United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, Seattle, WA 98101

2025 MS4 Annual Report
Under Phase II MS4 General Permitting Program
01/31/2024 - 01/30/2025

FORM Approved OMB No. 2040-0004 Expires On 07/31/2026

MS4 Entity Information

MS4 Name: Naval Air Station Whidbey Island Ms4

MS4 Operator: Department Of The Navy

MS4 Class: Phase II: Small
Operator Type: Federal
MS4 Entity Type: Military Installation

City: Oak Harbor
County: Island
MS4 State/Territory: Washington

Designation Date: 12/01/2018
Designation Type: RA - Required Evaluation
Population:
Source:

MS4 Identifier: MS4-WA-SM-FE-2018-0001
NPDES ID: WAS026611
MGP Number: WAS4IP000
Joint Coverage:

Latitude: 48.351944°N
Longitude: 122.655833°W

Description of Location:

MS4 Contact Information

MS4 Program Coordinator Information

First Name: Tel
Middle Initial: K
Last Name: Schieler

Title: Stormwater Program Manager

Phone: 360-257-5742
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MS4 Mailing Address

Address Line 1: NAS Whidbey Island Environmental Department

Address Line 2: 1115 W. Lexington Street

City: Oak Harbor
State: Washington
ZIP/Postal Code: 98278

Permittee Responsibilities and Equivalent Documents

Has the Permittee submitted to EPA for consideration any documents, plans, programs or program summaries that the Permittee believes to be equivalent to a required control measure or control measure? No

Have PFAS-containing AFFFs been used for any reason at Naval Air Station Whidbey Island during this reporting year? Yes

Please explain:

While conducting training on 11/09/2024 on taxiway golf using an Airport Response Fire Fighting (ARFF) unit, 0.36 gallons of Aqueous Film Foaming Foam (AFFF) was accidentally deployed at 3:45 PM. The ARFF unit was shut down immediately and crews on site used pigs and covers for drains. The Battalion Chief notified the Command Duty Officer (CDO), Operations Duty Officer (ODO), and informed environmental personnel. An emergency work order was placed with the emergency regional dispatch. Deputy NOSC - Sara Benovic indicated that given the amount, this is a non-reportable spill and all of it was collected and cleaned up. Locking switches to place on the AFFF release button are being considered to prevent this from happening again.

Do you, the Permittee, share Permit implementation responsibility with one or more Outside Entity for compliance with the Permit? No

Have you established and maintained relevant enforceable mechanisms to control pollutant discharges into and from the MS4 and to meet the requirements of this Permit? Yes

Are you maintaining system(s) to track SWMP data and information? Yes

MCM1: Public Education and Outreach

Have you listed and publicized means for the public and Permittee personnel to report spills and other illicit discharges? Yes

Have you informed target audiences of the environmental impacts associated with illegal discharges and improper disposal of waste and how to report them? Yes

Have you selected specific education and outreach topics to build general awareness and effect behavior change? Yes

Please list these topics:

The specific topic chosen to build general awareness and effect behavioral change is appropriate spill prevention practices and spill response. Additional topics include proper management of street, parking lot, sidewalk, and building wash water, proper recycling, and pet waste management.

Please summarize your activities and accomplishments as part of the Southern Resident Killer Whale Outreach and Education efforts.

As required by part 2.1.1.3, Naval Facilities Engineering Systems Command (NAVFAC) Northwest (NW) has been working with National Marine Fisheries Service (NMFS) to develop and deliver a training program for target audiences.
During Year 1 of the permit, NOAA hosted a virtual training for MS4 program managers and other Navy personnel who could potentially impact stormwater management.
During Year 2, NAS Whidbey Island participated in the Orca Recovery Day volunteer event on October 15, 2022. This was a NOAA Marine Debris Survey beach cleanup with Sound Water Stewards, WSU Ext Waste Wise, and WA State Parks.
During Year 3, NOAA provided a slide presentation to MS4 program managers on impacts from stormwater on Southern Resident killer whales (SRKW) on June 6, 2023. Additionally, an in-house presentation was given to program managers on January 9, 2024, focusing on how climate change is affecting the SRKW population.
During Year 4, the "NWAC RRT 10 Southern Resident Killer Whale Deterrence Task Force Final Report" was finalized discussing SRKW deterrence in regards to oil spills. At present, there are three methods approved for whale deterrence: oikomi pipes, underwater firecrackers, and low flying helicopters.

Have you conducted public education and outreach activities specifically on bacterial pollution problems? Yes

Have you assessed, or participated in efforts to assess, the understanding and adoption of intended behaviors by the target audiences for at least one of the topics? Yes

➜ **Please summarize your efforts to assess the education and outreach activities conducted during the reporting period, and how this information is being utilized to improve the public education and outreach program efforts. Please also include one or more example of successful education/outreach.**

PPV had a Fall festival in October 2024 where NAS Whidbey Island Public Works Department (PWD) Environmental Division personnel attended with a table display discussing general stormwater requirements that apply to base housing, conducted a tabletop stormwater display with the Enviroscape, and discussed pet waste as a water pollutant with residents. There were approximately 1200 attendees to the event with 46 pledges made covering 66 dogs saying that owners would make conscious efforts to improve their pet waste practices by collecting their pet's waste and disposing of it properly. There was also a beach cleanup of Crescent Harbor Beach in April where 62 volunteers cleaned up 1,100lbs of debris and 823 shotgun wads. There was another cleanup of Crescent Harbor Beach in November where eight volunteers removed 15,240lbs of creosote debris from the beach. For more, please see Appendix A Table 2.

Spill education/outreach:
Through continuous education and outreach efforts, personnel have become more actively involved with the NAS Whidbey Island Public Works Department (PWD) Environmental Division.
- The Facility Response Team (FRT) conducted a large-scale equipment deployment drill on August 22, 2024, in Port Angeles Harbor. The drill focused on safety, initial site assessment, the deployment of high encounter rate boom, the deployment of a previously untested geographic response plan strategy, and enhanced on-water skimming. This drill was observed by Washington Department of Ecology (DoE) to verify compliance with environmental regulations, evaluate oil spill contingency plans, and verify deployment of response issues. DoE stated that this drill was “a successful demonstration of the necessary coordination between multiple primary response contractors responding to a complex incident.” NAS Whidbey Island FRT also conducts monthly spill response on-the-water drills and trainings to validate the Incident Command System operations adherence to DoE requirements and regulations.
- All NAS Whidbey Island personnel are trained in spill awareness, including emergency and non-emergency spill protocols and procedures. The training tools distributed are now presented in a spill response flowchart, as opposed to list form.

MCM2: Public Involvement and Participation

Have you conducted one or more meetings to coordinate among appropriate staff, managers and others who play a role in Permit implementation? Yes

➜ **Briefly describe meeting(s), participants, and topics:**

Monthly regional stormwater meetings are held with key stormwater personnel at Naval Station Everett, Naval Air Station Whidbey Island, and Naval Base Kitsap. Monthly meetings were started in February 2020, and have continued since. These meetings are used to discuss any topic related to stormwater including the MS4 permit, MSGP, CGP, and climate change. The meetings provide a collaborative approach to stormwater management at the Navy’s northwest installations. A Summary of Monthly Stormwater Meetings is provided in Appendix A Table 1. NAS Whidbey Island PWD Environmental Division has internal meetings for ongoing environmental discussions across different media areas.
NAVFAC Design and Construction (D&C), NAS Whidbey Island Facilities Engineering and Acquisition Division (FEAD), and PWD Environmental Division continuously engage in project meetings to stay abreast of developments and environmental requirements applicable to construction projects. Engagement between PWD Environmental Division and Utilities began before the MS4 permit was issued, and collaborative efforts continue to address stormwater maintenance using a team approach.

Please describe any engagement with affected entities in setting priorities for the storm water program.

Meetings with D&C, FEAD, Utilities, and Environmental staff were held to discuss permit requirements and effects on existing installation practices, projects, and operations. Priorities have been focused on ensuring proper environmental planning for future projects, and determining how to adjust current projects to include permit requirements. Environmentally compliant dewatering activities and procedures have been a topic of discussion in year 4 of this permit.

Have you sponsored at least twice during the Permit term volunteer activities designed to actively engage residents and/or employees to better understand stormwater pollution? Yes

➜

Please describe these events and activities:

Please see Appendix A Table 2 for a list of public involvement and volunteer activities completed at NAS Whidbey Island in 2024.

MCM3: Illicit Discharge Detection and Elimination (IDDE)

Have you developed updated maps of the MS4 within the Permit Area that include all of the features listed in Part 2.3.1 of the Permit? N/A

Do you effectively prohibit non-stormwater discharges into the MS4 (except those authorized in Part 1.3.4 of this Permit) through effectively robust policies and procedures? Yes

For any discharges of potable water, have you dechlorinated to a total residual chlorine concentration of 0.1 ppm or less, pH-adjusted, and volumetrically and velocity controlled to prevent resuspension of sediments in the MS4?

No

Please explain:

On 14 February 2024 at approximately 1:30pm, Naval Air Station (NAS) Whidbey Island had a release of approximately 150,000 gallons of potable water to the stormwater system at at the intersection of Meadow Dr. and Oriole St. in military housing at Seaplane Base. Approximately, 20% of the discharge flowed overland to a nearby stormwater retention pond. A vacuum truck was deployed to clean out the effected catch basins after the break was under control. In addition, concentration of residual chlorine in the vicinity is typically between 0.5 and 0.8 mg/L. At 11:30pm on February 14, 2024, the line break was repaired with full flow and pressure restored to the community Housing drinking water system. This was reported to EPA on 15 February 2024 using the 24-hour EPA hotline, with follow on written notification of discharge.

Have discharges from lawn watering and other irrigation runoff been minimized through public education and water conservation efforts? Yes

For any discharges of swimming pool, spa and hot tub waters, have you dechlorinated to a total residual chlorine concentration of 0.1 ppm or less, pH-adjusted and re-oxygenized if necessary, volumetrically and velocity controlled to prevent resuspension of sediments in the MS4, thermally controlled to prevent an increase in temperature of the receiving waters, and prohibited the discharge of pool cleaning wastewater and filter backwash?

N/A

Have discharges from street and sidewalk wash water, water used to control dust, and routine external building wash down that does not use detergents been minimized through public education and water conservation efforts?

Yes

For any discharges of accumulated stormwater from utility vaults, have you conducted sampling to verify that no pollutants cause or contribute to water quality impairments, AND visually verified prior to any discharge, that there are no visible sheens or solids in the discharge?

No

Please explain:

On August 22, 2023, Naval Air Station (NAS) Whidbey Island contractor personnel (William Deitz, Sean Davis, Carl Stephens, Irene Tribou) responded to a steam condensate line leak between STMH-516 (vault 516) and STMH-517 (vault 517) at Ault Field. It was discovered when the sump pump in vault 517 failed due to hot temperature water. The leak was found to be inaccessible by the vault. The release is approximately 1,440 gallons per day of steam condensate and has been ongoing since August 22, 2023. The steam condensate primarily consists of water, but approximately 9 ounces of 6390 Condensate Treatment is injected every 24 hours. Approximately, 70% of the discharge was flowing through the sump pump into the stormwater system through Catch Basin 214 and the other 30% was flowing underground. Work orders were put in for repair and two repair scenarios were suggested on October 10, 2023.
On April 11, 2024, a check valve was removed in vault 516 when it was discovered to have been installed backwards. Removing the valve and letting the steam condensate drain from vault 517 to vault 516 exposed the source of the leak in the concrete block in vault 517. The steam condensate was discharging from the leak in vault 517, through the opened check valve into vault 516, and then to the stormwater system at Catch Basin 202. The pH at vault 517 was measured to be 8.4 s.u. on April 11, 2024. Temporary repairs were completed on May 14, 2024.

For any discharges of accumulated stormwater from secondary containment structures, have you conducted sampling to verify that no pollutants cause or contribute to water quality impairments, AND visually verified prior to any discharge, that there are no visible sheens or solids in the discharge?

No

Please explain:

In accordance with Section 2.3.2.2.6, visual inspections are conducted prior to each time a secondary containment is drained. Secondary containment valves are to remain secured at all times. After a rain event, the tenant will conduct a visual inspection of the secondary containment. If no sheen or POL is present, the tenant will then drain the containment and re-secure the valve. If a sheen or POL is present, the tenant will determine if they can remove the sheen/POL with absorbent pads and dispose of them properly before draining the containment. If the tenant cannot remove the sheen/POL, they will contact the Base Operating Support Contract (BOSC) contractor who will dispatch a vacuum truck and crew to clean out the containment and properly dispose of the contents.

Does the program described in the SWMP document include procedures for locating priority areas likely to have illicit discharges, including areas where complaints have been recorded and areas with storage of large quantities of materials that could result in spills and areas where storage, usage, releases or contamination of any pollutant in Table 2.4.4 is or has occurred?

Yes

Do you conduct a dry weather analytical and field screening monitoring program to identify non-stormwater flows from stormwater outfalls? Yes

For Annual Reporting Year 5 only, have you completed field screening of at least 75% of all MS4 outfalls located within the Permit Area? N/A

Are your screening methods/protocols consistent with Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments, Center for Watershed Protection, October 2004, or another methodology of comparable effectiveness?

Yes

Do you have and implement procedures for characterizing the nature of, and potential public or environmental threat posed by, any illicit discharges which are found by or reported to the Permittee? Yes

Do these procedures include the evaluation of whether the discharge must be immediately contained and the steps to be taken for containment of the discharge per the stipulations in Part 2.3.3.3? Yes

In the Comments section, please summarize all illicit discharge responses, including responses to spills and recurring discharges. Also summarize any investigations and referrals as detailed in Part 2.3.3.3.2.

NAS Whidbey Island tenants manage incidental spills that can be cleaned up with spill response supplies followed by notification to PWD Environmental Division. For spills that tenants cannot clean up due to size, supplies, personnel, etc., the BOSC contract or is notified to respond. For Emergency spills, NAS Whidbey Island Federal Fire Department (FFD) is notified to respond. Once the FFD completes their initial assessment of a spill, notification is made to the BOSC contractor to complete cleanup operations. The process for characterizing the nature of, and potential public or environmental threat posed by illicit discharges, is included in the SWMP.

Do you have and implement procedures for notification of affected parties, including immediate notification of the spills and illicit discharges and ongoing updates about abatement measures and possible impacts? Yes

Please summarize all notifications to downstream operators of MS4s, shellfish beds/fisheries, agricultural/livestock operations, drinking water systems (public or private) or other affected entity of spills or other non-stormwater discharges that may impact those systems. Please include in the description all outreach, discussions and/or information exchanges regarding the impacts of discharges and the status of illicit discharge elimination activities.

None have occurred during Year 4.

Do you have and implement procedures for tracing sources of illicit discharges, including visual inspections, opening manholes, using mobile cameras, collecting and analyzing water samples, and other procedures, as appropriate?

Yes

Do you have and implement procedures for eliminating illicit discharges, including scheduling and implementing remedial measures and other safeguards to ensure the discharge does not recur? Yes

Do these procedures include initiation of an investigation within 21 days of a report or discovery of an illicit connection to determine the source, nature and volume, and responsible party? Yes

Do these procedures include initiation of action to eliminate the illicit connection within 45 days of confirming the connection? Yes

Have all staff responsible for investigating, identifying and eliminating illicit discharges, spills, and illicit connections into the MS4 received program-specific training? Yes

Please describe any training provided during this reporting period, including new employee training and follow-up training.

Please see the summary list of training courses in Appendix A Table 3.

Please include a general summary of the results of dry weather screening program activities conducted over the preceding reporting period, including number and type of illicit connections identified, dry weather screening efforts, and location and efforts to correct identified illicit discharges.

During Year 2, initial dry weather visual field assessments of all known MS4 outfalls were completed. Visual inspections were conducted again at all known outfalls in Year 3. Year 4 focused efforts on identifying the comingling with groundwater issues at outfalls AFOF-26 (002), AFOF-9 (006), and AFOF-18 (003). AFOF-9 (006) and AFOF-18 (003) were identified to have perforated concrete pipe located in its system in portions under the tarmac. A project is in the design phase that is planned to include replacement of the stormwater system pipes flowing to AFOF-9 (006). AFOF-26 (002) has a curtain drain that is collecting groundwater and conveying it through the storm system. A project is in the design phase to expand the curtain drain and disconnect it from the storm system. The new curtain drain is planned discharge to the open channel ditch and no longer flow to AFOF-26 (002). AFOF-18 (003) will need a project to address its comingling groundwater issue.

MCM4: Construction Site Stormwater Runoff Control

Does the SWMP document describe, and are you implementing, a program to reduce pollutants in stormwater runoff to the MS4 from all construction in the Permit Area, including roads? Yes

During this reporting year have you provided adequate oversight to "regulated construction activities" and "regulated industrial activities" to ensure that all regulated activities obtained coverage under the appropriate stormwater permits?

Yes

Have you implemented an enforceable mechanism to address runoff from construction site projects to include the minimum requirements, thresholds and definitions? Yes

Does the enforceable mechanism include all of the criteria listed in Part 2.4.2.2 of the Permit? Yes

Have you had any equivalent criteria approved by EPA for use in stormwater controls from construction site runoff? No

Have you implemented policies and procedures, including contract mechanisms, to ensure review of all stormwater site plans for proposed development activities? Yes

Do you inspect, prior to clearing and construction, all development sites that have a high potential for sediment transport as determined through plan reviews based on definitions and requirements of Appendix C of the Permit?

Yes

Do you inspect all development sites during construction to verify proper installation and maintenance of required erosion and sediment controls? Yes

During this reporting year, did you take the necessary enforcement actions, as relevant, based on the results of these inspections? Yes

➔ **Please describe:**

There were six enforcement actions completed for the 2024 reporting year. These actions included enforcement of up-to-date environmental training certifications, proper concrete washout procedures, sediment controls, control of pollutants, and proper covering of dumpsters.

Were at least 80% of scheduled inspections completed during this reporting year? Yes

Have you established and implemented an internal tracking system to respond to issues of non-compliance? Yes

Please describe any training provided during this reporting period, including new employee training and follow-up training.

Please see Appendix A Table 3 for Summary of Trainings.

Please include a general summary any corrective actions taken at construction sites, number of site plans reviewed, site inspections, and one or more example of follow-up actions.

Refer to Appendix A Table 5 for summary of site plans reviewed and site inspections. There were six enforcement actions completed for the 2024 reporting year. These actions included enforcement of up-to-date environmental training certifications, proper concrete washout procedures, sediment controls, control of pollutants, and proper covering of dumpsters.

MCM5: Post-Construction Stormwater Management in New Development and Redevelopment

Does the SWMP document describe, and are you implementing, a program to reduce pollutants in stormwater runoff to the MS4 from new development and redevelopment project site activities in the Permit Area, including roads?

Yes

Have you implemented an enforceable mechanism to address runoff from new development and redevelopment to include the minimum requirements, thresholds and definitions? Yes

Does the enforceable mechanism include all of the criteria listed in Part 2.4.2.2 of the Permit? Yes

Have you had any equivalent criteria approved by EPA for use in stormwater controls from new development and redevelopment runoff? No

Please document what percentage of all permanent stormwater treatment and flow control BMPs/facilities and catch basins in new developments were inspected every six months prior to 90% of the common plan of development being constructed during this reporting year.

100%. One projects (Renovation of BEQ-13) in Year 4 is new development. The Renovation of BEQ-13 (Bachelor Enlisted Quarters) renovates a housing section for sailors and creates a new parking lot. This project is still ongoing, but inspections have occurred and will continue to occur at least every 6 months.

Do you inspect all development sites upon completion of construction and prior to final approval or occupancy to ensure proper installation of permanent stormwater facilities? Yes

Are all maintenance requirements assigned/entered into the electronic tracking system for stormwater treatment and flow control BMPs/facilities? Yes

Do you keep adequate records to document that all the requirements of Part 2.4.3 of the Permit have been fully implemented? Yes

Were at least 80% of scheduled inspections completed during this reporting year? Yes

Have you established and implemented an internal tracking system to respond to issues of non-compliance? Yes

Annual Reporting Year 1: Please describe the Early Action Projects (EAPs) you plan to implement during this permit term. Please also provide a summary of all EAP planning and implementation actions taken to date.

Not applicable. Currently in Year 4.

Annual Reporting Year 2-5: Please provide any updates to your Early Action Projects (EAPs) plan. Please also provide a summary of all EAP planning and implementation actions taken in this reporting year.

Please see Appendix A Table 4 for Summary of EAP status.

Annual Reporting Year 4: Have you submitted a written Stormwater Infrastructure Investment Plan to EPA that documents future investments and upgrades in your facility's stormwater infrastructure designed to improve MS4 discharge quality, AND that meets all of the requirements of Part 2.4.4?

Yes

Attach the SW Infrastructure Investment Plan:

Name	Uploaded Date	Size
NASWI SIIP 3-25-2025.pdf (reportAttachment/12121)	03/25/2025	3.25 MB

Please describe any training provided during this reporting period, including new employee training and follow-up training.

Please see Appendix A Table 3 for Summary of Trainings.

Please include a general summary any corrective actions taken at construction sites, number of site plans reviewed, site inspections, and one or more example of follow-up actions.

Refer to Appendix A Table 5 for summary of site plans reviewed and site inspections. There were six enforcement actions completed for the 2024 reporting year. These actions included enforcement of up-to-date environmental training certifications, proper concrete washout procedures, sediment controls, control of pollutants, and proper covering of dumpsters.

MCM6: Pollution Prevention and Good Housekeeping in Municipal Operations

Have you established maintenance standards that are protective of facility function for all permanent stormwater facilities used for onsite management, flow control and treatment? Yes

Were all required maintenance activities, as relevant, undertaken per the schedules in Part 2.5.1.2? Yes

Does your operation and maintenance program include an enforceable mechanism that clearly identifies the party/parties responsible for maintenance? Yes

During this reporting year have you conducted inspections of all stormwater treatment and flow control BMPS/facilities that discharge to the MS4 at least annually or per an alternative schedule as established in the SWMP based on maintenance records or other documented information?

