken, deformed, cracked, and/or showing signs of failure.			Replace a portion of the media pack or the entire plate pack depending upon severity of failure.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.			Repair or replace pipe.
	Vault Structure Damaged – Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Cracks wider than ½-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.			Replace vault or make repairs so that vault meets design specifications and is structurally sound.
		Cracks wider than ½-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.			Repair vault so that no cracks exist wider than ¼-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person.			Repair or replace baffles to specifications.

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.			Replace or repair ladder to specifications, and is safe to use as determined by inspection personnel.

COMMENTS:

Table 17: Inspection Checklist – Catch Basin Inserts

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Sediment Accumulation	When sediment forms a cap over the insert media of the insert and/or unit.			Remove sediment cap on the insert media and its unit.
	Trash and Debris Accumulation	Trash and debris accumulation on insert unit creating a blockage/restriction.			Remove trash and debris from insert unit so runoff freely flows into catch basin.
	Media Insert Not Removing Oil	Effluent water from media insert has a visible sheen.			Ensure effluent water from media insert is free of oils and has no visible sheen.
	Media Insert Water Saturated	Catch basin insert is saturated with water and no longer has the capacity to absorb.			Remove and replace media insert.
	Media Insert Oil Saturated	Media oil saturated due to petroleum spill that drains into catch basin.			Remove and replace media insert.
	Media Insert Use Beyond Product Life	Media has been used beyond the typical average life of media insert product.			Remove and replace media at regular intervals, depending on insert product.
COMMENTS:					

Table 18: Inspection Checklist – Media Filter Drain (MFD)

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Defect	Condition When Maintenance is Needed	Acceptable	Unacceptable	Results Expected When Maintenance is Performed
General	Sediment Accumulation on Grass Filter Strip	Sediment depth exceeds 2 inches or creates uneven grading that interferes with sheet flow.			Remove sediment deposits on grass treatment area of the embankment. Embankment should be level from side to side and drain freely toward the toe of the embankment slope. There should be no standing water once inflow has increased.
	No Vegetation Zone/Flow Spreader	Flow spreader is uneven or clogged so that flows are not uniformly distributed over entire embankment width.			Level the spreader and clean to spread flows evenly over entire embankment width.
	Poor Vegetation Coverage	Grass is sparse or bare, or eroded patches are observed in more than 10% of the grass strip surface area.			Determine why grass growth is poor and correct the condition. Reseed into loosened, fertile soil or compost; or, replant with plugs of grass from the upper slope.
	Vegetation	Grass becomes excessively tall (>10 inches); nuisance weeds and other vegetation start to take over.			Mow vegetation or remove nuisance vegetation to not impede flow. Mow grass to a height of 6 inches.
	Media Filter Drain Mix Replacement	Water is seen on the surface of the media filter drain >48 hours after the storms have ceased.			Excavate and replace all of the media filter drain mix contained within the media filter drain.
	Excessive Shading	Grass growth is poor because sunlight does not reach embankment.			If possible, trim back overhanging limbs and remove brushy vegetation on adjacent slopes.
	Trash and Debris	Trash and debris have accumulated on embankment.			Remove trash and debris from embankment.
	Flooding of Media Filter Drain	When media filter drain is inundated by flood water.			Evaluate media filter drain material for acceptable infiltration rate and replace if media filter drain does not meet long-term infiltration rate standards.

COMMENTS:

Table 19: Inspection Checklist – Bioretention Facilities

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
Earthen Side Slopes and Berms	Facility Footprint					
	B,S		Erosion (gullies/rills) greater than 2 inches deep around inlets, outlet, and alongside slopes.			<ul style="list-style-type: none"> Eliminate cause of erosion and stabilize damaged area (regrade, rock, vegetation, erosion control matting). For deep channels or cuts (over 3 inches in ponding depth), temporary erosion control measures should be put in place until permanent repairs can be made. Properly designed, constructed, and established facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems persist, the following should be reassessed: (1) flow volumes from contributing areas and bioretention facility sizing; (2) flow velocities and gradients within the facility; and (3) flow dissipation and erosion protection strategies at the facility inlet.
	A		Erosion of sides causes slope to become a hazard.			Take actions to eliminate the hazard and stabilize slopes.
	A,S		Sediment greater than 3 inches (relative to undisturbed sections of berm).			Restore to design height.
	A,S		Downstream face of berm wet, seeps or leaks evident.			Plug any holes and compact berm (may require consultation with engineer, particularly for large berms).

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
Concrete Sidewalls	A		Any evidence of rodent holes or water piping in berm.			<ul style="list-style-type: none"> Eradicate rodents Fill holes and compact
	A		Cracks or failure of concrete sidewalls.			<ul style="list-style-type: none"> Repair/seal cracks Replace if repair is insufficient
	A		Rockery sidewalls are insecure.			Stabilize rockery sidewalls (may require consultation with engineer, particularly for walls 4 feet or greater in height).
			Trash and debris present.			Clean out trash and debris.
Facility Area Bottom Area	A,S	B	Accumulated sediment to extend that infiltration rate is reduced or surface storage capacity significantly impacted.			<ul style="list-style-type: none"> Remove excess sediment Replace any vegetation damaged or destroyed by sediment accumulation and removal Mulch newly planted vegetation Identify and control the sediment source (if feasible) If accumulated sediment is recurrent, consider adding presettlement or installing berms to create a forebay at the inlet.
			Accumulated leaves in facility			Remove leaves if there is a risk to clogging outlet structure or water flow is impeded.
Low Permeability Check Dams and Weirs			Sediment, vegetation, or debris accumulated at or blocking (or having the potential to block) check dam, flow control weir, or orifice.			Clear the blockage
	A,S		Erosion and/or undercutting present.			Repair and take preventative measures to prevent future erosion and/or undercutting.
	A		Grade board on top of weir damaged or not level.			Restore to level position.
Ponded Water	B,S		Expressive ponding water: Water overflows during storms smaller than the design event or ponded water remains in the basin 48 hours or longer after the end of a storm.			<p>Determine cause and resolve in the following order:</p> <ol style="list-style-type: none"> Confirm leaf or debris buildup in the bottom of the facility is not impeding infiltration. If necessary, remove leaf litter/debris. Ensure that underdrain (if present) is not clogged. If necessary, clear underdrain. Check for other water inputs (e.g., groundwater, illicit connections).

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
						<p>4. Verify that the facility is sized appropriate for the contributing area. Confirm that the contributing area has not increased. If steps #1-4 do not solve the problem, the bioretention soil is likely clogged by sediment accumulation at the surface or has become overly compacted. Dig a small hole to observe soil profile and identify compaction depth or clogging front to help determine the soil depth to be removed or otherwise rehabilitated (e.g., tilled). Consultation with engineer.</p> <ul style="list-style-type: none"> Minimize all loading in the facility footprint (foot traffic and other loads) to the degree feasible in order to prevent compaction of bioretention soils. Never drive equipment or apply heavy loads in facility footprint. Because the risk of compaction is higher during saturated soil conditions, any type of loading in the cell (including foot traffic) should be minimized during wet conditions. Consider measures to distribute loading if heavy foot traffic is required or equipment must be placed in facility. (ex: boards) If compaction occurs, soil must be loosened or otherwise rehabilitated to original design state.
Bioretention Soil Mix	As needed		Bioretention soil mix protection is needed when performing maintenance requiring entrance into the facility footprint.			
Inlets/Outlets/Pipes						
Splash Block Inlet	A		Water is not being directed properly to the facility and away from the inlet structure.			Reconfigure/repair blocks to direct water to facility and away from structure.
Curb Cut Inlet/Outlet	M	Weekly during fall leaf drop	Accumulated leaves at curb cuts.			Clear leaves (particularly important for key inlets and low points along linear facilities).
Pipe Inlet/Outlet	A		Pipe is damaged.			Repair/replace.
	W		Pipe is clogged			Remove roots or debris.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
	A, S		Sediment, debris, trash, or mulch reducing capacity of inlet/outlet.			<ul style="list-style-type: none"> • Clear the blockage. • Identify the source of the blockage and take actions to prevent future blockages.
		Weekly during fall leaf drop	Accumulated leaves at inlets/outlets			Clear leaves (particularly important for key inlets and low points along long, linear facilities).
		A	Maintain access for inspections.			<ul style="list-style-type: none"> • Clear vegetation (transplant vegetation when possible) within 1 foot of inlets and outlets, maintain access pathways. • Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants.
Erosion Control at Inlet	A		Concentrated flows are causing erosion.			Maintain a cover of rock or cobbles or other erosion protection measure (e.g., matting) to protect the ground where concentrated water enters the facility (e.g., a pipe, curb cut, or swale). Remove/dispose.
Trash Rack	S		Trash or other debris present on trash rack.			Remove/dispose.
	A		Bar screen damaged or missing.			Repair/replace.
Overflow	A,S		Capacity reduced by sediment in debris.			Remove sediment or debris/dispose.
Underdrain Pipe	As needed	B	<ul style="list-style-type: none"> • Plant roots, sediment, or debris reducing capacity of underdrain • Prolonged surface ponding 			<ul style="list-style-type: none"> • Jet clean or rotary cut debris/roots from underdrain(s) • If underdrains are equipped with a flow restrictor (e.g, orifice) to attenuate flows, the orifice must be cleaned regularly.
Vegetation						
Facility Bottom Area and Upland Slope Vegetation	Fall and Spring		Vegetation survival rate falls below 75% within first two years of establishment..			<ul style="list-style-type: none"> • Determine cause of poor vegetation growth and correct condition. • Replant as necessary to obtain 75% survival rate or greater. • Confirm that plant selection is appropriate for site growing conditions. • Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
Vegetation (General)	As Needed		Presence of diseased plants and plant material.			<ul style="list-style-type: none"> Remove any diseased plants or plant parts and dispose of in an approved location to avoid risk of spreading the disease to other plants. Disinfect gardening tools after pruning to prevent spread of the disease. Replant as necessary. Prune trees and shrubs in a manner appropriate for each species.
Trees and Shrubs		All pruning seasons	Pruning as needed.			<ul style="list-style-type: none"> Prune trees and shrubs using most current standards. Remove trees and shrubs, if necessary.
	A		Large trees and shrubs interfere with operation of the facility or access for maintenance.			<ul style="list-style-type: none"> Remove standing dead vegetation. Replace dead vegetation within 30 days of reported dead and dying plants (as practical depending on weather/planting season). If vegetation replacement is not feasible within 30 days, and absence of vegetation may result in erosion problems, temporary erosion control measures should be put into place immediately. Determine cause of dead vegetation and address issue, if possible. If specific plants have a high mortality rate, assess the cause and replace with appropriate species. Consult with a landscape architect.
	Fall and Spring		Standing dead vegetation is present.			<ul style="list-style-type: none"> When working around and below mature trees, take care to minimize any damage to tree roots and avoid compaction of soil. Planting of small shrubs or groundcovers beneath mature trees may be desirable in some cases. Such plantings should use mainly plants that come as bulbs, bare root or in 4-inch pots. Plants should be in no larger than 1-gallon containers.
	Fall and Spring		Planting beneath mature trees.			