Yes

Please specify the number of inspections of permanent stormwater facilities conducted pursuant to Parts 2.5.2. Please also indicate what percentage of the overall number of permanent stormwater facilities these numbers represent.

During the permit term, 18 inspections (100% of facilities) were completed.

During this reporting year, have you conducted spot checks of all permanent stormwater facilities, per the requirements of Part 2.5.3 after all major storm events? Yes

Please specify the number of catch basins and inlets that were inspected during this reporting year. Please also indicate what percentage of the overall number of catch basins and inlets, this represents.

Please see Appendix A Table 6 for a summary of catch basin inspections and cleanings.

Please specify the number of catch basins cleaned during this reporting year.

Please see Appendix A Table 6 for a summary of catch basin inspections and cleanings.

During this reporting year, did you undertake and complete all the necessary maintenance, as required by Part 2.5.6 of the Permit, and as described in the SWMP document? Yes

Please briefly describe the animal waste management activities at the facility during this reporting year.

Animal waste management activities includes community outreach and education, along with maintaining 51 pet waste stations throughout NAS Whidbey Island. The Morale, Welfare, and Recreation (MWR) and contractor Hunt Properties manage the pet waste program.

Please summarize all measures implemented to minimize or eliminate discharges of PFAS via the MS4.

Measures to minimize or eliminate PFAS discharges are implemented during construction dewatering activities. Policies and procedures are established and included in the SWMP Plan for dewatering in areas likely or known to be impacted by PFAS. Discharge of construction dewatering activities is required to be approved by PWD Environmental Division.
For mobile sources: NAVFAC Pacific (PAC) developed a contract to change out AFFF to F3 on Fire and Emergency Service (F&SC) vehicles. This was completed in Year 4.
For the hangars: In Year 3, a Navy-Wide Tiger Team was working on solutions for replacing AFFF at the hangars. The large focus is on Hangar Discharge devices for Make/Model cross list with new QPL Foam. This was completed in Year 4. There is no AFFF used in the fire suppression systems in the hangars. Only four hangars (HGR 12 B2737, HGR 8 B2642, HGR 11 B2733, and HGR 9 B2681) are anticipated to still have AFFF residual in the systems due to previous use of it within the same systems.

Have you established specific protocols for minimizing the resuspension, conveyance and discharge of PFAS in the MS4, both during normal operations and during all maintenance and remediation activities? Yes

Please describe any training provided during this reporting period, including new employee training and follow-up training.

Please see Appendix A Table 3 for a list of stormwater trainings.

Have you developed and implemented SWPPPs for all heavy equipment maintenance and storage yards and all material storage facilities within the MS4 area that are not already regulated under the MSGP? N/A

During this reporting year, have you kept records of all inspections, findings of inspections, follow up actions to correct problems, and all maintenance? Yes

Monitoring, Recordkeeping and Reporting Requirements

Please provide a short statement summarizing your overall compliance with the Permit conditions and progress towards achieving the control measures, during this reporting year.

Compliance with the MS4 began before the official MS4 permit became effective in February 1, 2021. Continued efforts include the creation of new maintenance specifications for BOSC contract, implementation of storm water construction requirements, updating maps to include all stormwater structures, and routine site inspections throughout the installation. Work continues to meet all Early Action Projects permit requirements and the Stormwater Infrastructure Investment Plan has been completed and summited with this Annual Report. Based on the new BOSC contract, a more robust stormwater maintenance program has been implemented. Repairs to multiple oil water separators are underway and the main OWS collecting stormwater from areas on the flightline has been completed. Another OWS has been installed to process the stormwater from the Fuel Pier.

Status descriptions for the six installation-specific Minimum Control Measures (MCM) listed in the Phase II Stormwater Management Program Plan are below:

MCM #1- NAS Whidbey Island is fully compliant. Training and outreach efforts were established in 2021, and continue to meet permit compliance. In addition to outreach and trainings identified in Appendix A Table 3, purchases of outreach materials include spill response magnets, pet waste supplies, storm catch basin medallions, posters, and “no vehicle maintenance” magnets. Multiple trainings have been developed for the AEC/AEMs to include MS4 permit requirements.

MCM#2 - NAS Whidbey Island is fully compliant. See Appendix A Table 2 for public involvement and volunteer activities. Efforts will continue to increase engagement in stormwater pollution prevention activities.

MCM #3 - NAS Whidbey Island is implementing the final stages to meet compliance.
Procedures, in accordance with the MS4 permit, were developed and incorporated within the SWMP Plan. Additional activities taken include:
- Training to target audiences on BMPs to prevent illicit discharges.
- A continuing water conservation program to minimize discharges from lawn watering and irrigation.
- Development of procedures for discharges from utility vaults and secondary containment.
- The completion of the Car Wash located on Ault Field and educating tenants to not use soap while washing their vehicles outside of the car wash.

MCM #4/5 - NAS Whidbey Island is implementing the final stages to meet compliance.
Procedures and responsibilities were developed in accordance with the MS4 permit and incorporated within the SWMP. Multiple trainings were held during Year 4 of the permit to communicate requirements. Implementation efforts and accomplishments include:
- Training for project designers and construction management personnel,
- Implementation and completion of all required site plan reviews and construction inspections,
- Implementation and completion of corrective actions addressing inspection findings,
- Updating project contract language to include MS4 and CGP requirements.

MCM #6- NAS Whidbey Island is implementing the final stages to meet compliance. Improvements to stormwater maintenance have been made since the effective date of the MS4 permit and continues via implementation efforts and accomplishments during the permit year, including:
- Inspection of catch basins in compliance with requirements,
- Implementation of an audit to identify all stormwater structures requiring inspections,
- Development of maintenance standards for stormwater structures,
- Training for stormwater personnel on maintenance standards,
- Ongoing development of stormwater maintenance tracking and reporting,
- Pet waste assessments in housing and recreation areas.

For Annual Reporting Year 1: Did you select monitoring Option 1 (Monitoring/Assessment Plan) or monitoring Option 2 (participation in the Stormwater Action Monitoring Program)?

Option 2

➥ **Please summarize your activities as a participant with the Stormwater Action Monitoring Program.**

Through negotiations with the Stormwater Action Monitoring (SAM) Network, the Navy is considered an active participant through annual payment. The regional MS4 manager participates in SAM Stormwater Work Group meetings, and while not currently voting on project proposals, the ability to in the future is available. The Navy’s participation in SAM is outlined in the Cover Letter provided in the Year 1 MS4 Annual Report.

During this reporting year, have you complied with all elements of your Quality Assurance Program Plan (QAPP) developed pursuant to the requirements of part 3.3.9 of the Permit? No

➥ **Please explain:**

This question was skipped because NAS Whidbey Island chose Option 2.

Are you complying with the record-keeping requirements of Part 3.6 of the Permit? Yes

During this reporting year have you ensured that an updated SWMP and all SWMP records are available to the public? Yes

➥ **Please discuss what records are available on your website, any requests you have received for records and your responses.**

The NAS Whidbey Island Stormwater Management Plan (SWMP) and MS4 Annual Reports are listed on the stormwater website (https://cnrnw.cnic.navy.mil/Operations-and-Management/Environmental-Stewardship-and-Compliance/Water-Quality-Information/). There were no records requests in Year 4.

During this reporting year, have any transfers of operational authority or responsibility or boundary changes to your facilities resulted in either an increase or a decrease in the Permit Area? No

Please provide an annotated list of any attachments to this Annual Report.

Annotated List of Tables in Appendix A
Table 1. Summary of Monthly Stormwater Meetings
Table 2. Summary of Public Involvement Efforts (Education, outreach, volunteer events)
Table 3. Summary of Trainings
Table 4. Summary of Early Action Projects (EAP) Status
Table 5. Summary of Construction Site Inspections
Table 6. Summary of Catch Basin Inspections and Cleanings

Use the space below as needed to attach files to your Annual Report:

Name	Uploaded Date	Size
NASWI Year 4 MS4 Annual Report Appendix.pdf (reportAttachment/12109)	03/25/2025	217.59 KB

Are all monitoring data collected during this reporting year, as applicable, attached to this Annual Report? Yes

Required Response to Exceedances of Water Quality Standards

During this reporting year were any exceedances of water quality standards identified, per the terms of Part 4 of the Permit? No

Certification Information

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 gathered and evaluated the information submitted. Based upon my inquiry of the person(s) directly responsible for gathering the information, the information submitted is, to the best of my knowledge, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for willful violations.

Certified By: Laura Muhs

Certifier Title:

Certifier Email: laura.r.muhs@navy.mil

Certified On: 03/28/2025 6:56 PM ET

APPENDIX A – MS4 Compliance Support Data

NASWI MS4 WAS026611 Annual Report – Permit Year 4

February 1, 2024 – January 31, 2025

Table 1. Summary of Monthly Stormwater Meetings

Year	Month	Short Summary of Meeting Topics
2024	February	SWPPP and SWMP updates, annual reports, 6PPD, SWMMWW, Downspout Evaluation updates, stormwater mapping, upcoming construction projects, funding, upcoming NeT MS4 training, and MS4 education and outreach.
	March	Education and outreach campaign, stormwater mapping, funding, SWPPP for heavy equipment maintenance, firefighter training, and annual reports.
	April	Downspout Evaluation updates, SWMP and SWPPP updates, SIIPs, EAP, MCM# 1 discussion, educational and outreach materials, upcoming SWMMWW training, ongoing and upcoming construction projects, dewatering and monitoring plans for construction projects, and funding.
	May	Education outreach discussion.
	June	Funding, Downspout Evaluations, draft Ecology ISGP discussion, sampling discussion, MSGP signs, and construction projects.
	July	Contract awarding, SIIP, funding for permit renewal, Ecology MS4 permit discussion, 6PPD, PCBs, PFAS, SWPPP and maps, construction project updates, and education and outreach items.
	August	Meeting with EPA to discuss the MS4 permit and SAM program.
	September	Installation websites, upcoming SWMMWW training, vessel incidental discharge national standards, UNDS, EAPs, educational material items, stormwater mapping, and upcoming draft MSGP.
	October	2024 SWMMWW training presented by Ecology.
	November	Installation websites, SWMMWW recap, Ecology draft 2022 WQA, PFAS standards, educational materials, stormwater mapping, supplies, and funding.
	December	No meeting held due to holiday/scheduling conflicts.
2025	January	Educational material items and resources, IDDE, 2026 MSGP, contracting, annual reports, sampling for PFAs, AIMs Levels and documentation, source study, and draft proposed mod to CGP.

Table 2. Summary of Public Involvement Efforts (Education, outreach, volunteer events)

Date	Public Involvement	Notes
April 2024	Work party with Pacific Rim Institute: Pacific Rim Institute is a non-profit based out of Coupeville focused on prairie restoration on Whidbey Island and throughout native prairie lands in the Northwest. During the work party, volunteers planted trees, plant propagation, and out planting from the greenhouse to the nursery beds. Restoration of native prairie lands (and restoration to native conditions in general) is important for overall ecosystem health.	23 volunteers (92 hours)
April 2024	Crescent Harbor Beach Cleanup: The NASWI Environmental Division and WSU Island County Extension Community Litter Cleanup Program (CLCP) collaborated on a beach cleanup at Crescent Harbor April 20, 2024. This event drew in over 60 volunteers made up of Navy Sailors or civilians and their families, WSU Extension CLCP volunteers, and WA Fish and Wildlife (WDFW) volunteers. Hunt Military Communities/Base Housing provided lunch for all volunteers at the conclusion of the event. The objective of this event was to conduct a general beach cleanup with an emphasis of recovering and analyzing the distribution of shotgun wads.	1,100 lbs of marine debris and 823 shotgun wads were recovered. 62 volunteers; 140 volunteer hours.
May 2024	Base Safety Fair: NASWI Environmental Division tabled at a half-day "Safety Fair" hosted by the Naval Safety Command, attended by over 2,000 military, government civilians, and contractors. The topics covered in the Environmental display included stormwater vs. wastewater municipal management, spill prevention and response, and best management practices for stormwater protection.	Outreach to up to 2,000 attendees.
June 2024	Crescent Creek Restoration Site Visit: NASWI conducted a tour of the lower Crescent Creek restoration project completed in February 2022 to community groups and leaders. This site visit was jointly held by NASWI, the Skagit River Systems Cooperative, and Whidbey Camano Land Trust. Visitors included representatives from Island County, and the Puget Sound Partnership Leadership Council. During the tour, hosts discussed the history of the creek restoration, current feasibility studies, results of current monitoring surveys, and planned future	20 community leaders met at a creek restoration site at NASWI to highlight stakeholder cooperation.

	projects to highlight the partnerships involved in making the Crescent Creek project a success for salmon habitat. Monitoring surveys at the restoration site found juvenile Chinook and Coho salmon in all seven reaches of the new channel. Before the restoration, they were only found in the 3 lowest reaches of the historical channel. The new channel is longer and has a gradual gradient, allowing the water to move slower. Trees and shrubs were planted along the stream's riparian area to improve water quality and maintain temperature through canopy cover. Monitoring surveys will be ongoing to determine how salmon and other fish are using this critical habitat.	
September 2024	Rocky Point Beach Clean-Up: The VP-9 Junior Enlisted Association, with support from NASWI Environmental Division, conducted a beach cleanup at Rocky Point. 11 volunteers cleaned up 1500 ft of shoreline on Navy property.	6 bags of trash/marine debris. 35.75 volunteer hours.
October 2024	Crescent Harbor Beach Cleanup: The NASWI Environmental Division with a pair of lead Sailors from Ground Electronics and VAQ-132 led a beach clean-up in collaboration with the WSU Island County Extension Community Litter Cleanup Program (CLCP). The objective of this event was to conduct a general beach cleanup with an emphasis of recovering and analyzing the distribution of shotgun wads. The event drew in 23 volunteers made up of Navy Sailors or civilians and their families, WSU Extension CLCP volunteers, and WA Fish and Wildlife (WDFW).	9 bags of trash/marine debris, 237 shotgun wads recovered. 51.75 volunteer hours.
October 2024	Pet Waste Campaign: PPV had a Fall festival in October 2024 where Environmental attended with a table display discussing general stormwater requirements that apply to base housing, conducted a tabletop stormwater display with the Enviroscape, and discussed pet waste as a water pollutant with residents.	Approximately 1200 attendees to fall festival; 46 pledges to pick up pet waste; 66 dogs
November 2024	Crescent Harbor Beach Cleanup: A multi-day beach clean-up with an emphasis of creosote marine debris removal occurred at Crescent Harbor. This was in collaboration with the Washington Conservation Corps' crew.	8 volunteers (4 days 8am – 3pm) 15,240 lbs of creosote debris removed.

Table 3. Summary of Trainings

Date	Training	Topics Covered	Audience	Training Method	Number of personnel
Ongoing	Area Environmental Coordinator (AEC) Training (initial and annual refresher)	Stormwater awareness, regulatory and permit background, potential ecological impacts of stormwater runoff, proper BMPs usage and maintenance, allowable and prohibited discharges, key elements of the industrial stormwater program, common sources of stormwater pollution, and spill response.	Civilian and Military workers	In person	196
Ongoing	Quarterly Meetings Hosted by NAS Whidbey Island Environmental	AEM/Cs are required to attend at least 2 of every 4 quarterly meetings. Issues related to stormwater (inspection findings, for example), and any other training needs are covered. Stormwater awareness and other training needs were included in all quarterly meetings in 2024.	Civilian and Military workers	In person	194
Ongoing	ECATTS	Environmental Compliance Assessment, Training, and Tracking System (ECATTS) is an online training platform that AEM/Cs may utilize to conduct stormwater awareness training. Additionally, some contractors at NAS Whidbey Island use this platform to conduct environmental training. Stormwater related modules in ECATTS have been extracted for specific training. ECATTS modules and number of completions: • Stormwater Basic Information, NASWI: 229 • Stormwater Comprehensive Overview, WA: 24 • Stormwater for Contractors: 16 • Water Quality, WA: 23	Civilian, Military and contract workers	Online	292
Ongoing	New Sailor Monthly Indoctrination	General stormwater awareness, use of BMPs, spill response, base-wide stormwater policies such as no personal vehicle maintenance and no dumping in storm drains.	Military workers	In person	51 (missing Feb-April 2024 numbers

					due to change in personnel)
Oct-24	Stormwater - 2024 Stormwater Management Manual for Western Washington	The training covered the minimum requirements, LID, UICs, and updates to the 2024 SWMMWW. Some additions to the 2024 SWMMWW is new guidance for 6PPD, PCBs, and PAHs, climate change, and bioretention.	Stormwater program managers and Design Personnel	Virtual training or in person hosted by Washington state Department of Ecology	N/A
Jan-25	EPA's Proposed 2026 Multi-Sector General Permit (MSGP) for Industrial Stormwater Discharges	The training laws and regulations. Some proposed changes to the 2026 MSGP include Additional Implementation Measures, updated benchmark monitoring requirements for certain sectors, impaired water monitoring, PFAS indicator monitoring, water quality based effluent limit, and resilient stormwater control design.	Stormwater program managers	Virtual training hosted by EPA	N/A

Table 4. Summary of Early Action Projects (EAP) Status

Item	Summary	Status
Construction project process	Stormwater managers are included in the early design phase and continued efforts are underway to define the roles and responsibilities with various stakeholders.	Ongoing
Pet Waste Management	Continuing to maintain pet waste stations including pet waste bag replenishment. Housing purchased 23,000 bags in 2023.	Ongoing
PFAS	The Navy's Environmental Restoration Program is currently conducting base-wide assessments for PFAS. In 2022/2023, the Navy conducted a remedial investigation at Area 31, Former Runway Fire School, at Ault Field. In 2023, the Navy conducted a remedial investigation at the current Fire Training School at Ault Field. These investigations will require multiple phases to fully delineate PFAS. In 2025, the Navy will start a remedial investigation at the Ault Field airfield, including hangars, taxiways, runways, and runway ditches. This investigation is a large effort that will be phased over multiple years.	Ongoing
Catch basin inspections and cleaning	Catch basins are continuously evaluated.	Ongoing
Structural projects	Downspout evaluations for all buildings at NAS Whidbey Island were conducted during Year 3. The final report was provided to NAS Whidbey Island in Year 4.	Completed

Table 5. Construction Site Inspections

Task Name	EPP Reviewed	Stormwater Site Plan Reviewed	Pre-Con Meeting	Pre-Inspection	Initial site Inspection	6-month Inspection	Post-Inspection
Replace 4 Fuel USTs with ASTs, B2622/2623/2625/2626, NASWI	12/8/2022	N/A	N/A	3/7/2023 6/7/2023	1/23/2024	N/A	N/A
Renovate BEQ – B2701	2/3/2023	N/A	2/8/2023	3/9/2023 5/10/2023	10/26/2023	3/12/2024	TBA
P-260 P-8A Aircraft Airfield Pavement Improvements	2/9/2024	3/5/2024	4/23/2024	TBA	TBA	TBA	TBA
Repairs Post Inspection - Waterfront Facility B992, NASWI	N/A	N/A	N/A	3/11/2024	N/A	N/A	N/A
P-263 EA-18G Fleet Replacement Squadron Expansion	2/14/2024	2/22/2024	3/7/2024	4/18/2024	TBA	TBA	TBA
Repair Pavement, B992, NASW	N/A	N/A	3/11/2024	N/A	N/A	N/A	N/A
RV Storage	N/A	N/A	6/26/2024	N/A	N/A	N/A	N/A
Install Chemical Dosing Systems, SPB WWTP, B2615, NASWI	11/7/2024	TBA	TBA	TBA	TBA	TBA	TBA
Replace Raceway and Oily Waste Piping Supports	1/6/2025	TBA	TBA	TBA	TBA	TBA	TBA

Table 6. Summary of Catch Basin Inspections and Cleanings

Month	Number of CB to be inspected	Number of Inspections Completed	Corrective Actions	
			Identified	Completed
Feb-24	181	160	Repairs: 0 Cleanings: 0	0
Mar-24	181	173	Repairs: 0 Cleanings: 2	2
Apr-24	181	175	Repairs: 1 Cleanings: 3	4
May-24	181	166	Repairs: 0 Cleanings: 15	15
Jun-24	181	165	Repairs: 7 Cleanings: 11	18
Jul-24	181	170	Repairs: 0 Cleanings: 67	67
Aug-24	182	174	Repairs: 12 Cleanings: 12	24
Sep-24	0	0	Repairs: 0 Cleanings: 0	0
Oct-24	180	168	Repairs: 1 Cleanings: 1	2
Nov-24	181	173	Repairs: 5 Cleanings: 0	5
Dec-24	181	175	Repairs: 3 Cleanings: 34	37
Jan-25	181	168	Repairs: 2 Cleanings: 20	22
Totals	**1,991**	**1867**		**196**

NOTE: 93% of catch basins were inspected in 2024. September of each year there are no catch basins scheduled for inspection.

Naval Air Station Whidbey Island Stormwater Infrastructure Investment Plan March 2025

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1. Background

Part 2.2.4 of the Naval Air Station Whidbey Island (NASWI) MS4 Permit (WAS026611) states that the permittee "shall identify Early Action Projects (EAPs) that meet the objectives of this section" by identifying pollutants of concern and prioritizing reduction and elimination of these pollutants if they are identified in discharges. NASWI has prepared the following Stormwater Infrastructure Investment Plan (SIIP) to document future investments and upgrades in its stormwater infrastructure, designed to improve MS4 discharge quality in these and other areas.

This plan also evaluates any monitoring data collected and takes into consideration any other relevant monitoring data available from the Washington Department of Ecology, Island County, or other neighboring jurisdictions.

This SIIP evaluates potential projects and project locations to mitigate water quality impacts identified therein based on the following considerations:

- Monitoring data and watershed/basin plans;
- Effectiveness in improving water quality in the receiving water including support of beneficial uses;
- Feasibility;
- Cost effectiveness;
- Pollutant removal effectiveness; and
- Long term maintenance requirements.

2. Characterization of MS4 Discharges

NASWI's MS4 covers two installations that discharge into several waterbodies. Outfalls at Ault Field discharge into either the Strait of Juan de Fuca, or through the Clover Valley watershed to Dugualla Bay. Outfalls at Seaplane Base discharge either to Oak Harbor or Crescent Harbor. An outfall on Seaplane Base (SPOF3) discharges into a 0.625 square kilometer section of Oak Harbor that the Washington Department of Ecology (DoE) named Saratoga Passage (48122C6I4_01_01) that is on the 2022 303(d) list and was categorized as "impaired" for Bacteria - Enterococci. There is no published Total Maximum Daily Load (TMDL) for this waterbody. All other NASWI outfalls do not discharge to waterbodies on the 303(d) list.

3. Early Action Project (EAP) Plan

A finalized EAP plan was prepared in 2022 and submitted with the Year 2 Annual Report. This EAP plan evaluated pollutants of concern at all installations and provided a list of early action projects to be completed during the permit term. Table 3-1 summarizes these projects.

Table 3-1: Early Action Project Status

Installation	Project	Status
Ault Field	Clean and Assessment Project	This project was awarded in 2019 but was canceled due to unforeseen circumstances that

		substantially increased costs.
Ault Field/Seaplane Base	Repair of several Oil/Water Separators (OWS)	OWS-8 replacement has been completed. Two others (OWS-3 & OWS-6) began construction in 2024 and are still under construction in 2025.
Ault Field	Treatment system for dewatering stormwater/groundwater for PFAS	Not in place, still in planning phase

3.1. Pollutants of Concern

The EAP plan also prioritized areas of concern for specific pollutants. Over the course of the permit period, NASWI monitored several MS4 outfalls at Ault Field and Seaplane Base where potential pollutants might be expected. The pollutants which, after testing, showed levels of concern are summed in Table 3-2 and provide the focus for future infrastructure projects.

Table 3-2 – Pollutants of Concern

Installation	Pollutant of Concern	Receiving Waterbody
Ault Field	Copper, Zinc	Dugualla Bay/Juan de Fuca
Seaplane Base	Copper, Zinc, Nitrates	Oak Harbor/Crescent Harbor

3.2 Downspout Evaluation Survey

In 2023, a Downspout Evaluation investigation was conducted to evaluate the feasibility of using low impact development techniques and other controls that infiltrate, evapotranspire, harvest, and re-use stormwater runoff, or which otherwise eliminate stormwater pollutant loadings. The final report was provided to NASWI in June 2024. The report evaluated existing building locations where the disconnection of existing flows from rooftop downspouts into the MS4 would be feasible and will contribute to water quality improvement.

The downspout evaluation survey evaluated downspouts from buildings at NASWI. The survey is in Attachment A of this document. 593 buildings were considered feasible areas for potential modifications, the majority (624 buildings) incorporating splash blocks. Other modifications included dispersion trenches, infiltration trenches, and rain gardens. Table 3-3 shows the breakdown of recommended best management practices for Ault Field and Seaplane Base.

Table 3-3 – Feasible Buildings for Retrofits

Installation	Building Total	Splash Block	Infiltration Trench	Dispersion Trench	Rain Garden
Ault Field	52	24	23	5	0
Seaplane Base	606	600	4	1	1

4. Stormwater Master Plan

A Stormwater Master Plan was developed for NASWI Ault Field in 2023 and finalized in 2024. The Plan evaluates the stormwater management system, including conveyance and stormwater quality. It includes hydrologic and hydraulic modeling, evaluations of the storm drainage system capacity, and water quality analysis, as well as conceptual mitigation recommendations to address vulnerabilities. The study also investigated measures to separate industrial area stormwater from the rest of the system and analyzed options to minimize stormwater management impoundments and underground vaults near runways and taxiways.

One of the goals of the Stormwater Master Plan is to investigate the possibility of rerouting stormwater from flowing east and directing it west to avoid detention ponds or vaults which conflict with airfield operations. The study determined that rerouting stormwater would not negatively affect the wetland ecology to the east, because stormwater within the channels does not overtop and the wetland species are not dependent on these flows. Several Course of Actions (COAs) were developed, ranging from video inspections and sediment removal of the stormwater system to adding stormwater infrastructure that would separate industrial runoff from areas with lower pollutants of concern. If approved and funded, these COAs would most likely occur several years into the future.

Based on the Stormwater Master Plan, a Stormwater Flow Control Analysis was developed for Ault Field. The analysis report summarized and compared the flow control elements included in the Stormwater Master Plan and includes a review of the flow control requirements for Ault Field as related to future construction projects.

5. NASWI Stormwater Projects

For the MS4 permit period (February 2021-current), the following stormwater projects have occurred or are planned to take place:

5.1 Completed Projects

5.1.1 Ault Field

5.1.1.1 P-260 OWS-8 Replacement

This project replaced the main airfield oil/water separator (OWS-8) that discharges stormwater runoff from the Hangar 5 & 12 areas, the western portion of the apron, the western portions of taxiways Golf & Juliet, and the western portion of Runway 7/25 into the Strait of Juan de Fuca. This large capacity OWS will help to protect the Strait of Juan de Fuca and stormwater-stressed ecosystems. It has a volume of 30,000 gallons and can treat up to 2,600 gallons per minute (GPM). The effluent has a maximum oil concentration of 10 PPM.

5.1.2 Seaplane Base

5.1.2.1 Outfall 014 Zinc

Due to the success at Naval Base Kitsap Keyport in using oyster shells to decrease metal concentrations in stormwater runoff, oyster shells have been deployed in two catch basins (CB-1264 & CB-1265) located in NAS Whidbey Island Seaplane Base to decrease the concentration of zinc within its stormwater runoff. These were installed on 12/17/2024. Further zinc sampling was conducted in February 2025 and the data indicated that the main source of zinc in the stormwater was from the roofs of buildings in the area. Due to this information, the oyster shell bag located in CB-1264 was relocated to CB-1460 to better target roof runoff. The oyster bag in CB-1265 was left in place as the samples proved it was effective in treating high levels of zinc in stormwater with samples taken before stormwater flowed through the oyster shells and after. The before sample had a zinc concentration of 741µg/L and the after sample had a concentration of 19.9µg/L.

5.1.2.2 Fuel Pier Pavement Repair at Seaplane Base

This project was to repave the fuel pier. The stormwater system was improved and an OWS with a 100GPM capacity was installed. A Contech Storm Filter with a 5GPM capacity was also installed to treat both the effluent of the OWS and the runoff from the nearby gravel parking area.

5.1.3 PPV Housing

5.1.3.1 Repair playground drainage deficiencies Clover CDC

The playground at the Clover Child Development Center (CDC) had stormwater drainage concerns with puddles and stagnant water where children play. This has been addressed by adding stormwater drainage underneath the newly placed turf, and the stormwater drains as designed.

5.2 Projected Stormwater/Capital Improvement Projects

5.2.1 Airfield Pavement Improvements at Ault Field

This project is set to occur over multiple years. Media filters to treat stormwater runoff that flows off the pavement and infiltrates into the ground are proposed to be installed at the interior grass infill area (west side of Taxiway Echo, east side of Taxiway Alpha, and south side of Area A7), the Helipad area (north and east sides), east side of Taxiway Bravo, and a small portion at the corner of Taxiways Echo and Golf. To treat stormwater runoff that does not flow off the pavement and is instead collected in the storm sewer system, water quality facilities (such as the Aquip Stormwater Filtration System) will be installed at outfalls AFOF8 and AFOF9 before they discharge into the Strait of Juan de Fuca. This will comply with Minimum Requirement 6 of the 2019 Stormwater Management Manual for Western Washington (SWMMWW).

5.2.2 Replace and Extend Outfall Pipe of OWS-8 at Ault Field

This project has been developed to improve existing outfall (AFOF-9; OWS-8 effluent) that is badly deteriorating due to age and exposure to harsh marine conditions. This project is intended to protect waterways and stormwater-stressed ecosystem. This project involves relocating the outfall 50ft North of its current location and extending it 40 ft further to reduce the amount of sediment buildup in the pipe due to tidal influence. This project is planned for fiscal year 2032.

5.2.3 Repair Oil/Water Separators at Seaplane Base

The OWS treats stormwater from parking lots and roads on the Seaplane base for removal of petroleum, oils and lubricants (POL) along with copper and zinc. This project is intended to protect waterways and stormwater-stressed ecosystem. OWS #6 replacement will include a high coalescing plate OWS with two water quality treatment units and inlets/outlets, inline tidal check valve, wetwell pump station, elevated concrete pad, concrete paving restoration and grading, type 2 catch basin with flow splitter, type 2 catch basin with high flow bypass and 12-inch gate valve. Construction of this OWS began in the fall of 2024.

5.2.4 P-273 Fuel Hydrant System at Ault Field

This project will provide a new Type III pumphouse and underground jet fuel pipelines. Stormwater infrastructure improvements are also included for the pumphouse site. This project has not yet been awarded, but is planned for fiscal year 2025.

5.2.5 P-264 Regional Aircraft Service Facility at Ault Field

This project is for a new maintenance hangar on the south side of the industrial area. It includes water quality measures, flow control, and onsite conveyance as required. This project is planned for fiscal year 2026.

5.2.6 P-272 Hangar 9 Replacement at Ault Field

This project will replace Hangar 9 and will provide water quality, flow control, and onsite conveyance systems as required. This project is planned for fiscal year 2027.

5.2.7 Develop Airfield Repair Projects Study at Ault Field

Replaces aprons, taxiways, and runway pavements throughout the airfield and will be performed in multiple phases over twelve (12) years. The pavement improvement projects will also include water quality facilities, replacement of existing conveyance systems, and flow control most likely in the form of underground detention vaults.

5.2.8 P232 Cyber Warfare & Surveillance Facility at Ault Field

This project is to build a new multi-story building to house the Cyber Warfare and Surveillance mission team. Low Impact Design (LID) will be implemented, with flow control managed through underground detention vaults. Bioretention swales will also be implemented, and bioretention cells are being considered. This project is planned for fiscal year 2029.

5.2.9 P274 Theater Undersea Surveillance Command Pacific Renovations (TUSC PAC) at Ault Field

This project is a renovation and addition to Building 2700 on Ault Field. All SWMMWW minimum requirements will be implemented per the MS4 permit, including bioretention swales. Outfall AFOF15 will be renovated as a part of this project. This project is planned for fiscal year 2027.

Attachment A. Naval Air Station Whidbey Island MS4 Downspout Evaluation Report

NAVFAC
Naval Facilities Engineering Systems Command

FINAL
June 2024

MS4 Downspout Evaluation Report

Naval Air Station Whidbey Island

Island County, Washington

United States Department of the Navy
Naval Facilities Engineering Systems Command
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Naval Facilities Engineering Systems Command Northwest
Silverdale, WA

Final

MS4 Downspout Evaluation Report

Naval Air Station Whidbey Island
Island County, Washington

June 2024

DCN: LBJV-5006-4255-0005

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FINAL
MS4 DOWNSPOUT EVALUATION REPORT
NAVAL AIR STATION WHIDBEY ISLAND
ISLAND COUNTY, WASHINGTON

June 2024

Prepared for
United States Department of the Navy
Naval Facilities Engineering Systems Command Northwest
Silverdale, WA 98315

REVIEW AND APPROVAL

Task Order Manager: _____ June 25, 2024

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Acronyms and Abbreviations

Ault Field ..... Naval Air Station Whidbey Island Ault Field

BASH ..... Bird/Wildlife Aircraft Strike Hazard
BMP ..... best management practice

CWA ..... Clean Water Act

Ecology ..... Washington Department of Ecology
EPA ..... United States Environmental Protection Agency

FAA ..... Federal Aviation Administration

ID ..... identifier

MS4 ..... municipal separate storm sewer system

N/A ..... not applicable
NASWI ..... Naval Air Station Whidbey Island
NAVFAC NW ..... Naval Facility Engineering Systems Command Northwest
Navy ..... United States Department of the Navy
NPDES ..... National Pollutant Discharge Elimination System

O&M ..... operation and maintenance
OWS ..... oil-water separator

PAH ..... polycyclic aromatic hydrocarbon

ROM ..... rough order of magnitude

Seaplane Base ..... Naval Air Station Whidbey Island Seaplane Base
SIIP ..... Stormwater Infrastructure Investment Plan
SWMMWW ..... Stormwater Management Manual for Western Washington

TSS ..... total suspended solids

UIC ..... underground injection control
WAC ..... Washington Administrative Code

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1.0 Introduction

This Municipal Separate Storm Sewer System (MS4) Downspout Evaluation Report describes the evaluation of existing building locations at Naval Air Station Whidbey Island (NASWI) in Island County, Washington, where the disconnection of existing flows from rooftop downspouts into the MS4 and/or to Puget Sound could be suitable for and contribute to water quality improvement, including support of beneficial uses. This report was prepared by Liberty JV for Naval Facilities Engineering Systems Command Northwest (NAVFAC NW) under Contract No. N44255-20-D-5006, Task Order No. N4425523F4255.

1.1 MS4 Permit

The United States Environmental Protection Agency (EPA) issued an MS4 permit (Permit Number WAS026611) for NASWI, which went into effect on February 1, 2021. The MS4 permit (EPA, 2020) encompasses the two distinct operational areas under the same Command (Ault Field and Seaplane Base) and allows for stormwater discharge from non-industrial areas for activities that could potentially pollute waters of the United States under the National Pollutant Discharge Elimination System (NPDES) permit program in accordance with the Clean Water Act (CWA). The NASWI MS4 permit is based on EPA's Phase II regulations for MS4 discharges, which apply to urbanized areas with populations of fewer than 100,000.

Naval installations are federal jurisdictions and therefore are regulated by EPA. Although NASWI is in the state of Washington, municipal stormwater permits administered by the Washington Department of Ecology (Ecology) are not applicable. EPA does refer to Ecology documents for reference and guidance, but ultimately all regulatory requirements are based on EPA standards.

1.1.1 Downspout Disconnection Evaluation Requirements

As described in Section 2.4.4 of the MS4 permit for NASWI, a Stormwater Infrastructure Investment Plan (SIIP) is required with the Fourth Year Annual Report. The SIIP is a written plan submitted to EPA to document feasible and effective future investments and upgrades to stormwater infrastructure at the NASWI installation that are designed to improve the water quality of MS4 discharges. These improvements can be both operational and structural in nature and must be designed to prioritize the reduction and elimination of the pollutants of concern listed in Table 2.4.4 of the MS4 permit. Overall, the SIIP must evaluate and recommend potential projects that improve water quality based on effectiveness, feasibility, cost effectiveness, pollutant removal effectiveness, and long-term maintenance requirements.

One portion of the SIIP is an evaluation of rooftop downspouts of existing buildings. Section 2.4.4.7 of the MS4 permit requires an "evaluation of existing building locations where the disconnection of existing flows from rooftop downspouts into the MS4 and/or to Puget Sound could be feasible and could contribute to water quality improvement, including support of beneficial uses" (EPA, 2020). Beneficial uses, sometimes called designated uses, for Puget Sound include aquatic wildlife habitat, fish and shellfish harvesting, commerce and navigation, boating, and aesthetics (Washington Administrative Code [WAC] 173-201A-210). Water quality parameters that influence these beneficial uses include temperature, dissolved oxygen, turbidity or total suspended solids (TSS), pH, metals, toxic substances, and bacteria (enterococci or fecal coliform).

The MS4 permit requires that water quality best management practices (BMPs) described in the Ecology *Stormwater Management Manual for Western Washington* (SWMMWW) be considered (Ecology, 2019). The SWMMWW includes multiple BMPs for stormwater and water quality management, but some are not relevant or may not be reasonable to implement in conjunction with the disconnection of downspouts. BMPs that were considered appropriate or suitable for installation for the downspout disconnection evaluation are described in Section 2.1. This report documents the rooftop downspout disconnection evaluation required for the SIIP.

Runoff from rooftops can contain pollutants that negatively affect the beneficial uses for Puget Sound. On metal roofs, stormwater can react with the roof's surface and adsorb dissolved metals, and roofs with wooden or asphalt shingles can release pollutants such as polycyclic aromatic hydrocarbons (PAHs) and other inorganic compounds into the contacting stormwater. However, rooftops are typically not the most significant source of pollution in stormwater runoff. In general, most pollutant loading in stormwater runoff from non-industrial areas stems from the ground surface, particularly roadways. Other BMPs, such as regional water quality facilities that capture runoff from both roofs and catch basins located in the street, may provide much more water quality benefit while potentially being more cost-effective for the amount of area and pollutant loading treated.

1.2 Installation Description

The NASWI MS4 permit covers two distinct operational areas under the same Command: Ault Field and Seaplane Base. General descriptions of the two areas are provided in this section.

1.2.1 NASWI Ault Field

NASWI Ault Field (Ault Field) is a 4,361-acre property on the western shore of Whidbey Island. Ault Field consists of approximately 432 structures and contains most of the station's military activities.

Activities at Ault Field that may impact stormwater include aircraft maintenance activity, boiler plant activity, painting, sandblasting, vehicle washing, fuel storage and fueling activities, aircraft rinsing, paint storage, recycling, and fire training.

Stormwater runoff from Ault Field may infiltrate underlying soils, enter the storm drainage system, and/or drain via engineered open channel conveyance features. Runoff that is produced in the southwestern portion of Ault Field is primarily conveyed overland within open channels, and ultimately enters into wetlands, drains to the Strait of Juan de Fuca, or flows 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 within the flight line (runways and taxiways). Runoff flowing through this series of open channels infiltrates the large marshy wetland areas within the flight line area or continues to flow east to the lower Clover Valley Creek and Clover Valley Lake. The drainage areas and the installation's infrastructure are further described in the NASWI *Phase II Stormwater Management Program Plan* (NAVFAC NW, 2022).

1.2.2 NASWI Seaplane Base

NASWI Seaplane Base (Seaplane Base) is a 2,785-acre site east of the City of Oak Harbor and south of Ault Field on the eastern shore of Whidbey Island. Seaplane Base contains approximately 1,587 structures. The main activities at Seaplane Base include retail business, residential properties, and some light-industrial and commercial facilities. Seaplane Base also houses the fuel pier where jet fuel is transferred from a barge via pipeline to the fuel facility at Ault field. Activities that may impact stormwater include fuel transfer, vehicle fueling, residential and light industrial activities (i.e., an auto body shop, Commissary, Navy Exchange, and office building), and road maintenance.

Most of the developed industrial area at Seaplane Base is covered by impervious surfaces, and stormwater runoff drains to the storm drain system. Runoff from the eastern and western portions of the industrial area flows to the storm drain system and eventually to outfalls that drain to Oak Harbor and Crescent Harbor. In the southern portion of the site, runoff is conveyed primarily via natural swales and ditches to Oak Harbor and Cresent Harbor. From Torpedo Road to the east, runoff is conveyed via

swales/ditches and ultimately discharges 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, and man-made drainage conveyances such as engineered swales/ditches. Storm drain systems include catch basins, manholes, storm sewer pipes, and outlets. Oil-water separators (OWSs) are also incorporated into the storm drain systems at some petroleum, oil, and lubricant facilities, or within the storm drain system. The drainage areas and the infrastructure of Seaplane Base are further described in the NASWI *Phase II Stormwater Management Program Plan* (NAVFAC NW, 2022).

2.0 Stormwater Management

2.1 Potential BMPs

The MS4 permit recommends consideration of BMPs described in the SWMMWW that are feasible and could contribute to water quality improvement of existing downspout flows. The BMPs listed in the SWMMWW were evaluated by Liberty JV, with input from the United States Department of the Navy (Navy), for their suitability commensurate with the disconnection of downspouts. This initial screening removed BMPs from consideration if they were intended to treat runoff from ground surfaces or required considerable removal of the pavement around the downspout discharge location, installation of above-ground infrastructure that would impede typical site operations, and/or alteration of existing stormwater infrastructure other than the downspouts or simple connections to existing storm conveyance piping. Based on the MS4 permit language, implementation of BMPs that are more extensive or intrusive for the existing site conditions would likely be considered in alternative sections in the SIIP, as described in Sections 2.4.4.4 through 2.4.4.6 of the MS4 permit. BMPs that are more regional in nature and capture runoff from ground surfaces and runoff collected in catch basins in addition to rooftop runoff exceed the reasonably feasible threshold for disconnection of existing flows from rooftop downspouts. Table 2-1 lists the BMPs from the SWMMWW that were considered potentially suitable for downspout disconnection.

Table 2-1: Potentially Suitable BMPs for Downspout Disconnection

BMP General Name	BMP Classification in SWMMWW	BMP Short ID	BMP Description Report Section	BMP Detail Sheet in Appendix A	Water Quality Improvements
Infiltration Trench	BMP T5.10A	I	2.1.1.1	V-4.1 and V-4.2	Reduction of TSS, metals, bacteria, and quantity of stormwater runoff ultimately reaching Puget Sound
Drywell	BMP T5.10A	W	2.1.1.2	V-4.3	
Dispersion Trench	BMP T5.10B	D	2.1.2.1	V-4.4 and V-4.5	
Splashblock	BMP T5.10B	K	2.1.2.2	V-4.6	
Perforated Stub-out Connection	BMP T5.10C	C	2.1.3	V-4.7	
Infiltration Pond/Basin	BMP T7.10	B	2.1.4	V-5.4	
Bioretention (Swale or Planter Box)	BMP T7.30	P or S	2.1.5	Swale: V-5.12 – V-5.14 Planter: V-5.15	
Rain Garden	BMP T5.14	R	2.1.6	N/A	

Abbreviations/Acronyms:
BMP = best management practice
ID = identifier
N/A = not applicable
SWMMWW = Stormwater Management Manual for Western Washington
TSS = total suspended solids

In general, the SWMMWW BMPs not considered suitable include site design, dispersion, filtration, biofiltration, wetpool, pretreatment, manufactured treatment devices as BMPs, detention, and oil and water separators (Volumes V-2, V-3, V-6, V-7, V-8, V-9, V-10, V-12, and V-13 of the SWMMWW, respectively).