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
	Fall and Spring		Presence of or need for stakes and guys (tree growth, maturation, and support needs).			<ul style="list-style-type: none"> • Verify location of facility liners and underdrain (if any) prior to stake installation in order to prevent liner puncture or pipe damage. • Monitor tree support systems: Repair and adjust as needed to provide support and prevent damage to tree. • Remove tree supports (stakes, guys, etc.) after one growing season or maximum of 1 year. • Backfill stake holes after removal.
Trees and Shrubs Adjacent to Vehicle Travel Areas (or areas where visibility needs to be maintained)	A		Vegetation causes some visibility (line of sight) or driver safety issues.			<ul style="list-style-type: none"> • Maintain appropriate height for sight clearance. • When continued, regular pruning is required to maintain visual sight lines for safety or clearance along a walk or drive, consider relocating the plant to a more appropriate location. • Remove or transplant if continual safety hazard. • Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants.
Flowering Plants		A	Dead or spent flowers present.			Remove spent flowers (deadhead)
Perennials	Fall		Spent plants.			Cut back dying or dead and fallen foliage and stems.
Emergent Vegetation	Spring		Vegetation compromises conveyance.			Hand rake sedges and rushes with a small rake or fingers to remove dead foliage before new growth emerges in spring or earlier only if the foliage is blocking water flow (sedges and rushes do not respond well to pruning).
Ornamental Grasses (perennial)	Winter and Spring		Dead material from previous year's growing cycle or dead collapsed foliage.			<ul style="list-style-type: none"> • Leave dry foliage for winter interest. • Hand rake with a small rake or fingers to remove dead foliage back to within several inches from the soil before new growth emerges in spring or earlier if the foliage collapses and is blocking water flow.
Ornamental Grasses (evergreen)	Fall and Spring		Dead growth present in spring.			<ul style="list-style-type: none"> • Hand rake with a small rake or fingers to remove dead growth before new growth emerges in spring. • Clean, rake, and comb grasses when they become too tall. • Cut back to ground or thin every 2-3 years as needed.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
Noxious Weeds	Mar. – Oct., preceding seed dispersal		Listed noxious vegetation is present (refer to current county noxious weed list) Kitsap County – Attached Island County – Attached Snohomish County - https://snohomishcountywa.gov/750/Noxious-Weeds-List			<ul style="list-style-type: none"> Class A & B noxious weeds should be removed, bagged, and disposed as garbage immediately. Reasonable attempts must be made to remove and dispose of Class C noxious weeds. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. Apply mulch after weed removal.
Weeds	Mar. – Oct., preceding seed dispersal		Weeds are present.			Remove weeds with their roots manually with pincer-type weeding tools, flame weeders, or hot water weeders as appropriate.
Excessive Vegetation	Once in early to mid-May and once in early to mid-September		Low-lying vegetation growing beyond facility edge onto sidewalks, paths, or street edge poses pedestrian safety hazard or may clog adjacent permeable pavement surfaces due to associated leaf litter, mulch, and soil.			<ul style="list-style-type: none"> Edge or trim groundcovers and shrubs at facility edge. Avoid mechanical blade-type edger and do not use edger or trimmer within 2 feet of tree trunks. While some clippings can be left in the facility to replenish organic material in the soil, excessive leaf litter can cause surface soil clogging.
	As Needed		Excessive vegetation density inhibits stormwater flow beyond design ponding or becomes a hazard for pedestrian and vehicular circulation and safety.			<ul style="list-style-type: none"> Determine whether pruning or other routine maintenance is adequate to maintain proper plant density and aesthetics. Determine if planting type should be replaced to avoid ongoing maintenance issues. Remove plants that are weak, broken, or not true to form; replace in-kind. Thin grass or plants impacting facility function without leaving visual holes or bare soil areas. Consult with a landscape architect, when needed, for removal, transplant, or substitution of plants.
	As Needed		Vegetation blocking curb cuts, causing excessive sediment buildup and flow bypass.			Remove vegetation and sediment buildup.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
Mulch		Following weeding	Bare spots (without mulch cover) are present or mulch depth less than 2 inches.			<p style="text-align: center;">Mulch</p> <ul style="list-style-type: none"> • Supplement mulch with hand tools to a depth of 2 to 3 inches. • Replenish mulch. Often course compost is used in the bottom of the facility and arborist wood chips are used on side slopes and rim (above typical water levels). • Keep all mulch away from woody stems. <p style="text-align: center;">Watering</p>
Irrigation system (if any)	Based on manufacturer's instructions		Irrigation system present			Follow manufacturer's instructions for O&M
	A		Sprinklers or drip irrigation not directed/located to properly water plants.			Redirect sprinklers or move drip irrigation to desired areas.
Summer Watering (1 st Year)	Once every 1-2 weeks or as needed during prolonged dry periods.		Trees, shrubs, and groundcovers in first year of establishment period.			<ul style="list-style-type: none"> • 10-15 gallons per tree • 3-5 gallons per shrub • 2 gallons water per square foot for groundcover areas • Water deeply, but infrequently, so that the top 6 to 12 inches of the root zone is moist. • Use soaker hoses or spot water with a shower type wand when irrigation system is not present. -Pulse water to enhance soil absorption, when feasible -Pre-moisten soil to break surface tension of dry or hydrophobic soils/mulch, followed by more water to infiltration prior to runoff. • Add a tree bag or slow-release watering device (e.g., bucket with a perforated bottom) for watering newly installed trees when irrigation system is not present.
Summer Watering (2 nd and 3 rd Year)	Once every 2-4 weeks or as needed during prolonged dry periods		Trees, shrubs, and groundcovers in second or third year of establishment period.			<ul style="list-style-type: none"> • 10-15 gallons per tree • 3-5 gallons per shrub • 2 gallons water per square foot for groundcover areas

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
						<ul style="list-style-type: none"> Water deeply, but infrequently, so that the top 6 to 12 inches of the root zone is moist. Use soaker hoses or spot water with a shower type wand when irrigation system is not present. -Pulse water to enhance soil absorption, when feasible -Pre-moisten soil to break surface tension of dry or hydrophobic soils/mulch, followed by more water to infiltration prior to runoff. Plants are typically selected to be drought tolerant and not require regular watering after establishment; however, trees may take up to 5 years of watering to become fully established. Identify trigger mechanisms for drought-stress (e.g., leaf wilt, leaf senescence, etc.) of different species and water immediately after initial signs of stress appear. Water during drought conditions or more often if necessary to maintain plant cover.
Summer Watering (after establishment)	As needed		Established vegetation (after 3 years)			
Pest Control						
Mosquitoes	B, S		Standing water remains for more than 3 days after the end of a storm.			<ul style="list-style-type: none"> Identify the cause of the standing water and take appropriate actions to address the problem. To facilitate maintenance, manually remove standing water and direct to the storm drain system (if runoff is from non-pollution-generating surfaces) or sanitary sewer system (if runoff is from pollution-generating surfaces). Use of pesticides may be considered only as a temporary measure when addressing the standing water cause. Reduce site conditions that attract nuisance species where possible (e.g. plant shrubs and tall grasses to reduce open areas for geese, etc.) Place predator decoys Follow developed protocols for specific nuisance animal issues. Remove pet waste regularly.
Nuisance Animals	As Needed		Nuisance animals causing erosion, damaging plants, or depositing large volumes of feces.			