From the remaining categories of BMPs in the SWMMWW, Sections 2.1.1 through 2.1.6 describe the potentially suitable BMPs for the downspout disconnection evaluation.

2.1.1 BMP T5.10A – Downspout Full Infiltration

Downspout full infiltration systems are designed to promote infiltration of runoff from roof downspouts and are typically trench or drywell designs. Infiltration systems require testing to demonstrate adequate infiltration rates in the native soil beneath the proposed BMP and adequate vertical separation between the expected bottom elevation of the infiltration feature and the seasonal high ground water table.

Setbacks may be required for sites with slopes greater than 40 percent, landslide areas, open water features, springs, wells, and septic tank drain fields. For example, infiltration systems may be required to be set back at least 10 feet from any structure, property line, or sensitive area or at least 50 feet from the top of any slope over 40 percent or must be downgradient of a septic drainfield.

2.1.1.1 Pipe or Sheet Flow to Infiltration Trench

Figures V-4.1 and V-4.2 in Appendix A provide typical details of downspout infiltration trenches. Downspout infiltration trenches are generally at least 2 feet wide and 1.5 feet deep and are filled with clean (washed) coarse rock. Stormwater is able to flow through the voids of the aggregate fill temporarily and infiltrate the underlying soil. A perforated pipe can be used to distribute the water within the trench; however underground injection control (UIC) requirements apply if a perforated pipe is used (EPA, 2023), as described in Section 2.1.1.3.

Filter fabric must be placed over the drain rock prior to backfilling. Because of low saturated hydraulic conductivity, silt- and clay-type soils do not provide adequate infiltration and are thus unsuitable for downspout infiltration trenches.

Infiltration trenches must not be built on slopes greater than 25 percent. A geotechnical analysis may be required on slopes greater than 15 percent if the proposed infiltration trench is located in a landslide hazard area or within 200 feet of the top of a slope of 40 percent or steeper.

The Ecology SWMMWW outlines general operations and maintenance (O&M) procedures for infiltration trenches, which are included in Table V-A.2 in Appendix D. The inlet to the trenches may accumulate sediment, and therefore the sediment must be periodically removed from the area to ensure the sediment does not impact the infiltration rate of the feature.

2.1.1.2 Drywell

Infiltration drywells (see Figure V-4.3 in Appendix A) are often precast concrete structures. They typically are at least 48 inches in diameter and are installed 5 to 10 feet deep or deeper. Drywells must be spaced a minimum of 10 feet apart and must be installed where the bottom elevation of the drywell is a minimum of 5 feet above the seasonal high ground water level or impermeable soil layer. Filter fabric must be placed above the drain rock and on drywell sides prior to backfilling. Similar to infiltration trenches, drywells may not be built on slopes greater than 25 percent or placed in a landslide hazard area or on slopes greater than 15 percent without evaluation by a licensed geotechnical expert, geologist, or engineer, or without jurisdiction approval.

The Ecology SWMMWW describes general O&M procedures for drywells. Drywells must be maintained to ensure adequate infiltration. The drywells should be opened and cleaned of debris and sediment periodically, or as needed, to maintain adequate infiltration.

2.1.1.3 Underground Injection Control Requirements

Installation of infiltration trenches or drywells must consider UIC requirements. A drywell is considered a Class V UIC structure because it is a subsurface fluid distribution system for which the depth is greater than the largest surface dimension, as defined in the UIC regulations (Title 40 of the Code of Federal Regulations, Section 144.3). Additionally, infiltration trenches that include a perforated pipe are also considered Class V UIC structures (Ecology, 2019). Inventory information on Class V UICs must be sent to EPA and potentially registered with Ecology as well. Regulations to prevent contamination of underground sources of drinking water exist at both the federal and state level, which likely require evaluation of any contamination risks, BMP design, and O&M requirements for any new drywells installed onsite.

2.1.2 BMP T5.10B – Downspout Dispersion Systems

Downspout dispersion systems, most commonly splashblocks or gravel-filled trenches, are designed to spread roof runoff over vegetated or pervious areas. Dispersion slows the runoff, which provides some filtration by allowing the larger particles to settle out before entering the conveyance system. Runoff is conveyed to the vegetated flow path,

which must be a well-established lawn or pasture or native vegetation or landscaping with well-established groundcover. The groundcover should be dense enough to promote dispersion and infiltration of flows and prevent erosion and flooding of downstream properties.

To maintain separation of flows, the vegetated flowpaths for multiple splashblocks or dispersion trenches must not overlap with other flowpaths. If the vegetated flow path is less than 25 feet in length, erosion or flooding may occur because of the downspout dispersion, and a perforated stub-out connection may be used instead. Splashblocks or dispersion trenches on slopes greater than 15 percent or in erosion hazard areas must be evaluated by a licensed engineer or geologist.

Although downspout dispersion systems are simple to install, system designers must consider that runoff from a downspout dispersion system can potentially damage an adjacent, down-gradient property. Residential areas can be at risk for stormwater damage and intrusion through a foundation or basement because of the short separation distance and gradient between houses. Additionally, dispersion and over-saturation of lawns at multifamily units or single-family homes with small lots can render the outdoor recreation space unusable for those occupants and their children. Use of the dispersion area and the potential ramifications of introducing additional stormwater should be considered before disconnecting any downspouts.

2.1.2.1 Downspout Dispersion Trench

Dispersion trenches (see Figures V-4.4 and V-4.5 in Appendix A) must have a vegetated flow path of at least 25 feet long, unless their location has a slope steeper than 15 percent; in this case, they must be at least 50 feet long. A setback of at least 5 feet must be maintained between any edge of the trench and structures or property lines. Trenches may be 10 feet long by 2 feet wide to serve up to 700 square feet of roof area. For roof areas with areas larger than 700 square feet, a notched grade board dispersion trench may be used. The total trench length may not exceed 50 feet and must provide at least 10 feet of trench length per 700 square feet of roof runoff area. The length can vary based on contribution area, as described above, but dispersion trenches are typically 2 feet wide and 3 feet deep.

Ecology does not include O&M guidelines for downspout dispersion trenches. If catch basins are installed upstream of a dispersion trench, the O&M activities associated with catch basins (as outlined in the SWMMWW and included in Table V-A.5 in Appendix D) should be completed.

2.1.2.2 Splashblock

Typically, splashblocks (see Figure V-4.6 in Appendix A) can be implemented if the ground is sloped away from the foundation and adequate vegetation and area are available to disperse storm runoff. Flexible downspout extension pipes can also be used instead of a splashblock to direct the downspout discharge farther away from a structure, particularly if the structure has a basement or the ground is fairly level. Splashblocks or flexible piping may be used to disperse runoff from downspouts discharging to a vegetated flow path that is at least 50 feet long.

Ecology does not have O&M guidelines for splashblocks.

2.1.3 BMP T5.10C – Perforated Stub-out Connections

A perforated stub-out connection (see Figure V-4.7 in Appendix A) is a length of perforated pipe in a drain rock-filled trench that can be placed between roof downspouts and the local drainage system to provide infiltration and/or flow control.

Perforated stub-out connections consist of at least 10 feet of perforated pipe per 5,000 square feet of roof area, laid in a level trench that is 2 feet wide and 1.5 feet deep and backfilled with washed drain rock. The drain rock should be extended to at least 8 inches below the bottom of the pipe and must cover the pipe. The pipe should be level, and the rock trench should be covered with filter fabric and 6 inches of soil fill. Similar to infiltration trenches, perforated stub-out connections are considered Class V UIC structures and must follow the UIC requirements in Section 2.1.1.3 of the MS4 permit.

Perforated stub-out connections are almost identical to infiltration trenches except for the inclusion of an outflow pipe in case of insufficient infiltration within the stormwater feature. The need for an outflow pipe could be determined only during the engineering design phase and would be based on infiltration testing and hydrologic analysis of the contributing drainage area. As such, perforated stub-out connections are not identified in Appendix B, but that does not mean that they are not a potentially suitable BMP. All infiltration trenches should be evaluated as part of the engineering process to determine the need for an outflow pipe.

Ecology does not include O&M guidelines for perforated stub-out connections.

2.1.4 BMP T7.10 – Infiltration Basins and Ponds

Infiltration basins and ponds (see Figure V-5.4 in Appendix A) are shallow impoundments used for collection, temporary storage, and infiltration of stormwater runoff. Typically, an infiltration basin or pond is used to convey stormwater runoff from new development or redevelopment areas to the ground; filtration, adsorption, and

biological properties of native soils and vegetation are used to remove pollutants as stormwater soaks into the ground.

A site is not suitable for an infiltration basin or pond if implementation will cause a violation of Ecology's Ground Water Quality Standards to protect ground water quality (Ecology, 2019). A geotechnical and hydrogeologic report must be prepared by a licensed engineer to determine site selection and design decisions. Infiltration methods used for treatment must meet a soil infiltration rate of 9 inches per hour or less, and the base of the infiltration basin must be higher than 5 feet above the seasonal high groundwater elevation. It is important that vegetation within and near the basin or pond is maintained to provide optimal water quality benefits.

The Ecology SWMMWW outlines general O&M procedures for infiltration basins and ponds. These procedures are included in Table V-A.2 in Appendix D. These maintenance activities ensure adequate infiltration for stormwater and beneficial vegetative cover. The vegetation in the basin or pond should be maintained at a height equal to or less than 18 inches. To minimize vegetation maintenance, the infiltration basin or pond should be seeded with slow-growing stoloniferous grasses, which will allow for mowing only twice per year on average.

Infiltration basins and ponds are typically designed to collect stormwater from multiple buildings for treatment. Additionally, these facilities often treat runoff from streets and catch basins in addition to building downspouts. Although these facilities can provide great benefit, they typically require substantial modifications to the subsurface conveyance system and site grading to accommodate the various inflow sources, compared with disconnection of downspouts from a single building. These regional water quality facilities are considered under alternative sections of the SIIP, but they have been deemed to be outside the scope of a downspout disconnection program and therefore are not considered in the evaluation. A description of BMP T7.10 (Infiltration Basins and Ponds) has been retained in this report for potential use in other sections of the SIIP because of the significant stormwater quality benefit that these features can provide.

2.1.5 BMP T7.30 – Bioretention

Bioretention areas (see Figures V-5.12 through V-5.15 in Appendix A) are shallow landscaped areas that receive stormwater from impervious surfaces such as roofs, driveways, sidewalks, and parking lots. Bioretention can vary in design and is used to describe various features used to collect stormwater and remove pollutants using a designed soil and plant mix as a treatment medium.

Bioretention designs may include swales or planters. Bioretention swales are shallow trenches with a designed planting soil mix and a variety of vegetation used to treat stormwater runoff. Planters and planter boxes (see Figure V-5.15 in Appendix A) are vertical-walled structures containing bioretention soil mixes and are often used in urban settings. Planters are typically more expensive to construct and maintain than a swale that treats the same quantity of runoff, and therefore these BMPs are typically installed only where space is limited and a swale will not fit (i.e., between a building and a sidewalk). Each method of bioretention provides pollutant removal mechanisms through filtration, adsorption, and biological action.

For purposes of the rough order of magnitude (ROM) cost analysis, it was assumed that bioretention swales would be 8 feet wide, have a ponding and freeboard depth of 1.5 feet, and include a 2-foot-thick layer of organic media and a 1-foot-deep underdrain at the base of the swale. Planter boxes were assumed to be 4 feet wide, have a ponding depth of 1 foot, and include a 1.5-foot-thick layer of organic media.

The Ecology SWMMWW outlines general O&M procedures for bioretention features to maintain optimum infiltration, storage, and pollutant removal capabilities, which are included in Table V-A.21 in Appendix D. Vegetation used for bioretention features should be drought tolerant and mature to allow watering through natural storm events. The features should be weeded manually without herbicides semi-annually and should coincide with typical growth cycles. Mulch on top of the soil should be replaced annually if known to receive significant heavy metals pollutant contributions from stormwater or replaced every 5 years otherwise. The features should be inspected regularly to identify sediment accumulation, erosion areas, and failing vegetation.

2.1.6 BMP T5.14 – Rain Gardens

Rain gardens are non-engineered, shallow, landscaped depressions composed of composted soils and plants that temporarily store stormwater runoff from adjacent areas. Stormwater passes through the amended soil layer and into the native soil beneath, thereby reducing stormwater pollutants and surface runoff. The *Rain Garden Handbook for Western Washington: A Guide for Design, Installation, and Maintenance* (Hinman et al., 2013) provides rain garden specifications, construction guidance, and routine maintenance recommendations. Table 6 in Appendix E summarizes O&M procedures for rain gardens. For the ROM cost analysis, it was assumed that rain gardens have a ponding and freeboard depth of 1.5 feet and include a 2-foot-thick layer of an organic medium.

2.2 Water Quality Benefits of BMPs

As described in the MS4 permit, the purpose of the potentially suitable BMPs identified in Section 2.1 is to improve the water quality of stormwater runoff conveyed in downspouts that ultimately drains to Puget Sound. Water quality parameters of stormwater runoff that influence the beneficial uses of Puget Sound include temperature, dissolved oxygen, turbidity or TSS, pH, metals, toxic substances, and bacteria (enterococci or fecal coliform).

In general, all the identified BMPs promote infiltration, which reduces the quantity of stormwater runoff that leaves a site and ultimately discharges to Puget Sound. Soil, whether placed as part of the BMP construction or consisting of the native underlying material, can filter out pollutants in stormwater runoff before it enters the groundwater table. Runoff that infiltrates the ground is no longer a source of pollutants that can degrade the water quality of Puget Sound. By promoting infiltration of rooftop runoff, the contribution of pollutants such as TSS, metals, toxic substances (if roofing materials leach these substances), and even bacteria discharging from a site can be reduced or eliminated. Additionally, infiltration can reduce the extent of downstream flooding during heavy rain events.

Vegetated BMPs (e.g., dispersion across lawns, bioretention swales, and rain gardens) can also reduce pollutants in stormwater that does not infiltrate the underlying soil. Vegetation can filter out pollutants as runoff flows through a BMP, and the roots can adsorb pollutants within the plant structure, reducing the concentrations of pollutants that discharge from a site. Dispersion across lawns, however, can potentially degrade water quality if pet droppings or excess fertilizers from the area are mobilized to a downstream water source. Proper maintenance of lawns and increased flow distances across lawns can reduce this potential source of water quality degradation.

3.0 Suitability Evaluation

The field investigation at NASWI, conducted from 01 August through 04 August 2023, by Liberty JV personnel, included evaluation of all facilities documented on base maps provided by the Navy. The investigation crew observed certain conditions that would make downspout disconnection reasonably suitable. This section describes the conditions for suitability.

3.1 Suitable BMP Options

The Liberty JV field evaluation team observed each facility onsite and determined which, if any, of the initially screened stormwater BMPs could be reasonably implemented at each location. The findings do not account for any additional analyses that may be needed for implementation of the BMPs (e.g., geotechnical analysis, utility surveys, engineering design, permitting, etc.). Tables B-1 and B-2 in Appendix B show the structures for which downspout disconnection was considered suitable at NASWI Ault Field and Seaplane Base, respectively; multiple BMPs may be deemed suitable for a single feature.

A BMP was deemed to be suitable at a structure if it could be installed and receive runoff contributions from one or more downspouts around the perimeter of the structure. In many cases, typically because of existing landscaping, pavement, and utility constraints, downspouts from only a portion of a structure would be suitable for disconnection for the benefit of the MS4 program.

3.2 Unsuitable Downspout Disconnection Rationale

This section describes common conditions of unsuitability based on general site characteristics and observations made during the field investigation. Tables C-1 and C-2 in Appendix C list the structures for which downspout disconnection was considered unsuitable at NASWI and the reasons for removal from consideration.

3.2.1 Land Use Considerations

NASWI includes areas of housing and services for families that limit options for suitably implementable BMPs for stormwater management. Residential areas, as well as buildings where children are expected to frequent (i.e., daycare facilities and schools), were noted during the evaluation process. The first limitation stems from the need to ensure child safety by eliminating from consideration the installation of stormwater features that include exposed gravel (e.g., dispersion trenches, bioretention planters, and infiltration trenches without soil/vegetative cover). Such features pose a safety risk to children playing in or around the area. Note that bachelor enlisted quarters do not

have the same restrictions for child-safe BMPs because only adults are expected to use these housing units, and children will not be present.

Through discussions of the ramifications, the Navy and Liberty JV determined that drywells or infiltration trenches installed at residential properties are not suitable BMP options for downspout disconnection. In theory, a drywell can be installed in almost any area with a 6-foot-diameter clear space, including almost every residential lawn. Given the expected utility conflicts, drywells and infiltration trenches would likely be able serve only a single residential property. The Navy and Liberty JV concluded that the cost and effort associated with geotechnical investigations, design, UIC documentation/inventory requirements, construction, and disturbance of the occupants are unacceptable for installation of infiltration features at each individual residential property. Therefore, drywells and infiltration trenches were considered suitable only for non-residential properties.

Rain gardens were not considered appropriate for installation at industrial/commercial buildings. Rain gardens, in accordance with the SWMMWW, are non-engineered facilities that are typically installed at a residential property as part of that property's landscaping. Because the required drainage area and resultant quantity of stormwater runoff are much less than at a typical industrial/commercial building, rain gardens are most suitable for residential applications. Industrial/commercial buildings should use an engineered BMP for downspout disconnection options, except for a splashblock directing runoff directly to a vegetated area; therefore, rain gardens were not considered a suitable BMP for any non-residential buildings.

Although not a uniform exclusion policy, use of downspout disconnection features at residential areas must ensure that stormwater management does not result in potential stormwater intrusion into a building's foundation or basement and that the dwelling's outside space remains suitable for the occupants' use and children's recreation. As a result of the rationale described above, the only BMPs determined to be suitable for installation at residential properties are splashblocks and rain gardens.

Regional water quality facilities, such as infiltration basins, ponds, or swales that would collect stormwater from multiple buildings for treatment, were determined to be not suitable BMPs for the purposes of this downspout disconnection evaluation. Although these facilities can provide great benefit, they typically require substantial modifications to the subsurface conveyance system and site grading to accommodate the various inflow sources compared with disconnection of downspouts from a single building. Additionally, these facilities typically treat runoff from streets and catch basins in addition to building downspouts. Regional water quality facilities are considered under alternative sections of the SIIP, but they have been deemed to be outside the scope of a downspout disconnection program and therefore are not considered in the evaluation.

3.2.2 Common Reasons for Unsuitability of BMPs

In addition to the suitability limitations for certain BMPs because of the land use considerations described in Section 3.2.1, certain infrastructure conditions prevent downspout disconnection from being suitable and reasonably implementable. Existing downspout outlet locations that are surrounded by paved surfaces and catch basins prevent redirection of stormwater flow to an area where a stormwater BMP could be constructed and are therefore considered unsuitable. Removal of paved surfaces and catch basins and regrading of the existing site were deemed to be beyond the scope of a downspout disconnection program.

Downspouts that are inside the structures are not considered suitable for disconnection. The flow from a disconnected downspout must be routed to an area where it is possible to install stormwater BMPs. Rerouting downspouts that are internal to a structure was deemed to be beyond the scope of the program because of the challenges of locating all the internal downspouts and the necessary disturbances to the building structure. Additionally, areas that did not have sufficient setback from pavement or structures (as outlined in the SWMMWW) for installation of any of the potential BMPs were also considered unsuitable.

In cases in which downspouts were already disconnected and runoff drains onto vegetation, then the intent of the MS4 downspout disconnection strategy had already been met. Installing additional BMPs in these instances was considered unnecessary. Similarly, some structures do not have gutters, and runoff from the structures' roofs drains directly to vegetation. In these cases, disconnection of downspouts and installation of BMPs was also deemed unnecessary.

Numerous facilities that are not buildings have been identified on the base maps. In these cases, there is no roof to produce runoff, and the downspout disconnection program does not apply. The facilities that are not buildings have been identified in Tables C-1 and C-2 in Appendix C.

3.2.3 Birds and Standing Water

Stormwater BMPs that use open-air detention or retention of water attract wildlife because the standing water during and following a storm event provides potential preferred habitat for migratory and resident bird populations. Wildlife-attracting facilities pose significant hazard potential to aircraft traffic because of the increased risk for aircraft collisions with birds. The United States Department of Transportation Federal Aviation Administration (FAA) has published an Advisory Circular that notes that stormwater treatment facilities, including retention and settling ponds, often attract large numbers of potentially hazardous wildlife and that development of new open water

facilities should be avoided to prevent wildlife attractants. Overall, the FAA recommends that wildlife-attracting facilities be located away from airports to reduce the risk of bird strikes by aircraft (FAA, 2020).

NASWI also has a Bird/Wildlife Aircraft Strike Hazard (BASH) prevention program to minimize risk to flight operations at Ault Field (Navy, 2018). Reducing wildlife-attracting facilities is a key goal of this program, and the Navy has stated that creating standing water facilities as a result of downspout disconnection is not feasible because of aircraft and pilot safety concerns. For this reason, the downspout disconnection evaluation at Ault Field did not consider installation of stormwater BMP facilities that create open-air detention and/or retention of stormwater, including bioretention swales, planters, and infiltration basins/ponds.

3.3 Cost Estimates

ROM costs were developed for each of the structures for which downspout disconnection was determined to be suitable. The capital costs for construction or installation of the recommended BMPs, as well as 10-year O&M costs, are included in Tables B-1 and B-2 in Appendix B. Capital costs for each type of BMP were developed on an incremental cost basis, where a single dimension or count is used to scale the cost of the BMP construction. The cost and quantity for each suitable BMP at each feature are listed in Tables B-1 and B-2 in Appendix B as well. For features for which multiple BMPs were deemed suitable for installation, the ROM cost estimate was developed for each suitable BMP.