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
Insect Pests	Every site visit associated with vegetation management		Signs of pests, such as wilting leaves, chewed leaves and bark, spotting, or other indicators.			<ul style="list-style-type: none"> For public and right-of-way sites, consider adding garbage cans with dog bags for picking up pet waste. Reduce hiding places for pests by removing diseased and dead plants. For infestations, follow local procedures.
<p>FREQUENCY: A = Annually; B = Biannually (twice per year); M = Monthly; W = At least one visit should occur during the wet season; S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval)</p> <p>COMMENTS:</p>						

Table 20: Inspection Checklist – Permeable Pavement

Installation _____ Date Inspected _____ Time _____

BMP# _____ Site Name: _____

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
Permeable Pavements, All	A, S		Runoff from adjacent pervious areas deposits soil, mulch, or sediment on paving.			<ul style="list-style-type: none"> • Clean deposited soil or other materials from permeable pavement or other adjacent surfacing. • Check if surface elevation of planted area is too high, or slopes towards pavement, and can be regraded (prior to regrading, protect permeable pavement by covering with temporary plastic and secure covering in place). • Mulch and/or plant all exposed soils that may erode to pavement surface.
Porous Asphalt or Pervious Concrete		A or B	None (routine maintenance)			<p>Clean surface debris from pavement surface using one or a combination of the following methods:</p> <ul style="list-style-type: none"> • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement. • Vacuum/sweep permeable paving installation using: <ul style="list-style-type: none"> - Walk-behind vacuum (sidewalks) - High-efficiency regenerative air or vacuum sweeper (roadways, parking lots) - ShopVac or brush brooms (small areas) • Hand-held pressure washer or power washer with rotating brushes: Follow equipment manufacturer guidelines for when equipment is most effective for cleaning permeable pavement. Dry weather is more effective for some equipment.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
	A (during rain event)		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)			<ul style="list-style-type: none"> Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility) Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 sf. Perform an additional test for each additional 2,500 s.f. (up to 15,000 s.f. total). Above 15,000 s.f., add one test for every 10,000 s.f. If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. To clean clogged pavement surfaces, use one or a combination of the following methods: <ul style="list-style-type: none"> Combined pressure washer and vacuum system calibrated not to dislodge wearing course aggregate. Hand-held pressure washer or power washer with rotating brushes. Pure vacuum sweepers. <p>Note: if the annual/biannual routine maintenance standard to clean the pavement surface is conducted using equipment from the list above, corrective maintenance may not be needed.</p>
	A		Sediment present at the surface of the pavement.			<ul style="list-style-type: none"> Assess the overall performance of the pavement system during a rain event. If water runs off the pavement and/or there is ponding, then see above. Determine source of sediment loading and evaluate whether or not the source can be reduced/eliminated. If the source cannot be addressed, consider increasing frequency of routine cleaning.
	Summer		Moss growth inhibits infiltration or poses slip safety hazard.			<ul style="list-style-type: none"> Sidewalks: Use a stiff broom to remove moss in the summer when it is dry. Parking lots and roadways: Pressure wash, vacuum sweep, or use a combination of the two for cleaning moss from pavement surface.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
Interlocking Concrete Paver Blocks and Aggregate Pavers	A		Major cracks or trip hazards and concrete spalling and raveling.			<ul style="list-style-type: none"> • Fill potholes or small cracks with patching mixes. • Large cracks and settlement may require cutting and replacing the pavement section. Replace in-kind where feasible. Replacing porous asphalt with conventional asphalt is acceptable if it is a small percentage of the total facility area and does not impact the overall facility function. • Take appropriate precautions during pavement repair and replacement efforts to prevent clogging of adjacent porous materials.
		A or B	None (routine maintenance)			<p>Clean surface debris from pavement surface using one or a combination of the following methods:</p> <ul style="list-style-type: none"> • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves). • Vacuum/sweep permeable paving installation using: <ul style="list-style-type: none"> - Walk-behind vacuum (sidewalks) - High-efficiency regenerative air or vacuum sweeper (roadways, parking lots) - ShopVac or brush brooms (small areas) <p>Note: Vacuum settings may have to be adjusted to prevent excess uptake of aggregate from paver openings or joints. Vacuum surface openings in dry weather to remove dry, encrusted sediment.</p> <ul style="list-style-type: none"> • Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility). • Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 sf. Perform an additional test for each additional 2,500 s.f. (up to 15,000 s.f. total). Above 15,000 s.f., add one test for every 10,000 s.f.
	A (during rain event)		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate).			

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
						<ul style="list-style-type: none"> If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. Clogging is usually an issue in the upper 2 to 3 centimeters of aggregate. Remove the upper layer of encrusted sediment, and fines, and/or vegetation from openings and joints between the pavers by mechanical means and/or suction equipment (e.g., pure vacuum sweeper). Replace aggregate in paver cells, joints, or openings per manufacturer's recommendation. Assess the overall performance of the pavement system during a rain event. If water runs off the pavement and/or there is ponding, then see above. Determine source of sediment loading and evaluate whether or not the source can be reduced/eliminated. If the source cannot be addressed, consider increasing frequency of routine clearing. Sidewalks: Use a stiff broom to remove moss in the summer when it is dry. Parking lots and roadways: Pressure wash, vacuum sweep, or use a combination of the two for cleaning moss from pavement surface.
	A		Sediment present at the surface of the pavement.			
	Summer		Moss growth inhibits infiltration or poses slip safety hazard.			
	A		Paver block missing or damaged.			Remove individual damaged paver blocks by hand and replace or repair per manufacturer's recommendations.
	A		Loss of aggregate material between paver blocks.			Refill per manufacturer's recommendations for interlocking paver sections.
	A		Settlement of surface			May require resetting.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
Open-celled paving grid with gravel		A or B	None (routine maintenance)			<ul style="list-style-type: none"> Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) Follow equipment manufacturer guidelines for cleaning surface.
	A (during rain event)		Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate).			<ul style="list-style-type: none"> Use vacuum truck to remove and replace top course aggregate. Replace aggregate in paving grid per manufacturer's recommendations.
	A		Paving grid missing or damaged.			<ul style="list-style-type: none"> Remove pins, pry up grid segments, and replace gravel. Replace grid segments when three or more adjacent rings are broken or damaged. Follow manufacturer guidelines for repairing surface.
	A		Settlement of surface			May require resetting
	A		Loss of aggregate material in paving grid.			Replenish aggregate material by spreading gravel with a rake (gravel level should be maintained at the same level as the plastic rings or no more than 1/4 inch above the top of rings). See manufacturer's recommendations.
		A	Weeds present.			<ul style="list-style-type: none"> Manually remove weeds. Presence of weeds may indicate that too many fines are present (refer to Actions Needed under "Aggregate is clogged" to address this issue).
Open-celled Paving Grid with Grass		A or B	None (routine maintenance)			<ul style="list-style-type: none"> Remove sediment, debris trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves). Follow equipment manufacturer guidelines for cleaning surface.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
	A (rain event)		Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate).			Rehabilitate per manufacturer's recommendations.
	A		Paving grid missing or damaged.			<ul style="list-style-type: none"> Remove pins, pry up grid segments, and replace grass. Replace grid segments when three or more adjacent rings are broken or damaged. Follow manufacturer guidelines for repairing surface.
	A		Settlement of surface.			May require resetting.
	A		Poor grass coverage in paving grid.			<ul style="list-style-type: none"> Restore growing medium, reseed or plant, aerate, and/or amend vegetated area as needed. Traffic loading may be inhibiting grass growth; reconsider traffic loading if possible.
		As needed	Routine Maintenance			Use a mulch mower to mow grass.
		A	Routine Maintenance			<ul style="list-style-type: none"> Sprinkle a thin layer of compost on top of grass surface (1/2" top dressing) and sweep it in. Do not use fertilizer.
		A	Weeds present.			<ul style="list-style-type: none"> Manually remove weeds. Mow, torch, or inoculate and replace with preferred vegetation.
	Inlets/Outlets/Pipes					
Inlet/outlet/pipe	A		Pipe is damaged			Repair/replace.
	A		Pipe is clogged			Remove roots or debris.
Underdrain Pipe	Clean pipe as needed	Clean orifice at least biannually	Plant roots, sediment, or debris reducing capacity of underdrain (may cause prolonged drawdown period).			<ul style="list-style-type: none"> Jet clean or rotary cut debris/roots from underdrain(s). If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly.