The costs presented are to be considered ROM cost estimates for planning purposes and should be verified and refined during the design process. Prior to construction of any BMPs onsite, additional evaluation and design effort is required, including geotechnical investigations, utility locating, engineering design, potential hydrologic/hydraulic modeling, determination of any permit requirements, and preparation of a detailed cost estimate.

3.4 Considerations Prior to Implementation of Suitable BMPs

Selection of the BMPs considered suitable and presented in Appendix B was based on information gathered during a visual inspection of the site as part of a feasibility screening-level assessment by Liberty JV. Prior to construction of any BMPs onsite, additional evaluation and design effort are required, including geotechnical investigations, utility locating, engineering design, potential hydrologic/hydraulic modeling, determination of any permit requirements, and preparation of a detailed cost estimate. Some of the BMPs may be determined to be infeasible based on the presence

of utilities or results from geotechnical investigations that were not evident during the visual inspection.

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4.0 Future Development

For any future development, design guidance from the SWMMWW should be considered to address runoff quantity and quality as part of the Navy's design and permitting requirements for all new structures. Although the Navy is not required to follow Ecology guidance because Naval installations are federal jurisdictions and are regulated by EPA, the existing MS4 permit does reference the SWMMWW for guidance in improving stormwater quality. BMPs incorporated during the construction phase of new development are more cost effective than retrofits and can be more effective for improving stormwater quality. The conveyance system design and siting of low-impact designs, regional facilities, and other stormwater quality BMPs can be optimized if included in the initial design of a property.

Additionally, incorporating stormwater treatment requirements during the design phase of a project will most likely allow for runoff from both rooftops and ground surfaces to be captured and treated, maximizing water quality ultimately discharged to Puget Sound.

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5.0 Conclusions

A total of 2,019 structures were evaluated at NASWI as part of this MS4 downspout disconnection feasibility assessment. Of the evaluated structures at NASWI, 52 buildings (a total of 12% of the assessed structures) at Ault Field and 1,111 buildings (a total of 70% of the assessed structures) at Seaplane Base were determined to have downspouts that could feasibly be disconnected to meet the requirements of Section 2.4.4.7 of the MS4 permit.

Although runoff from rooftops can include pollutants (such as dissolved metals, PAHs, and other inorganic compounds), rooftops are typically not a major pollutant source. In general, the source of most pollutant loading in stormwater runoff from non-industrial areas is the ground surface, particularly roadways. The downspout disconnection options described in this report meet the requirements in Section 2.4.4.7 of the MS4 permit. However, permittees must evaluate and recommend potential projects that improve water quality based on the feasibility, cost effectiveness, pollutant removal effectiveness, and long-term maintenance requirements in the SIIP. It is worth noting that other BMPs not included in this evaluation may accomplish the goals of the SIIP more efficiently than downspout disconnection. These BMPs include regional water quality facilities that capture runoff from both roofs and catch basins in the street, which can provide more water quality benefits and cost-effectiveness for the amount of runoff area and pollutant loading treated. However, downspout disconnection BMPs do provide low-cost and easily implementable solutions for improving water quality.

All of the recommendations presented in this report are based on information gathered during a non-intrusive visual inspection of the site as part of a feasibility screening-level assessment, and the costs presented are to be considered ROM cost estimates for planning purposes. Prior to the construction of any BMPs onsite, additional evaluation and design effort are required, including geotechnical investigations, utility locating, engineering design, potential hydrologic/hydraulic modeling, determination of any permit requirements, and preparation of a detailed cost estimate.

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Appendix A:
BMP Standard Details,
Figures excerpted from *2019 Stormwater Management Manual for Western Washington*, Volume V - Chapter 5, revised July 2019

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Figure V-4.1: Typical Downspout Infiltration Trench

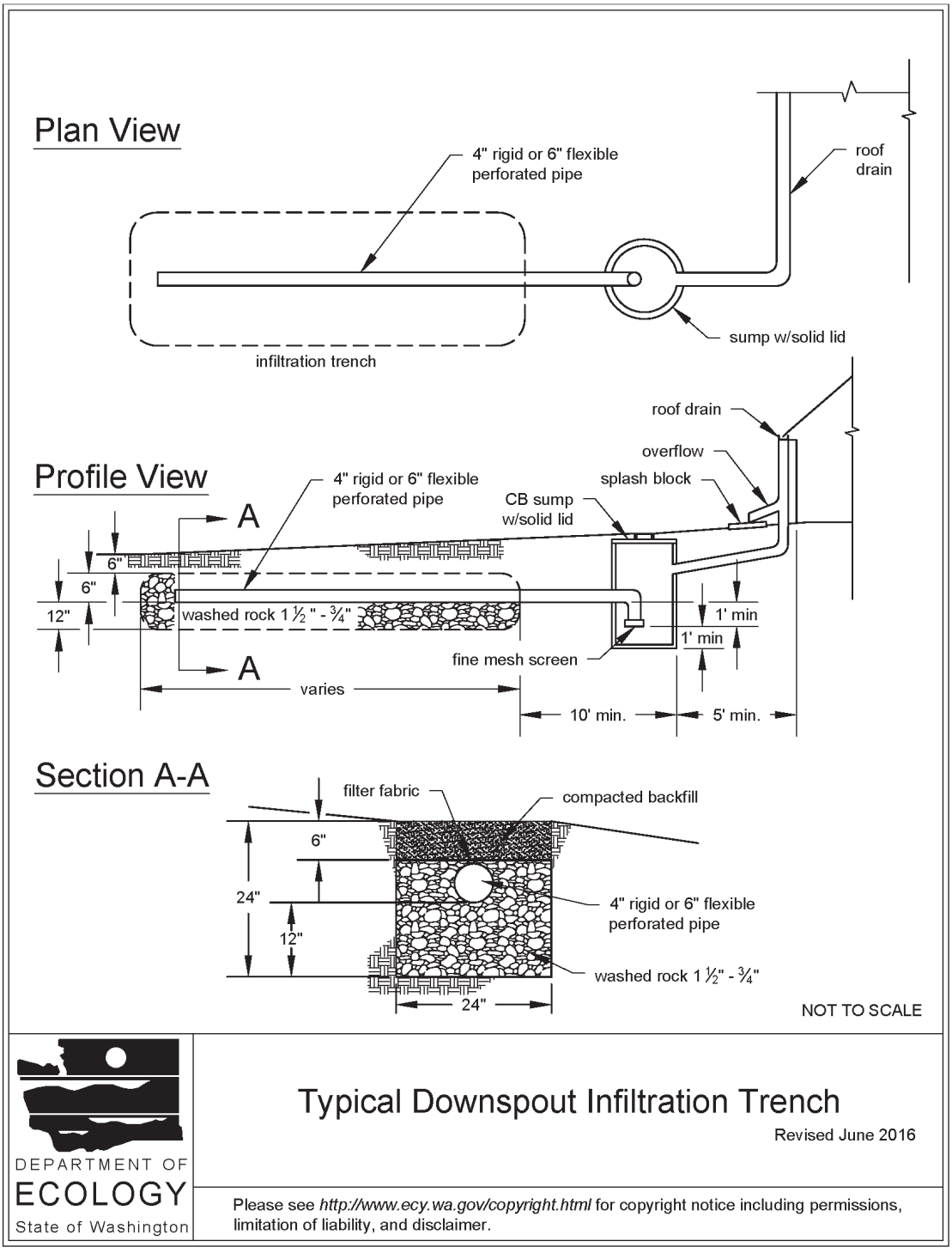
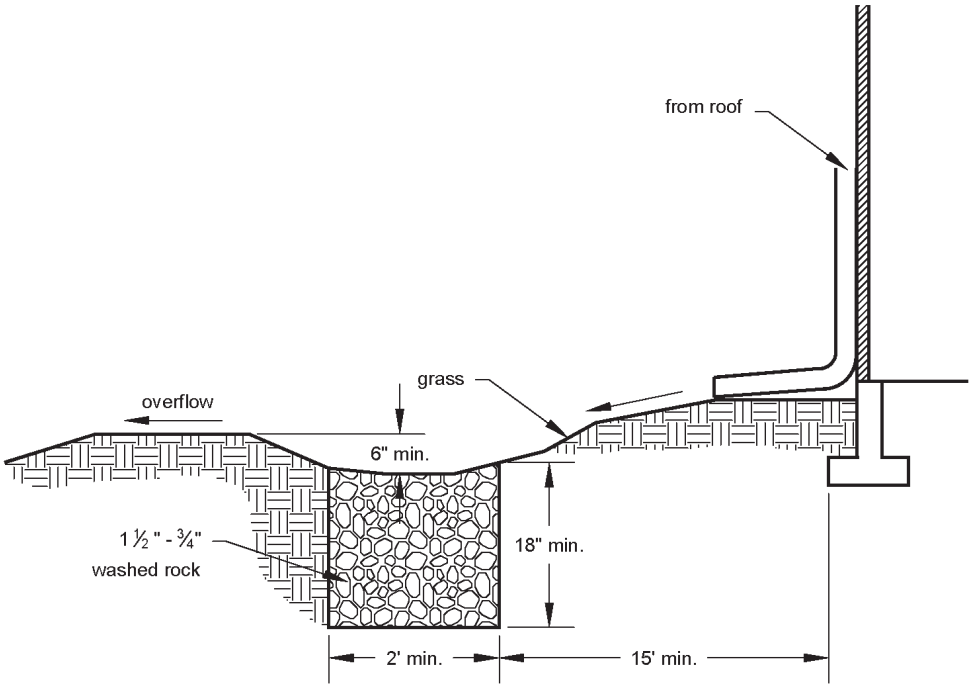


Figure V-4.2: Alternative Downspout Infiltration Trench System for Coarse Sand and Gravel



Note: Same length dimensions and site limitations as typical system

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Alternative Downspout Infiltration Trench System for Coarse Sand and Gravel

Revised June 2016

Figure V-4.3: Typical Downspout Infiltration Drywell

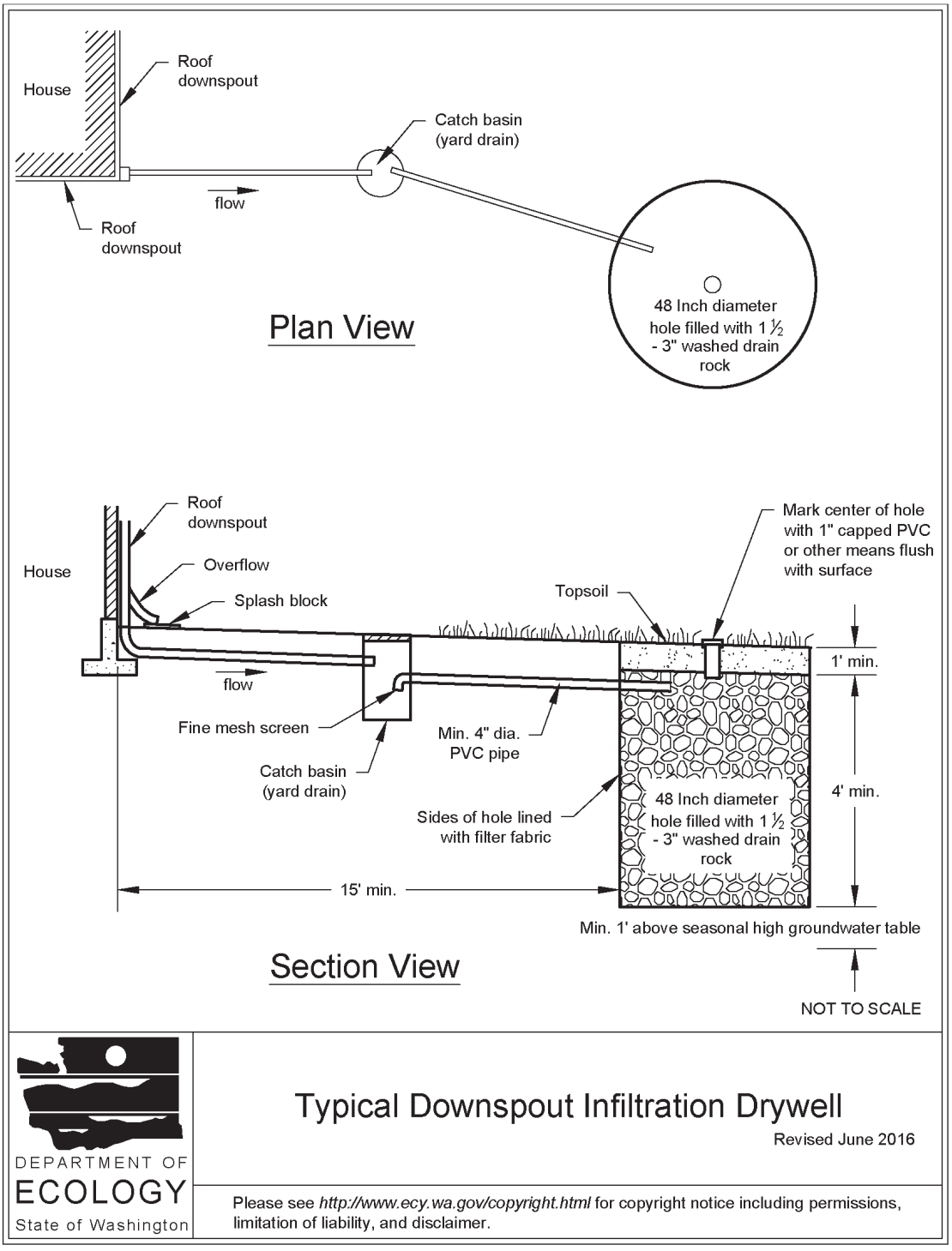


Figure V-4.4: Typical Downspout Dispersion Trench

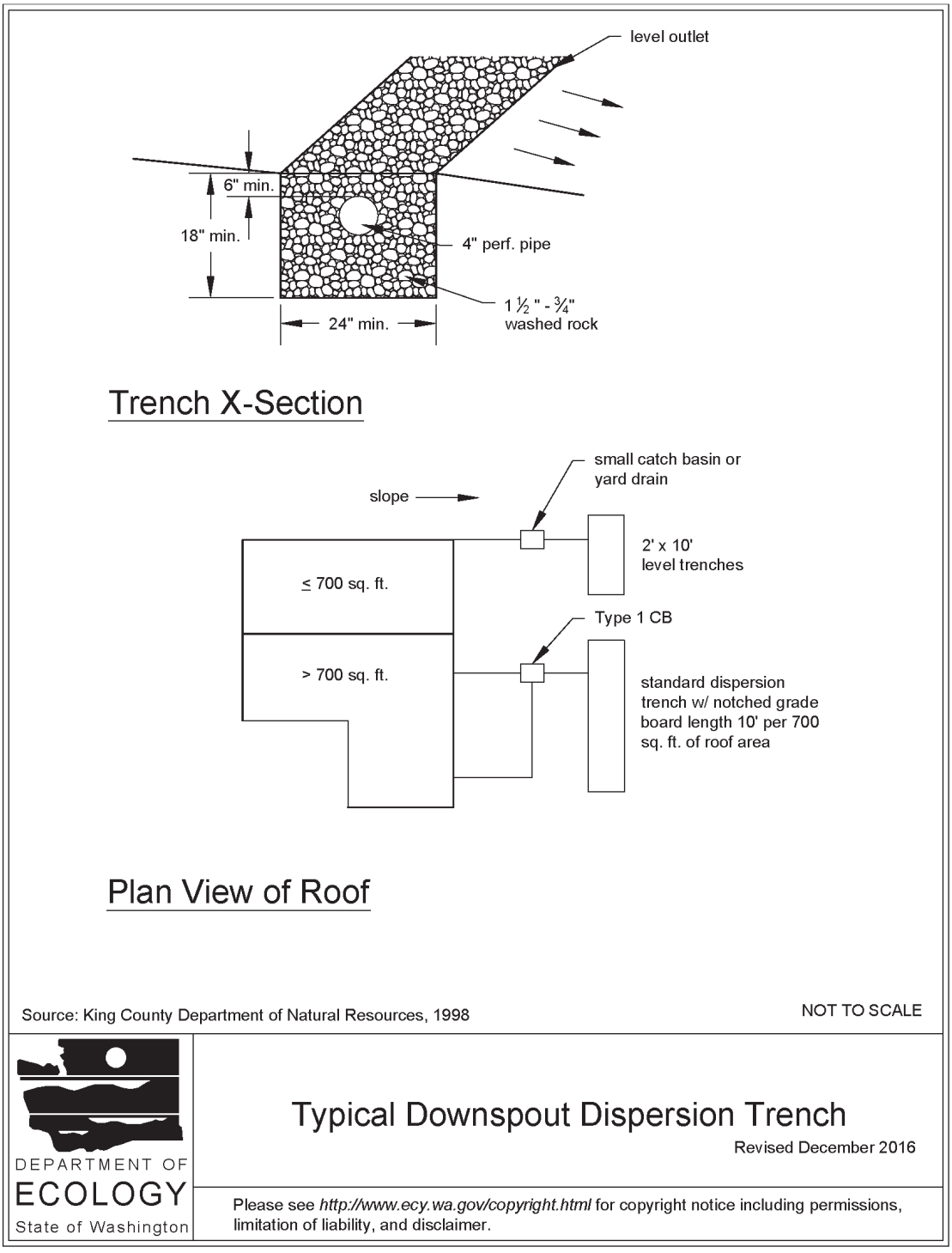


Figure V-4.5: Standard Dispersion Trench with Notched Grade Board

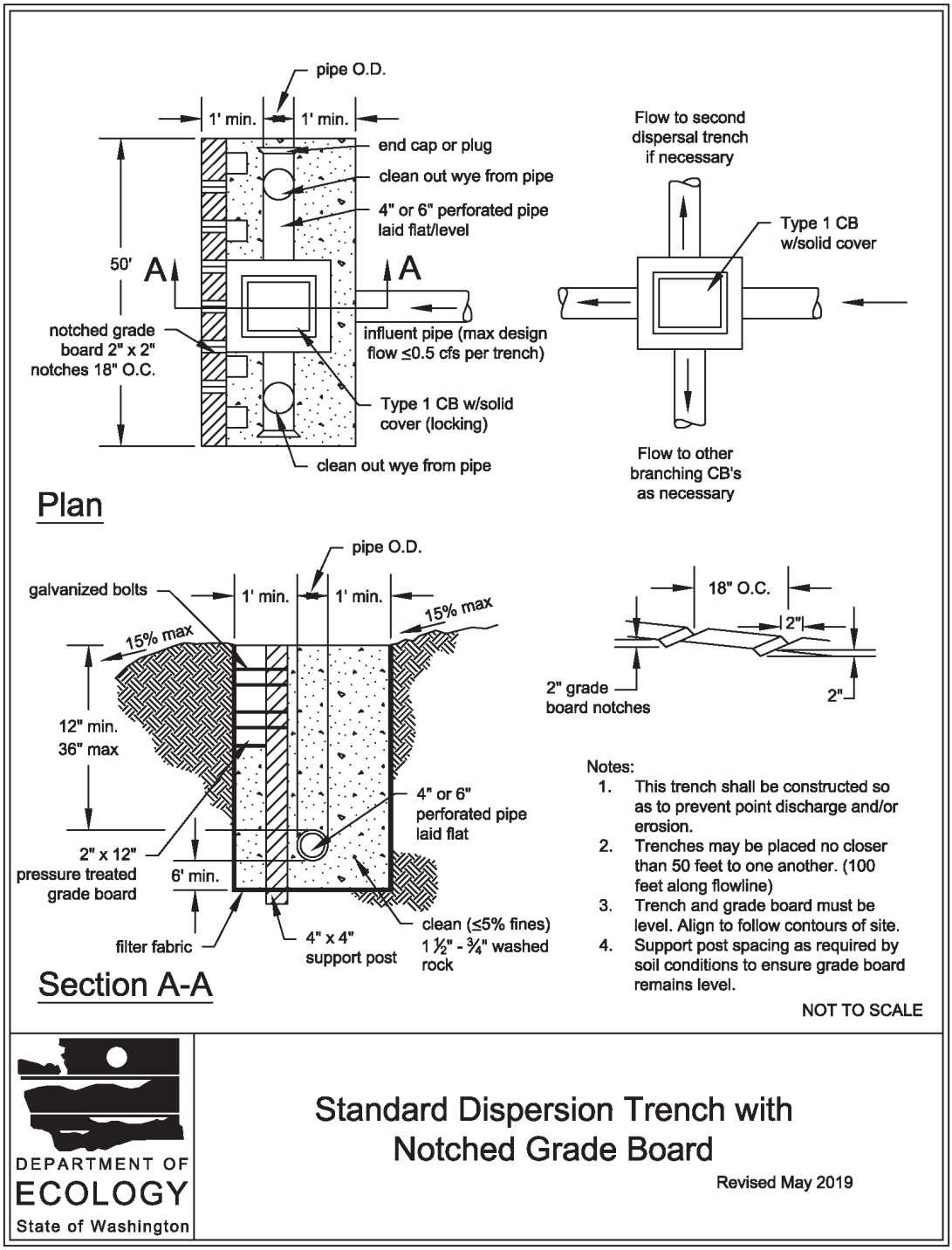


Figure V-4.6: Typical Downspout Splashblock Dispersion

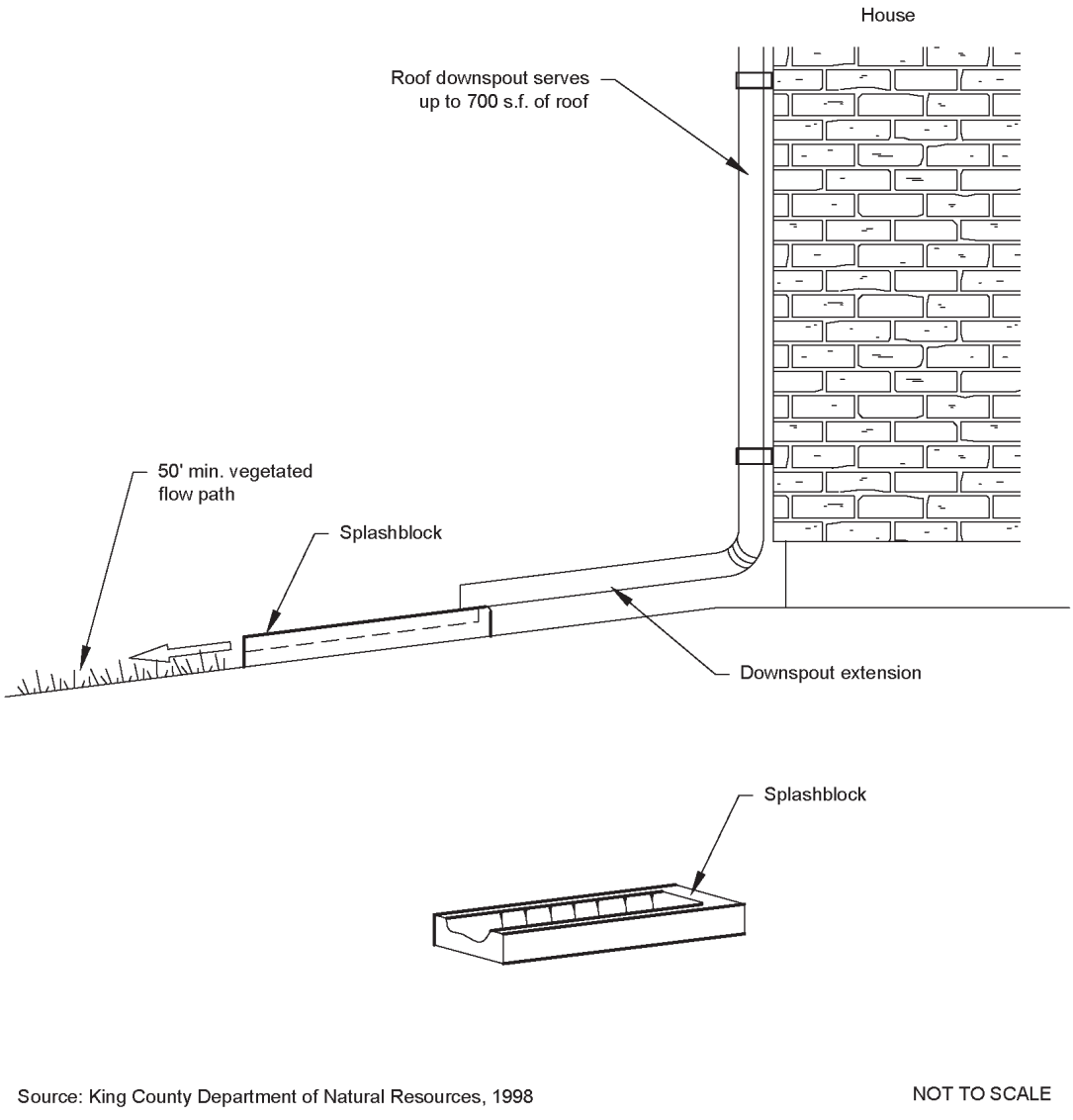


Figure V-4.7: Perforated Stub-Out Connection

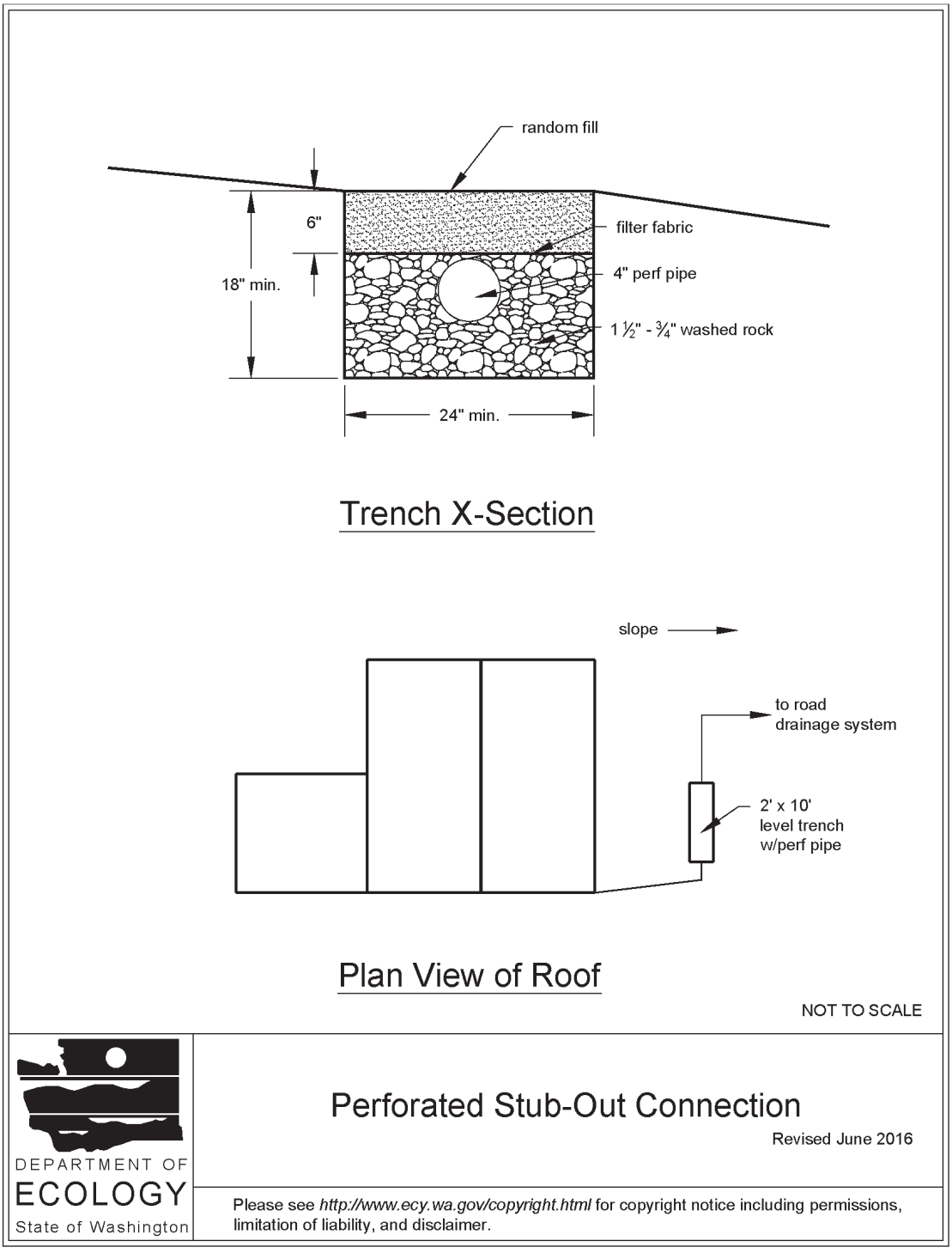


Figure V-5.4: Typical Infiltration Pond/Basin

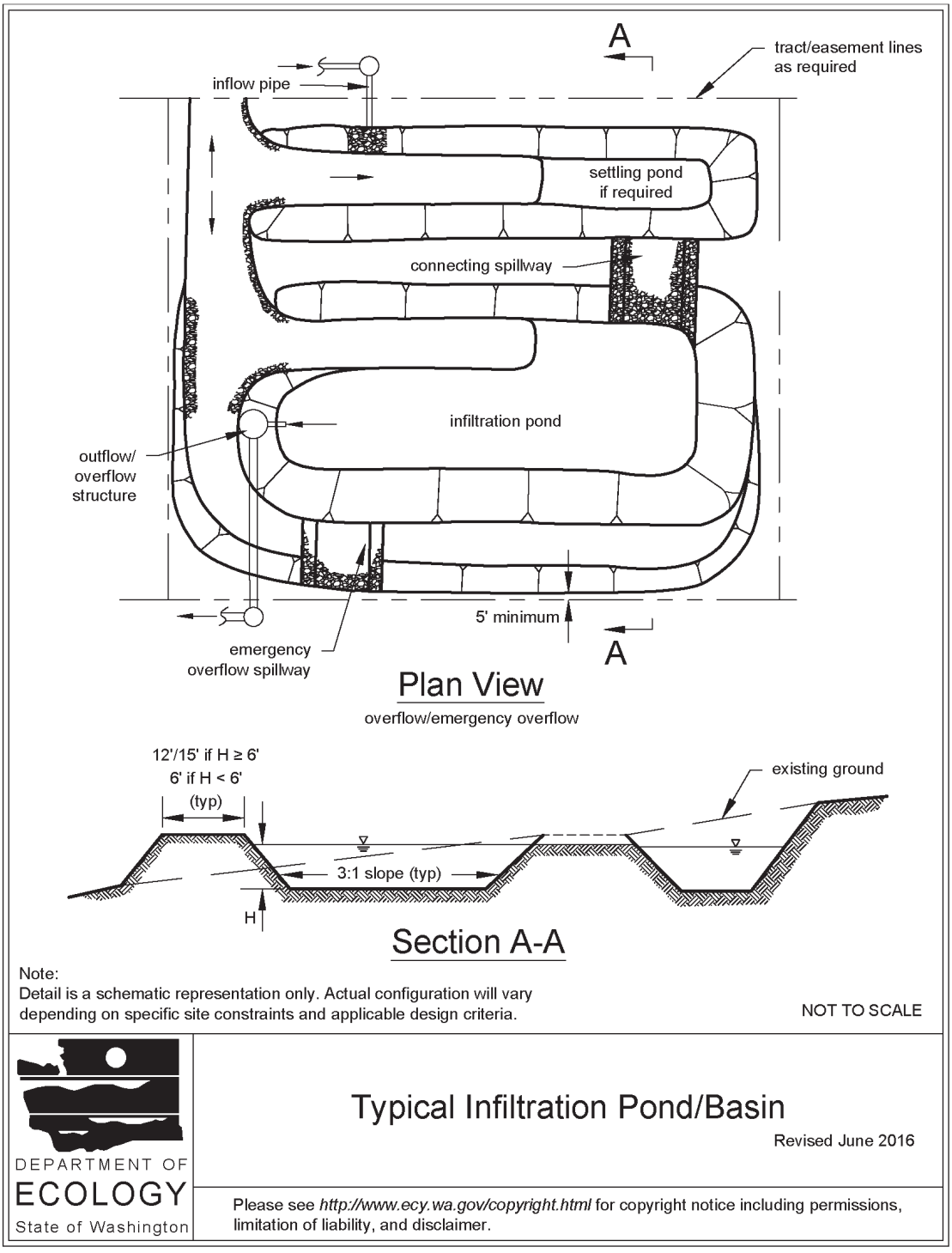


Figure V-5.12: Typical Bioretention

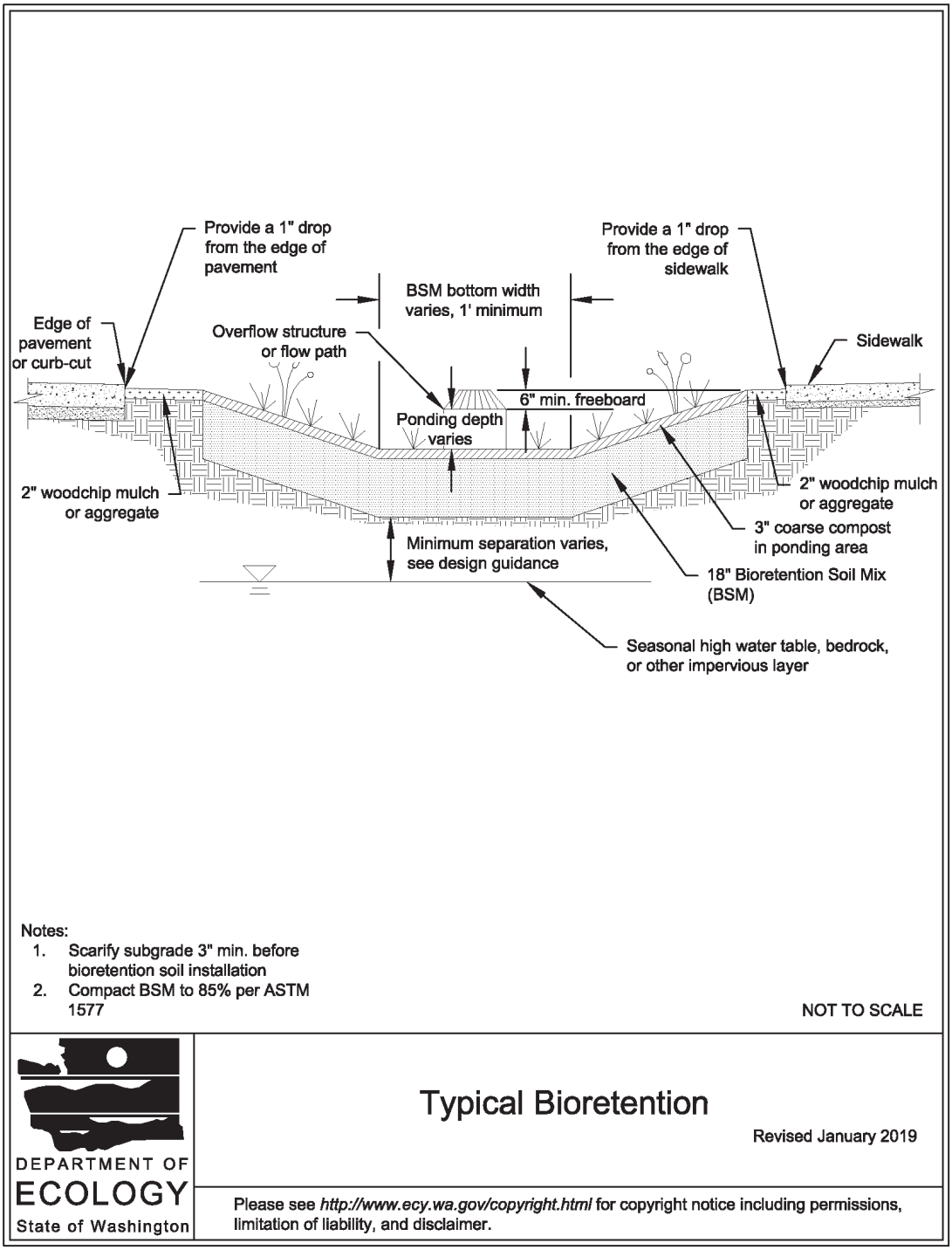
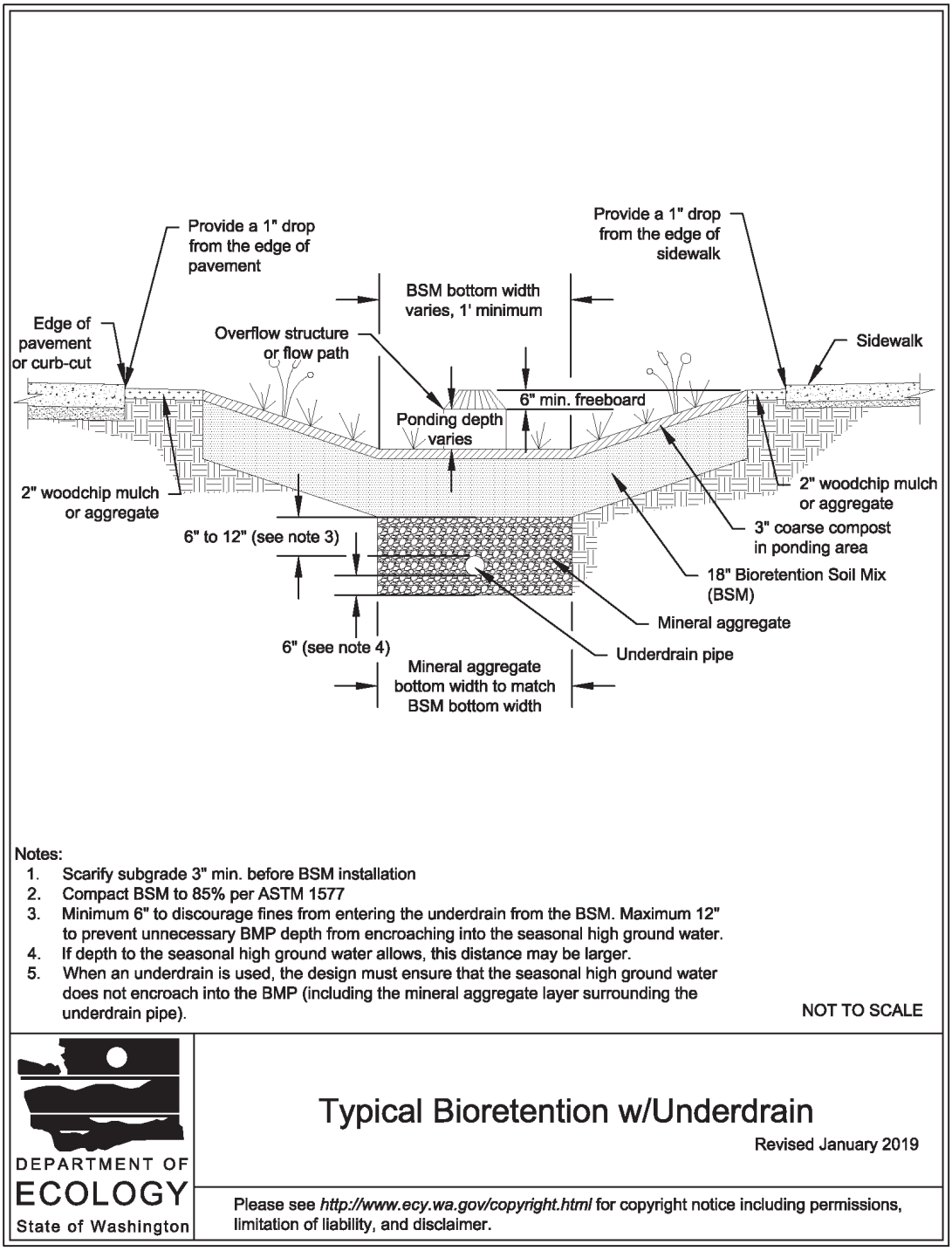


Figure V-5.13: Typical Bioretention w/Underdrain



Notes:
1. Scarify subgrade 3" min. before BSM installation
2. Compact BSM to 85% per ASTM 1577
3. Minimum 6" to discourage fines from entering the underdrain from the BSM. Maximum 12" to prevent unnecessary BMP depth from encroaching into the seasonal high ground water.
4. If depth to the seasonal high ground water allows, this distance may be larger.
5. When an underdrain is used, the design must ensure that the seasonal high ground water does not encroach into the BMP (including the mineral aggregate layer surrounding the underdrain pipe).

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Typical Bioretention w/Underdrain

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Figure V-5.14: Typical Bioretention w/Liner (Not LID)