Maintenance Components	Recommended Frequency		Condition When Maintenance is Needed (Standards)	Acceptable	Unacceptable	Actions Needed (Procedures)
	Inspection	Routine Maintenance				
Raised Subsurface Overflow Pipe	Clean pipe as needed	Clean orifice : B	Plant roots, sediment, or debris reducing capacity of underdrain			<ul style="list-style-type: none"> • Jet clean or rotary cut debris/roots from underdrain(s). • If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly.
Outlet Structure	A, S		Sediment, vegetation, or debris reducing capacity of outlet structure.			<ul style="list-style-type: none"> • Clean the blockage. • Identify the source of the blockage and take action to prevent future blockages.
Overflow	B		Native soil is exposed or other signs of erosion damage are present at discharge point.			Repair erosion and stabilize surface.
Vegetation						
Adjacent Large Shrubs or Trees	As needed		Vegetation related fallout clogs or will potentially clog voids.			<ul style="list-style-type: none"> • Sweep leaf litter and sediment to prevent surface clogging and ponding. • Prevent large root systems from damaging subsurface structural components.
	Once in May and once in September		Vegetation growing beyond facility edge onto sidewalks, paths, and street edge.			Edging and trimming of planted areas to control groundcovers and shrubs from overreaching the sidewalks, paths, and street edge improves appearance and reduces clogging of permeable pavements by leaf litter, mulch, and soil.
Leaves, Needles, and Organic Debris	In fall (Oct. to Dec.) after leaf drop (1-3 times, depending on canopy cover)		Accumulation of organic debris and leaf litter.			Use leaf blower or vacuum to blow or remove leaves, evergreen needles, and debris (i.e. flowers, blossoms) off of and away from permeable pavement.
<p>FREQUENCY: A = Annually; B = Biannually (twice per year); M = Monthly; W = At least one visit should occur during the wet season; S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval)</p> <p>COMMENTS:</p>						

Pet Station #	Location	Housing Subdivision	Responsible Unit
AF-1	Cliffside Campground (3 stations)		MWR
AF-2	Rocky Point Beach Park		MWR
AF-3	Seaview Trail heading to Nortz Gate (2 stations)		MWR
AF-4	Seaview Trail heading towards Fitness Center		MWR
SB-CH-1	Western Drive	Crescent Harbor	Hunt Properties
SB-CH-2	Central Drive	Crescent Harbor	Hunt Properties
SB-CH-3	Central Drive	Crescent Harbor	Hunt Properties
SB-CH-4	Central Drive	Crescent Harbor	Hunt Properties
SB-CH-5	Central Drive	Crescent Harbor	Hunt Properties
SB-CH-6	Central Drive	Crescent Harbor	Hunt Properties
SB-CH-7	Central Drive	Crescent Harbor	Hunt Properties
SB-CH-8	Central Drive	Crescent Harbor	Hunt Properties
SB-CH-9	Central Drive	Crescent Harbor	Hunt Properties
SB-CH-10	Spruce Lane	Crescent Harbor	Hunt Properties
SB-CH-11	Spruce Lane	Crescent Harbor	Hunt Properties
SB-CH-12	Maple Lane	Crescent Harbor	Hunt Properties
SB-CH-13	Larch Drive	Crescent Harbor	Hunt Properties
SB-CH-14	Hemlock Drive x Magnolia Way	Crescent Harbor	Hunt Properties
SB-CH-15	Magnolia Way	Crescent Harbor	Hunt Properties
SB-MP-1		Maylor Point Housing	
SB-MP-2		Maylor Point Housing	
SB-MP-3		Maylor Point Housing	
SB-MP-4		Maylor Point Housing	
SB-SH-1	Sandstone Drive	Saratoga Heights Area	Hunt Properties
SB-SH-2	Guam Avenue	Saratoga Heights Area	Hunt Properties
SB-SH-3	Swan Drive	Saratoga Heights Area	Hunt Properties
SB-SH-4	Raven Drive	Saratoga Heights Area	Hunt Properties

Pet Station #	Location	Housing Subdivision	Responsible Unit
SB-SH-5	Raven Drive	Saratoga Heights Area	Hunt Properties
SB-SH-6	Guam Avenue	Saratoga Heights Area	Hunt Properties
SB-SH-7	Guam Avenue	Saratoga Heights Area	Hunt Properties
SB-SH-8	Briars Circle	Saratoga Heights Area	Hunt Properties
SB-SH-9	Goldfinch Street	Saratoga Heights Area	Hunt Properties
SB-SH-10	Goldfinch Street	Saratoga Heights Area	Hunt Properties
SB-SH-11	Canary Alley	Saratoga Heights Area	Hunt Properties
SB-SH-12	Lark Street	Saratoga Heights Area	Hunt Properties
SB-SH-13	Brandt Street	Saratoga Heights Area	Hunt Properties
SB-SH-14	Clover Street	Saratoga Heights Area	Hunt Properties
SB-SH-15	Osprey Street	Saratoga Heights Area	Hunt Properties
SB-SH-16	Canary Street	Saratoga Heights Area	Hunt Properties
SB-SH-17	Heron Drive	Saratoga Heights Area	Hunt Properties
SB-SH-18	Canary Street	Saratoga Heights Area	Hunt Properties
SB-SH-19	Canary Street	Saratoga Heights Area	Hunt Properties