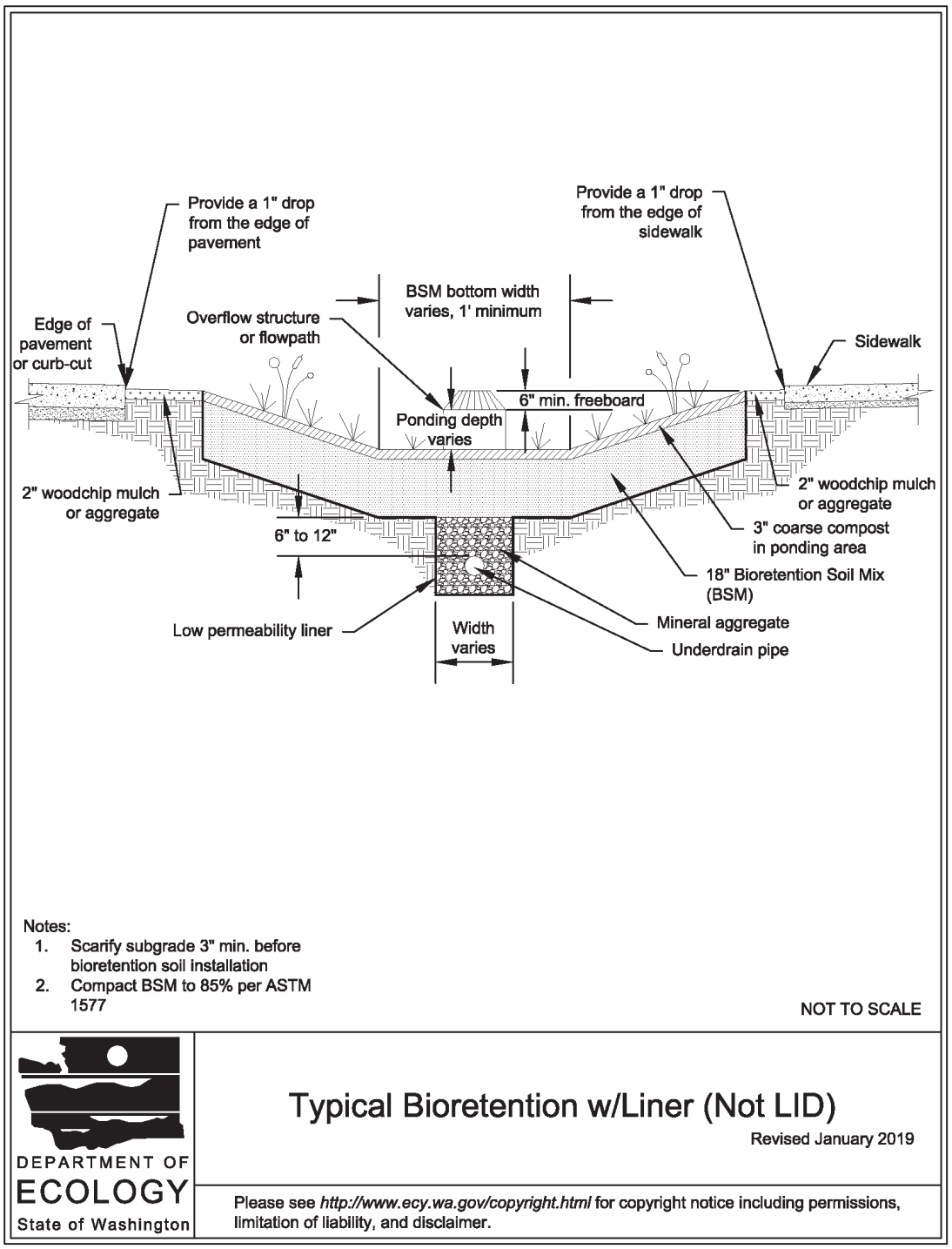
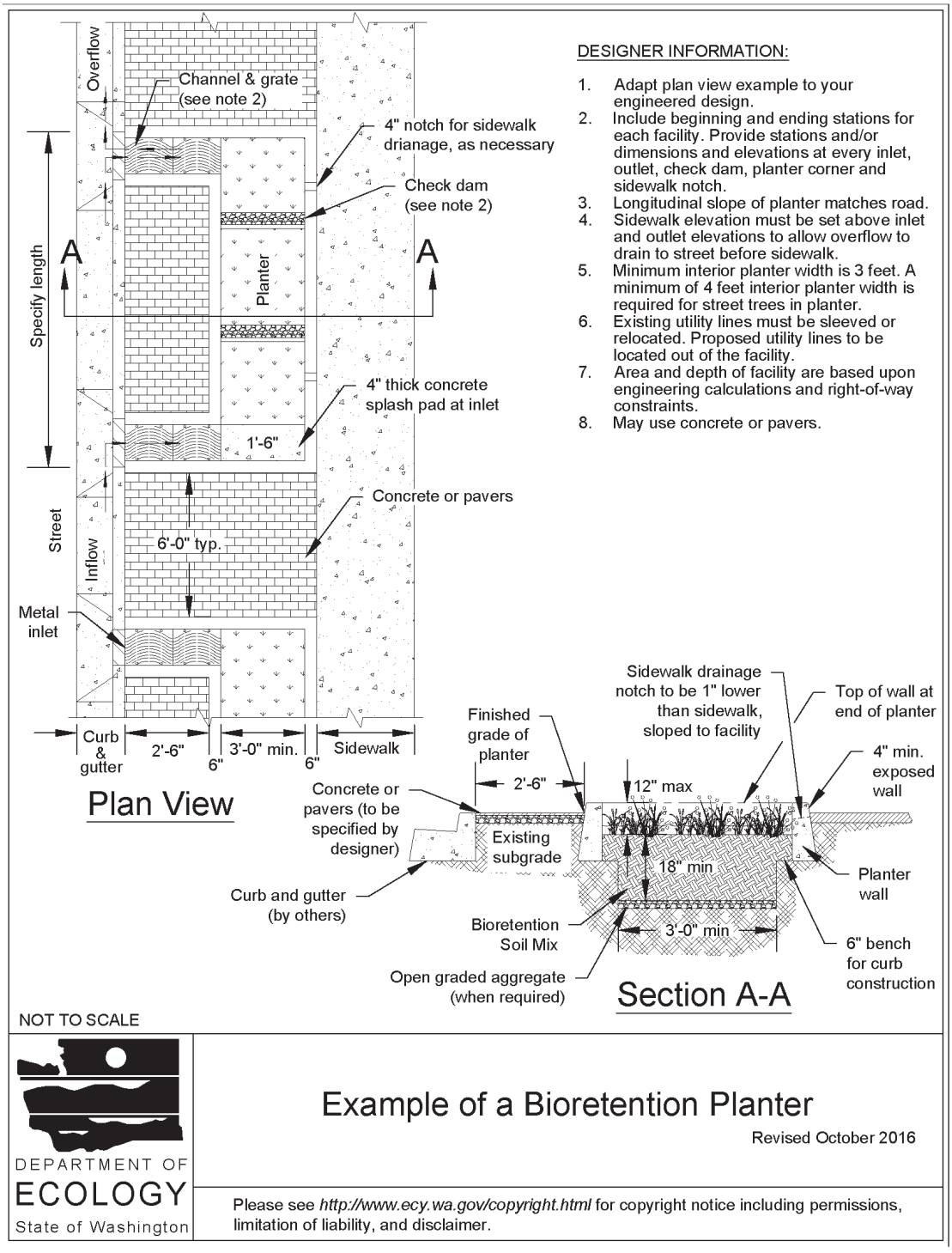


Figure V-5.15: Example of a Bioretention Planter



Appendix B:
Suitable Downspout Disconnection Locations, Recommended BMPs, and ROM Cost Estimates

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Table B-1: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Ault Field
Investigation conducted from 8/1/2023 to 8/4/2023

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench W = Dry Well K = Splash Block D = Dispersion Trench S = Bioretention Swale P = Bioretention Planter/Box R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
103	Infiltration Trench	**I**	**350**	**LF**	**$ 42,000**	**$ 4,000**
		K	1	EA	$ 150	$ -
1111	Splash Block	**K**	**3**	**EA**	**$ 450**	**$ -**
117	Infiltration Trench	**I**	**300**	**LF**	**$ 36,000**	**$ 3,000**
		K	1	EA	$ 150	$ -
		D	50	LF	$ 7,500	$ 2,000
2546	Splash Block	**K**	**2**	**EA**	**$ 300**	**$ -**
2556	Infiltration Trench	**I**	**175**	**LF**	**$ 21,000**	**$ 3,000**
2547	Infiltration Trench	**I**	**250**	**LF**	**$ 30,000**	**$ 4,000**
		K	1	EA	$ 150	$ -
2593	Splash Block	I	140	LF	$ 16,800	$ 3,000
		K	**3**	**EA**	**$ 450**	**$ -**
2641	Splash Block	I	200	LF	$ 24,000	$ 2,000
		K	**3**	**EA**	**$ 450**	**$ -**
2644	Splash Block	I	50	LF	$ 7,500	$ 2,000
		K	**2**	**EA**	**$ 300**	**$ -**
		D	50	LF	$ 7,500	$ 2,000
2670	Splash Block	I	50	LF	$ 7,500	$ 2,000
		K	**4**	**EA**	**$ 600**	**$ -**
		D	50	LF	$ 7,500	$ 2,000
2740	Splash Block	I	100	LF	$ 15,000	$ 2,000
		K	**3**	**EA**	**$ 450**	**$ -**
2765	Infiltration Trench	**I**	**85**	**LF**	**$ 12,750**	**$ 2,000**
2771	Splash Block	I	100	LF	$ 15,000	$ 2,000
		K	**4**	**EA**	**$ 600**	**$ -**
2787	Infiltration Trench	**I**	**80**	**LF**	**$ 12,000**	**$ 2,000**
2801	Splash Block	**K**	**2**	**EA**	**$ 300**	**$ -**
2802	Splash Block	I	100	LF	$ 15,000	$ 2,000
		K	**4**	**EA**	**$ 600**	**$ -**
2818	Infiltration Trench	**I**	**50**	**LF**	**$ 7,500**	**$ 2,000**
2836	Splash Block	I	80	LF	$ 12,000	$ 2,000
		K	**2**	**EA**	**$ 300**	**$ -**
2836A	Infiltration Trench	**I**	**150**	**LF**	**$ 18,000**	**$ 3,000**
2837	Infiltration Trench	**I**	**200**	**LF**	**$ 24,000**	**$ 3,000**
		K	1	EA	$ 150	$ -
2853	Splash Block	I	130	LF	$ 15,600	$ 3,000
		K	**6**	**EA**	**$ 900**	**$ -**
		D	80	LF	$ 12,000	$ 2,000
2863	Splash Block	**K**	**1**	**EA**	**$ 150**	**$ -**
2857	Splash Block	**K**	**2**	**EA**	**$ 300**	**$ -**
2884	Splash Block	I	90	LF	$ 13,500	$ 2,000
		K	**3**	**EA**	**$ 450**	**$ -**
		D	90	LF	$ 13,500	$ 2,000
2911	Dispersion Trench	I	75	LF	$ 11,250	$ 2,000
		D	**75**	**LF**	**$ 11,250**	**$ 2,000**
2923	Dispersion Trench	I	250	LF	$ 30,000	$ 3,000
		D	**250**	**LF**	**$ 30,000**	**$ 3,000**

Table B-1: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Ault Field
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
2943	Dispersion Trench	**D**	**40**	**LF**	**$ 6,000**	**$ 2,000**
		I	40	LF	$ 4,800	$ 3,000
2970	Splash Block	**K**	**5**	**EA**	**$ 750**	**$ -**
2973	Splash Block	I	150	LF	$ 18,000	$ 3,000
		K	**4**	**EA**	**$ 600**	**$ -**
2973A	Dispersion Trench	I	25	LF	$ 3,750	$ 2,000
		D	**25**	**LF**	**$ 3,750**	**$ 2,000**
3000	Splash Block	I	220	LF	$ 26,400	$ 3,000
		K	**3**	**EA**	**$ 450**	**$ -**
		D	50	LF	$ 7,500	$ 2,000
3001	Infiltration Trench	**I**	**150**	**LF**	**$ 18,000**	**$ 3,000**
3014	Infiltration Trench	**I**	**50**	**LF**	**$ 7,500**	**$ 2,000**
373	Infiltration Trench	**I**	**200**	**LF**	**$ 24,000**	**$ 3,000**
382	Infiltration Trench	**I**	**100**	**LF**	**$ 15,000**	**$ 2,000**
385	Splash Block	I	150	LF	$ 18,000	$ 3,000
		K	**3**	**EA**	**$ 450**	**$ -**
420	Splash Block	I	80	LF	$ 12,000	$ 2,000
		K	**3**	**EA**	**$ 450**	**$ -**
909	Infiltration Trench	**I**	**60**	**LF**	**$ 9,000**	**$ 2,000**
911	Infiltration Trench	**I**	**225**	**LF**	**$ 27,000**	**$ 3,000**
912	Dispersion Trench	I	25	LF	$ 3,750	$ 2,000
		D	**25**	**LF**	**$ 3,750**	**$ 2,000**
917	Infiltration Trench	**I**	**20**	**LF**	**$ 3,000**	**$ 2,000**
919	Infiltration Trench	**I**	**50**	**LF**	**$ 7,500**	**$ 2,000**
923	Infiltration Trench	**I**	**80**	**LF**	**$ 12,000**	**$ 2,000**
925	Infiltration Trench	**I**	**80**	**LF**	**$ 12,000**	**$ 2,000**
926	Infiltration Trench	**I**	**200**	**LF**	**$ 24,000**	**$ 3,000**
928	Infiltration Trench	**I**	**100**	**LF**	**$ 15,000**	**$ 2,000**
975	Splash Block	I	100	LF	$ 15,000	$ 2,000
		K	**2**	**EA**	**$ 300**	**$ -**
976	Splash Block	I	370	LF	$ 37,000	$ 4,000
		K	**8**	**EA**	**$ 1,200**	**$ -**
		D	300	LF	$ 36,000	$ 3,000
994	Infiltration Trench	**I**	**200**	**LF**	**$ 24,000**	**$ 3,000**
995D	Infiltration Trench	**I**	**60**	**LF**	**$ 9,000**	**$ 2,000**
R-118	Splash Block	**K**	**2**	**EA**	**$ 300**	**$ -**
R-80	Splash Block	**K**	**2**	**EA**	**$ 300**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench, W = Dry Well, K = Splash Block, D = Dispersion Trench, S = Bioretention Swale, P = Bioretention Planter/Box, R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1007	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1010	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1011	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1013	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1015	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1016	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**2**	**EA**	**$ 170**	**$ -**
1017	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1018	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1019	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1020	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1021	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1022	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1023	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1024	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**2**	**EA**	**$ 170**	**$ -**
1025	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1026	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**2**	**EA**	**$ 170**	**$ -**
1027	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1029	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1031	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1032	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1033	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1034	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1037	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1038	Splash Block	R	250	SF	$ 6,300	$ 4,500
		K	**4**	**EA**	**$ 340**	**$ -**
1039	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1041	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1042	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1043	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1045	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1046	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1047	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1048	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1049	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1050	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1051	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1053	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1054	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1055	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1056	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1057	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1060	Splash Block	R	250	SF	$ 6,300	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1068	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	250	SF	$ 6,300	$ 4,500
1070	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
1071	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
1074	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**2**	**EA**	**$ 170**	**$ -**
1078	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**1**	**EA**	**$ 85**	**$ -**
1086	Splash Block	**K**	**6**	**EA**	**$ 510**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1088	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**6**	**EA**	**$ 510**	**$ -**
1089	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	250	SF	$ 6,300	$ 4,500
1090	Splash Block	**K**	**6**	**EA**	**$ 510**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
1091	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1092 MTE	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1092 PIL	Splash Block	**K**	**6**	**EA**	**$ 510**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1093	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1095	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1096	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1097	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1099	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1100	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1101	Splash Block	R	250	SF	$ 6,300	$ 4,500
		K	**1**	**EA**	**$ 85**	**$ -**
1103	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1104	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**4**	**EA**	**$ 340**	**$ -**
1105	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**4**	**EA**	**$ 340**	**$ -**
1107	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**4**	**EA**	**$ 340**	**$ -**
1110	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**4**	**EA**	**$ 340**	**$ -**
1111	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	350	SF	$ 8,800	$ 4,500
1112	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1113	Splash Block	R	350	SF	$ 8,800	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1115	Splash Block	R	350	SF	$ 8,800	$ 4,500
		K	**4**	**EA**	**$ 340**	**$ -**
1116	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1117	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	350	SF	$ 8,800	$ 4,500
1118	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1119	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	350	SF	$ 8,800	$ 4,500
1120	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1123	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	350	SF	$ 8,800	$ 4,500
1124	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1126	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1127	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	350	SF	$ 8,800	$ 4,500
1128	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1129	Splash Block	R	350	SF	$ 8,800	$ 4,500
		K	**4**	**EA**	**$ 340**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1131	Splash Block	R	350	SF	$ 8,800	$ 4,500
		K	**4**	**EA**	**$ 340**	**$ -**
1132	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1133	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	350	SF	$ 8,800	$ 4,500
1135	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	350	SF	$ 8,800	$ 4,500
1137	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1138	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1139	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	350	SF	$ 8,800	$ 4,500
1140	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1141	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
1143	Splash Block	R	350	SF	$ 8,800	$ 4,500
		K	**4**	**EA**	**$ 340**	**$ -**
1145	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1146	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1147	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1148	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1149	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		K	**2**	**EA**	**$ 170**	**$ -**
1151	Splash Block	R	250	SF	$ 6,300	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1152	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1153	Splash Block	R	250	SF	$ 6,300	$ 4,500
		K	**2**	**EA**	**$ 170**	**$ -**
1156	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1157	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**4**	**EA**	**$ 340**	**$ -**
1159	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1160	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1161	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1163	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1164	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1165	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1167	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1169	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1170	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1171	Splash Block	R	600	SF	$ 16,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
1172	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1173	Splash Block	R	500	SF	$ 16,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
1174	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1175	Splash Block	R	600	SF	$ 16,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
1176	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1200	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1201	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**2**	**EA**	**$ 170**	**$ -**
1203	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**2**	**EA**	**$ 170**	**$ -**
1204	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	250	SF	$ 6,300	$ 4,500
1205	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**2**	**EA**	**$ 170**	**$ -**
1207	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**2**	**EA**	**$ 170**	**$ -**
1208	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1209	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1211	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1212	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1213	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1214	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1215	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1216	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
1218	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1219	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1220	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1221	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1223	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1224	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1225	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1227	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1228	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1229	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1231	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1233	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1234	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1235	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1236	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1237	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1238	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1239	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1240	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1241	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1243	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1244	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**2**	**EA**	**$ 170**	**$ -**
1249	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**3**	**EA**	**$ 255**	**$ -**
1251	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1253	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1254	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1255	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1256	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1257	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1258	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1259	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1260	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1261	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1263	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1265	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1300	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1301	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1302	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1303	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1304	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1305	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1306	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1307	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1308	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1309	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1310	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1312	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1313	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1314	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1315	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1316	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1317	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1318	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1319	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1321	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1323	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1325	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1327	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1328	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1329	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1330	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1331	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1332	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1333	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1335	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1336	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1337	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1339	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1340	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1341	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1342	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1343	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1344	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1345	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1346	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1347	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1348	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1349	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1350	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1351	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1353	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1354	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1355	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1357	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1358	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1359	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1361	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1363	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1364	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1365	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1367	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1368	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1369	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1370	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1371	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1372	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1373	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1374	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1375	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1376	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1377	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1378	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1379	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1380	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1381	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1383	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1384	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1385	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1386	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1387	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1388	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1389	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1390	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1391	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1400	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1401	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1402	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1403	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1404	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1405	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1407	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1409	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1410	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1411	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1412	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1413	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1415	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1416	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1417	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1418	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1419	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1420	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	125	SF	$ 3,900	$ 3,500
1421	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1422	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1423	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1425	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1427	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1428	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1429	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1430	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1431	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1432	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1433	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1435	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1436	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1437	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1438	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench, W = Dry Well, K = Splash Block, D = Dispersion Trench, S = Bioretention Swale, P = Bioretention Planter/Box, R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1439	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1440	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1441	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1443	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1444	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1445	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1446	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1448	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1449	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1450	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1451	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1452	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1454	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1456	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1457	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1458	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1459	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1462	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1463	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1464	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1465	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1466	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1467	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1468	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1469	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1470	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1471	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1472	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1473	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1474	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1475	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1476	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1477	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1478	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1479	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1480	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1481	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1482	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1483	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1485	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1487	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1488	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1489	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1490	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1491	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1492	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1493	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	75	SF	$ 2,300	$ 3,500
1499	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	75	SF	$ 2,300	$ 3,500
1528	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
1530	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1532	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1534	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1535	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
	Splash Block	R	150	SF	$ 4,700	$ 3,500
1536	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
1538	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	150	SF	$ 4,700	$ 3,500
1542	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
1552	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	250	SF	$ 6,300	$ 4,500
1556	Splash Block	R	250	SF	$ 6,300	$ 4,500
		K	**2**	**EA**	**$ 170**	**$ -**
1560	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1561	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1562	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1563	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1565	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1566	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1567	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1568	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1569	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1570	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1571	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1572	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1574	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1575	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1576	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1577	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1578	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1600	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1601	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1602	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1604	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1605	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1606	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1607	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1608	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1609	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1610	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1611	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1613	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1614	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1615	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1616	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1617	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1619	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1620	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1621	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1623	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1625	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1627	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1628	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1630	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1631	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1632	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1633	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1634	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1635	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1637	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1640	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1641	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1643	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1645	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1646	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1647	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1648	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1649	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1650	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1651	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1653	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1655	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1657	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1658	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1659	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1660	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1661	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1662	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1663	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1664	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1665	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1666	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1667	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1669	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1670	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1671	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1673	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1674	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1675	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1677	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1678	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1679	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1680	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1681	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1682	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1683	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1685	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1686	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1687	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1688	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1689	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1690	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1691	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1692	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1693	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1700	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1701	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1702	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1703	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1704	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1705	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1706	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1707	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1708	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1709	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1710	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1711	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1712	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1713	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1714	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1715	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1720	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1721	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1722	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1723	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1724	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1725	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1791	Splash Block	R	250	SF	$ 6,300	$ 4,500
		K	**1**	**EA**	**$ 85**	**$ -**
1797	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
1809	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
1810	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1812	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1813	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
1891	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1899	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
1901	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1902	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1903	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1904	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
1905	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1906	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
1911	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	200	SF	$ 6,200	$ 3,500

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
1914	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	100	SF	$ 3,100	$ 3,500
1917	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
1918	Splash Block	R	100	SF	$ 3,100	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
1920	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	100	SF	$ 3,100	$ 3,500
1928	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	300	SF	$ 7,500	$ 4,500
2004ED	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
2006	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2008	Splash Block	R	150	SF	$ 4,700	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
2012	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
2015E	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
2017E	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
2019E	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
2020	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2021	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2027	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2049	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
2051	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
2052	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**5**	**EA**	**$ 425**	**$ -**
2053	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
21	Infiltration Trench	**I**	**200**	**FT**	**$ 24,000**	**$ 3,000**
		K	2	EA	$ 170	$ -
		P	70	LF	$ 28,000	$ 10,000
2104	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**4**	**EA**	**$ 340**	**$ -**
2106	Splash Block	R	600	SF	$ 12,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
2108	Splash Block	R	600	SF	$ 12,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
2127	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
2130	Splash Block	R	600	SF	$ 12,000	$ 6,300
		K	**3**	**EA**	**$ 255**	**$ -**
2142	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**2**	**EA**	**$ 170**	**$ -**
2150	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
2208	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
2210	Splash Block	R	300	SF	$ 7,500	$ 4,500
		K	**4**	**EA**	**$ 340**	**$ -**
2211	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
2214	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2220	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
2300	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2313	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2314	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2316	Splash Block	R	400	SF	$ 8,800	$ 5,000
		K	**6**	**EA**	**$ 510**	**$ -**
2320	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2325	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2326	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2328	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
2334	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2336	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
2340	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2341	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
2342	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2344	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2346	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
2347	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2348	Splash Block	**K**	**6**	**EA**	**$ 510**	**$ -**
		R	400	SF	$ 18,000	$ 6,300
2356OS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2358OS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	100	SF	$ 3,100	$ 3,500
2372	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2372OS	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
2373OS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
2374OS	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
2379OS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
2381OS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
2387OS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
2388OS	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
2389OS	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
2390OS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2402OS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2403OS	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
2410	Splash Block	**K**	**5**	**EA**	**$ 425**	**$ -**
2412	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**4**	**EA**	**$ 340**	**$ -**
2414	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
2415	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2418	Splash Block	R	400	SF	$ 14,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
2429	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
2431	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
2432	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	100	SF	$ 3,100	$ 3,500
2433	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
2679	Rain Garden	**R**	**150**	**SF**	**$ 4,700**	**$ 3,500**
		I	40	FT	$ 6,000	$ 2,000
2789	Infiltration Trench	**I**	**100**	**FT**	**$ 12,000**	**$ 3,000**
2826	Infiltration Trench	S	175	SF	$ 52,500	$ 15,000
		P	175	LF	$ 61,300	$ 15,000
		I	**300**	**FT**	**$ 30,000**	**$ 4,000**
2828	Splash Block	**K**	**1**	**EA**	**$ 150**	**$ -**
2874	Dispersion Trench	S	180	SF	$ 54,000	$ 15,000
		D	**180**	**FT**	**$ 21,600**	**$ 3,000**
		K	4	EA	$ 600	$ -
		I	180	FT	$ 21,600	$ 3,000
2875	Splash Block	**K**	**2**	**EA**	**$ 300**	**$ -**
2887	Splash Block	I	375	FT	$ 37,500	$ 4,000
		K	**12**	**EA**	**$ 1,800**	**$ -**
		S	375	SF	$ 93,800	$ 20,000
2918	Splash Block	W	3	EA	$ 45,000	$ 3,000
		K	**12**	**EA**	**$ 1,800**	**$ -**
		S	120	SF	$ 36,000	$ 15,000
		I	100	FT	$ 12,000	$ 3,000
		P	100	LF	$ 40,000	$ 10,000
2926	Infiltration Trench	P	170	LF	$ 59,500	$ 15,000
		S	115	SF	$ 34,500	$ 15,000
		I	**325**	**FT**	**$ 32,500**	**$ 4,000**
		W	2	EA	$ 30,000	$ 3,000