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APPENDIX F: MONITORING, RECORDKEEPING, AND RECORDS

SAM Letter of Intent
SAM Cover Letter



DEPARTMENT OF THE NAVY
NAVAL AIR STATION WHIDBEY ISLAND
3730 NORTH CHARLES PORTER AVENUE
OAK HARBOR, WA 98277-5000

5090
Ser N46/ 0288
February 18, 2021

Misha Vakoc
Municipal Stormwater Permit Coordinator
US EPA Region 10
1200 6th Avenue, Suite 155
Mail Code WD-19-H16
Seattle, WA 98101-3188

Dear Ms. Vakoc:

SUBJECT: NAVAL AIR STATION WHIDBEY ISLAND OFFICIAL NOTIFICATION
TO SELECT MONITORING OPTION 2 IN THE NPDES MUNICIPAL
STORMWATER PERMIT NO. WAS026611

The purpose of this letter is to submit the official notification of the intent to join the Stormwater Action Monitoring (SAM) program per Section 3.4 Monitoring Option 2, of the municipal stormwater permit for Naval Air Station (NAS) Whidbey Island. NAS Whidbey Island selects Monitoring Option 2, to pay into the collective SAM fund for a regional stormwater monitoring program.

If you require further information, please contact Mrs. Jaime Jensen, NAS Whidbey Island Water Program Manager at (360)257-5631 or Jaime.c.jensen@navy.mil.

Sincerely,

A handwritten signature in cursive script that reads "Melissa Gehrmann".

M. S. GEHRMANN
By direction



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000

711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

June 15, 2021

Nicole Iutzi-Kubista, EV1
NAVFAC Northwest
1101 Tautog Circle RM 204
Silverdale, WA 98315-1101
Sent by email only: nicole.m.iutzi-kubista.civ@us.navy.mil

RE: Navy on joining Stormwater Action Monitoring Program

Dear Nicole Iutzi-Kubista:

The Stormwater Action Monitoring (SAM) program is administered by the Washington State Department of Ecology (Ecology) on behalf of the municipal separate storm sewer system (MS4) permittees in Western Washington, including the Washington State Department of Transportation (WSDOT). The Stormwater Work Group (SWG) is a formal stakeholder committee that oversees Ecology's administration of SAM and identifies priorities for SAM studies. All SWG members represent caucus groups that meet to discuss upcoming and ongoing topics on SWG's agenda as well as broader stormwater management and science.

EPA's MS4 permits for Naval Base Kitsap (WAS026646), Naval Station Everett (WAS026620), and Naval Air Station Whidbey Island (WAS026611) provided the Navy with the option to participate in the SAM network as a way to satisfy the Navy's MS4 permit requirements for monitoring. Any MS4 Permittee can join SAM; the level of financial contribution is set at a fixed annual amount based on the population served by the MS4 for the Effectiveness Studies and Source Identification projects and the Status and Trends monitoring of receiving waters. Ecology will invoice the Navy annually in May during their permit term 2021 – 2025. The invoice total of \$15,318 covers all three permitted locations for both the Effectiveness Studies and Status and Trends Monitoring SAM program components for the period of August – August, starting in 2022. The first invoice will be pro-rated for 2021, covering February – August 2021, as the Navy is joining SAM mid-way through their permit year. On May 19th, 2021, the SWG approved this approach for Navy participation in SAM. Ecology writes an annual report that reflects on the prior year's accomplishments, describes studies completed that year, and provides an update for ongoing projects. We will send this annual report with the invoice each year.

Nicole Iutzi-Kubista

June 15, 2021

Page 2

Every two to three years SAM solicits proposals for new stormwater studies from the greater regional stormwater scientific and practitioner community. Successful proposals are funded by SAM and managed by Ecology. Proposals are reviewed and refined by SWG committees in a process organized by SAM staff. Project proponents present their revised proposals at a stakeholder workshop that is followed by MS4 permittee voting on the proposals to inform SWG approval of funding and timing of successful projects. The Navy's financial contribution to the SAM program provides the Navy the opportunity to vote on new projects for SAM funding in each round of project selection as a participating MS4 permittee; this voting is encouraged but it is not a requirement for participation in SAM. The only participation requirement is paying the annual invoice.

Ecology welcomes the Navy's participation in SAM. If you have any further questions please contact Brandi Lubliner, SAM Coordinator, brandi.lubliner@ecy.wa.gov. The 2021 SAM invoice and the 2020 SAM Annual Report are enclosed. Learn more about SAM at ecology.wa.gov/SAM.

Sincerely,



Jeff Killelea, Manager
Program Development Services Section
Water Quality Program

Enclosures (2)

cc: Matt Jabloner, US Navy, matthew.l.jabloner.civ@us.navy.mil
Brandi Lubliner, Ecology, brwa461@ecy.wa.gov

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APPENDIX G: RESERVED

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