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
300	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**3**	**EA**	**$ 255**	**$ -**
303	Splash Block	**K**	**2**	**EA**	**$ 170**	**$ -**
		R	400	SF	$ 8,800	$ 5,000
318	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
321	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
700	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
701	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
702	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
703	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
705	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
707	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
708	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
709	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
710	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
711	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
712	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
713	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
714	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
715	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
716	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
717	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
718	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
719	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
720	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
721	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench* *W = Dry Well* *K = Splash Block* *D = Dispersion Trench* *S = Bioretention Swale* *P = Bioretention Planter/Box* *R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
722	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
723	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
724	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
725	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
727	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
728	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
729	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
730	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
731	Splash Block	R	500	SF	$ 10,000	$ 6,300
		K	**4**	**EA**	**$ 340**	**$ -**
733	Splash Block	**K**	**4**	**EA**	**$ 340**	**$ -**
		R	500	SF	$ 10,000	$ 6,300
772ECS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	200	SF	$ 6,200	$ 3,500
773ECS	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
783ECS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
785ECS	Splash Block	R	350	SF	$ 8,800	$ 4,500
		K	**3**	**EA**	**$ 255**	**$ -**
798ECS	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
800	Splash Block	**K**	**6**	**EA**	**$ 900**	**$ -**
802	Splash Block	**R**	**300**	**SF**	**$ 7,500**	**$ 4,500**
		K	**2**	**EA**	**$ 300**	**$ -**
CN1050	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
	Splash Block	R	400	SF	$ 8,800	$ 5,000
CN1056	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
CN1061	Splash Block	R	200	SF	$ 6,200	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
CN1086	Splash Block	R	150	SF	$ 4,700	$ 3,500
		K	**2**	**EA**	**$ 170**	**$ -**
CN1171	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
CN1173	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
CN1175	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
CN120	Splash Block	R	100	SF	$ 3,100	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**
CN1416	Splash Block	R	100	SF	$ 3,100	$ 3,500
		K	**1**	**EA**	**$ 85**	**$ -**

Table B-2: Locations Suitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Recommended BMP	Suitable BMP(s) *I = Infiltration Trench, W = Dry Well, K = Splash Block, D = Dispersion Trench, S = Bioretention Swale, P = Bioretention Planter/Box, R = Rain Garden*	Installation Quantity	Installation Units	Total Installation Cost	10-Year O&M Cost (2024 $USD)
CN1417	Splash Block	R	125	SF	$ 3,900	$ 3,500
		K	**2**	**EA**	**$ 170**	**$ -**
CN1419	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	225	SF	$ 5,600	$ 4,500
CN1427	Splash Block	R	75	SF	$ 2,300	$ 3,500
		K	**2**	**EA**	**$ 170**	**$ -**
CN1431	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	75	SF	$ 2,300	$ 3,500
CN1563	Splash Block	R	250	SF	$ 6,300	$ 4,500
		K	**1**	**EA**	**$ 85**	**$ -**
CN1564	Splash Block	**K**	**3**	**EA**	**$ 255**	**$ -**
		R	250	SF	$ 6,300	$ 4,500
CN1566	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**
		R	250	SF	$ 6,300	$ 4,500
CN1574	Splash Block	**K**	**1**	**EA**	**$ 85**	**$ -**

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Appendix C:
Locations Unsuitable for Downspout Disconnection

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Table C-1: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Ault Field
Investigation conducted from 8/1/2023 to 8/4/2023

Facility Number	Disconnection Unsuitability Explanation
100	Already drains to landscaping.
108	Already drains to landscaping.
118	May drain west to infiltration galley, surrounded by pavement.
124	Surrounded by pavement.
128	Already drains to landscaping.
130	Already drains to landscaping.
135	Already drains to landscaping.
135TWR	Not a building.
137	Not a building.
138	Already drains to landscaping.
158	Not a building.
189	Already drains to landscaping.
198	Already drains to landscaping.
200122	Not a building.
201427	Not a building, storage yard.
201431	Not a building, storage yard.
201493	Not a building, storage yard.
201692TWRS	Not a building.
201706	Not a building, pipeline.
201802	Not a building, weather meter.
201935	Not a building.
202784	Not a building.
202795-A	Already drains to landscaping.
202810	Not a building.
203073	Not a building.
203294	Not a building.
203324	Not a building.
203324	Duplicate.
206	Already drains to landscaping.
219	Surrounded by pavement.
2510	No external downspouts.
2524	Already drains to landscaping.
2524UPS	Already drains to landscaping.
2525A	Not a building.
2527	No external downspouts.
2542	Surrounded by pavement.
2544	Surrounded by pavement, No external downspouts.
2544-F	Surrounded by pavement.
2547-A	Surrounded by pavement.
2547-B	Surrounded by pavement.
2548	Already drains to landscaping.
2548A	Already drains to landscaping.

Table C-1: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Ault Field
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2549	Surrounded by pavement.
2551	Surrounded by pavement.
2555	Already drains to landscaping.
2557	Already drains to landscaping.
2558	Already drains to landscaping.
2561	Already drains to landscaping.
2563	Already drains to landscaping.
2564	Most drains to landscaping.
2565	Surrounded by pavement. Adjacent landscaping is small and steep.
2565-A	Surrounded by pavement. Adjacent landscaping is small and steep.
2565-B	Surrounded by pavement. Adjacent landscaping is small and steep.
2577	Already drains to landscaping.
2578	Already drains to landscaping.
2579	Already drains to landscaping.
2580	Already drains to landscaping.
2581	Already drains to landscaping.
2583	Already drains to landscaping.
2583-5	Already drains to landscaping.
2584	Already drains to landscaping on west, surrounded by pavement on other sides.
2595	Surrounded by pavement.
2595A	Already drains to landscaping.
2596	Already drains to landscaping.
2605	Already drains to landscaping.
2614	Already drains to landscaping.
262	Already drains to landscaping.
2622	Not a building, AST.
2623	Not a building, AST.
2625	Not a building, AST.
2626	Not a building, AST.
2631	Already drains to landscaping.
2632	Already drains to landscaping.
2636	Already drains to landscaping.
2642	Surrounded by pavement.
2643	Surrounded by pavement.
2645	Already drains to landscaping.
2646	Already drains to landscaping.
2647	Already drains to landscaping.
2664-TOWER	Not a building, already drains to landscaping.
2665	Already drains to landscaping.
2670A	Already drains to landscaping.
2678	Already drains to landscaping.
2680	Already drains to landscaping.

Table C-1: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Ault Field
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2681	Surrounded by pavement.
2681-F	Already drains to landscaping.
2699	Landscaping is too narrow. Otherwise surrounded by pavement.
2700	Already drains to landscaping.
2700A	Already drains to landscaping.
2700B	Already drains to landscaping.
2700C	Already drains to landscaping.
2701	Building under construction.
2702	Not a building, gas pump.
2702-A	Gas station canopy.
2702-B	Already drains to landscaping.
2703	Already drains to landscaping.
2708	Already drains to landscaping.
2710-B	Already drains to landscaping.
2714	Landscaping is too narrow. Otherwise surrounded by pavement.
2717	Not a building, bunker.
2718	Not a building, bunker.
2719	Not a building, bunker.
2720	Not a building, bunker.
2721	Not a building, bunker.
2722	Not a building, bunker.
2723	Not a building, bunker.
2724	Not a building, bunker.
2725	Not a building, bunker.
2726	Not a building, bunker.
2727	Not a building, bunker.
2728	Already drains to landscaping.
2729	Already drains to landscaping.
2730	Already drains to landscaping.
2731	Ground graded towards road and not feasible to add a gutter.
2733	Surrounded by pavement.
2734	Surrounded by pavement.
2737	Surrounded by pavement.
2737-F	Surrounded by pavement.
2738	Elevated slope around building that prevents infiltration away from building.
2739	Already drains to landscaping.
2743	Already drains to landscaping.
2746	Already drains to landscaping.
2747	Already drains to landscaping.
2749	No external downspouts.
2750	Already drains to landscaping.
2753	No space on east.
2757	Already drains to landscaping.
2758	Already drains to landscaping.
2758-A	Already drains to landscaping.
2759	Already drains to landscaping.
2761	Already drains to landscaping.
2762	Already drains to landscaping.
2766	Surrounded by pavement.

Table C-1: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Ault Field
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2767	Already drains to landscaping.
2768	Surrounded by pavement.
2769	Adverse slope towards building on three sides. Utilities and monitoring wells on west side.
2770	Already drains to landscaping.
2772	Surrounded by pavement.
2777	Already drains to landscaping.
2781	Already drains to landscaping.
2787-F	Already drains to landscaping.
2788-TOWER	Not a building.
2790	Already drains to landscaping.
2791	Already drains across pavement to landscaping.
2793	Already drains to landscaping.
2794	Utility conflicts in landscaping.
2796	Already drains to landscaping.
2804	Not a building.
2805	Not a building.
2806	Not a building.
2808	Not a building.
281	Already drains to landscaping.
2811	Already drains to landscaping.
2815	Already drains to landscaping.
2818-F	Surrounded by pavement.
2820	Already drains to landscaping.
2836-F	Surrounded by pavement.
2838	Infiltration or grading not recommended since this is a superfund site.
284	Already drains to landscaping.
2848	Surrounded by pavement.
285	Surrounded by pavement and steep terrain.
2850	Already drains to landscaping.
2854	Surrounded by pavement.
2855	Under cover.
2856	Under cover.
2858	Under cover.
2859	Already drains to landscaping.
2861	Surrounded by pavement.
2862	Under cover.
2864	Under canopy.
2865	Under canopy.
2867	Already drains to landscaping.
2868	Surrounded by pavement.
2869	Surrounded by pavement.
2871	Already drains to landscaping.
2872	Already drains to landscaping.
2872-L1	Not a building, fuel pump.
2872-L2	Not a building, fuel pump.
2872-L3	Not a building, fuel pump.
2872-L4	Not a building, fuel pump.
2872-T1	Not a building, AST.
2872-T2	Not a building, AST.
2872-T3	Not a building, AST.

Table C-1: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Ault Field
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2873	Surrounded by pavement.
2876	Already drains to landscaping.
2877	Already drains to landscaping.
2878	Already drains to landscaping.
2885	Already drains to landscaping.
2886	Already drains to landscaping.
2888	Surrounded by pavement.
2889	Surrounded by pavement.
2890	Surrounded by pavement.
2891	Already drains to landscaping.
2892	Surrounded by pavement.
2897	Surrounded by pavement.
2898	Surrounded by pavement.
2899	Surrounded by pavement.
2900	Surrounded by pavement.
2901	Not a building, bunker.
2903	Surrounded by pavement.
2905	Surrounded by pavement.
2906	Surrounded by pavement.
2907	Surrounded by pavement.
2910	East side already drains to landscaping.
2910-T1	Not a building, AST.
2910-T2	Not a building, AST.
2910-T3	Not a building, AST.
2910-T4	Not a building, AST.
2912	Not a building, fuel pump.
2913	Not a building, fuel pump.
2913-A	Surrounded by pavement, fuel canopy.
2915	Already drains to landscaping.
2916	Already drains to landscaping.
2917	Already drains to landscaping.
2920	Already drains to landscaping.
2921	Surrounded by pavement.
2922	Already drains to landscaping.
2924	Surrounded by pavement.
2925	Surrounded by pavement.
2925-F	Already drains to landscaping.
2927	Already drains to landscaping.
2929	Not a building, AST.
2929-A	Surrounded by pavement, fuel canopy.
2929-B	Not a building, fuel pump.
2932	Already drains to landscaping.
2933	Already drains to landscaping.
2939	Surrounded by pavement, insufficient landscaping for BMP options.
2945	Already drains to landscaping.
2947	Not a building, gas pump.
2947-F	Already drains to landscaping.
2948	Not a building, gas pump.
2950	Already drains to landscaping.
2950A	Already drains to landscaping.

Table C-1: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Ault Field
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2951	Already drains to landscaping.
2952	Surrounded by pavement.
2954	Already drains to landscaping.
2955	Already drains to landscaping.
2956	Already drains to landscaping.
2957	Already drains to landscaping.
2958	Already drains to landscaping.
2959	Already drains to landscaping.
2960	Surrounded by pavement, west side too close, forest east.
2961	Not enough space for dispersion trench.
2968	Surrounded by pavement.
2973B	Not a building.
2980	Surrounded by pavement.
2981	Not a building.
2982	Surrounded by pavement.
2983	Already drains to landscaping.
2984	Surrounded by pavement.
2985	Already drains to landscaping.
2986	Lots of nearby utilities.
2987	Surrounded by pavement.
2987-F	Surrounded by pavement.
2988	Steep and small adjacent landscaping.
2990	Surrounded by pavement.
2994	Downspouts on north and south side, landscaping upgradient from building.
2995	Not a building.
2998	Insufficient landscaping available, otherwise surrounded by pavement.
2999	Already drains to landscaping.
3006	Not a building, AST.
3007	Not a building, AST.
3008	Surrounded by pavement.
3009	Already drains to landscaping.
3013	Already drains to landscaping.
337	Already drains to landscaping.
338	Already drains to landscaping.
340	Already drains to landscaping.
353	Not a building.
354	Already drains to landscaping.
368	Already drains to landscaping.
369	Surrounded by pavement.
369A	Surrounded by pavement.
371	Surrounded by pavement, no downspout near landscaping.
371-A	Already drains to landscaping.
371-B	Already drains to landscaping.
373-A	Already drains to landscaping.
373-B	Already drains to landscaping.
374	Already drains to landscaping.
375	Already drains to landscaping.
375-A	Already drains to landscaping.
376	Already drains to landscaping.
376-A	Already drains to landscaping.

Table C-1: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Ault Field
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
377	Already drains to landscaping.
377-A	Already drains to landscaping.
378	Already drains to landscaping.
378-A	Already drains to landscaping.
379	Already drains to landscaping.
379-A	Already drains to landscaping.
380	No external downspouts.
381	No external downspouts.
384	No external downspouts.
386	Surrounded by pavement.
386-F	Surrounded by pavement.
390BLDG	Already drains to landscaping.
410	Surrounded by pavement.
410-F	Surrounded by pavement.
415	Already drains to landscaping.
421	No external downspouts.
423	Already drains to landscaping, downspout ponds against building.
424	Not a building, bunker.
425	Not a building, bunker.
430	Already drains to landscaping.
462	Already drains to landscaping.
463	Already drains to landscaping.
464	Already drains to landscaping.
465	Already drains to landscaping.
466	Already drains to landscaping.
469	Already drains to landscaping.
470	Already drains to landscaping.
471	Already drains to landscaping.
492	Already drains to landscaping.
494	Not a building, storage yard.
853	Already drains to landscaping.
856	Already drains to landscaping.
858	Drains across pavement to landscaping.
873	Already drains to landscaping.
874	Already drains to landscaping.
889	Already drains to landscaping.
894	No building present during site visit.
895	Already drains to landscaping.
909B	Rerouting downspouts conflicts with pedestrian/vehicle access.
911A	Rerouting downspouts conflicts with pedestrian/vehicle access.
912A	Surrounded by pavement.
913	Adverse slope towards building and landscaping too steep for BMP options.
913A	Surrounded by pavement.
913B	Rerouting downspouts conflicts with pedestrian/vehicle access.
914	Adverse slope towards building and landscaping too steep for BMP options.
914A	Rerouting downspouts conflicts with pedestrian/vehicle access.
914B	Rerouting downspouts conflicts with pedestrian/vehicle access.
915A	Rerouting downspouts conflicts with pedestrian/vehicle access.
916	Adverse slope towards building and landscaping too steep for BMP options..
917A	Rerouting downspouts conflicts with pedestrian/vehicle access.

Table C-1: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Ault Field
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
917B	Rerouting downspouts conflicts with pedestrian/vehicle access.
918	Adverse slope towards building and landscaping too steep for BMP options.
918A	Rerouting downspouts conflicts with pedestrian/vehicle access.
919A	Rerouting downspouts conflicts with pedestrian/vehicle access.
919B	Rerouting downspouts conflicts with pedestrian/vehicle access.
920	Adverse slope towards building and landscaping too steep for BMP options.
920-1ST	No building present during site visit.
923A	Rerouting downspouts conflicts with pedestrian/vehicle access.
923B	Rerouting downspouts conflicts with pedestrian/vehicle access.
925A	Rerouting downspouts conflicts with pedestrian/vehicle access.
925B	Rerouting downspouts conflicts with pedestrian/vehicle access.
926A	Rerouting downspouts conflicts with pedestrian/vehicle access.
926C	Rerouting downspouts conflicts with pedestrian/vehicle access.
928A	Rerouting downspouts conflicts with pedestrian/vehicle access.
928B	Rerouting downspouts conflicts with pedestrian/vehicle access.
946	East and south drain to landscaping, west is surrounded by pavement.
960	Majority already drains to landscaping.
973	No external downspouts.
985	Surrounded by pavement.
993	No external downspouts.
993A	Already drains to landscaping.
995	Surrounded by pavement.
995-F	Surrounded by pavement.
995A	Surrounded by pavement.
995C	Surrounded by pavement.
995B	Surrounded by pavement, does not drain north to landscaping.
995E	Already drains to landscaping.
B-1112	Already drains to landscaping.
COHPSBUILD	Already drains to landscaping.
OWS8-0AF	Not a building.
OWS9-0AF	Not a building, Already drains to landscaping.
R-07	Drains to pavement, unable to drain to landscaping without regrading pavement.
R-111	Already drains to landscaping.
R-112	Already drains to landscaping.
R-14	Already drains to landscaping.
R-17	Not a building, storage yard.
R-18	Surrounded by pavement.
R-25	Graded towards runway, infeasible to route to landscaping.
R-27	Surrounded by pavement.
R-3002	Surrounded by pavement.
R-43	Surrounded by pavement.
R-45	Surrounded by pavement.
R-56	Surrounded by pavement.
R-57	Surrounded by pavement.
R-81	Surrounded by pavement, can't add gutters.
R-82	Surrounded by pavement.
RH TWR	Not a building, drains to landscaping.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023

Facility Number	Disconnection Unsuitability Explanation
1001	Landscaping at downspouts graded towards adjacent house.
1003	Landscaping at downspouts graded towards adjacent house.
1005	Landscaping at downspouts graded towards adjacent house.
1006	Landscaping at downspouts graded towards adjacent house.
1008	Landscaping at downspouts graded towards adjacent house.
1009	Landscaping at downspouts graded towards adjacent house.
1058	Lots too close together for BMP options.
1059	Lots too close together for BMP options.
1061	Lots too close together for BMP options.
1062	Lots too close together for BMP options.
1063	Lots too close together for BMP options.
1065	Lots too close together for BMP options.
1066	Lots too close together for BMP options.
1067	Lots too close together for BMP options.
1069	Lots too close together for BMP options.
1073	Lots too close together for BMP options.
1075	Lots too close together for BMP options.
1077	Lots too close together for BMP options.
1079	Lots too close together for BMP options.
1080	Lots too close together for BMP options.
1081	Lots too close together for BMP options.
1083	Lots too close together for BMP options.
1084	Lots too close together for BMP options.
1085	Lots too close together for BMP options.
1087	Lots too close together for BMP options.
110	Landscaping is sloped towards building and lots too close together for BMP options.
1102	Landscaping is sloped towards building and lots too close together for BMP options.
1106	Landscaping is sloped towards building and lots too close together for BMP options.
1108	Landscaping is sloped towards building and lots too close together for BMP options.
1109	Landscaping is sloped towards building.
111	Landscaping is sloped towards building and lots too close together for BMP options.
1114	Landscaping is sloped towards building and lots too close together for BMP options.
113	Landscaping is sloped towards building and lots too close together for BMP options.
114	Landscaping is sloped towards building and lots too close together for BMP options.
12	No external downspouts.
1246	Landscaping is sloped towards building and lots too close together for BMP options.
1248	Landscaping is sloped towards building and lots too close together for BMP options.
1250	Landscaping is sloped towards building and lots too close together for BMP options.
1252	Landscaping is sloped towards building and lots too close together for BMP options.
13	No external downspouts.
1392	Landscaping is too steep and lots too close together for BMP options.
1393	Lots too close together for BMP options.
1394	Landscaping is too steep and lots too close together for BMP options.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
1395	Lots too close together for BMP options.
1396	Landscaping is too steep and lots too close together for BMP options.
1397	Lots too close together for BMP options.
1398	Landscaping is too steep and lots too close together for BMP options.
1399	Lots too close together for BMP options.
1406	Landscaping is too steep and lots too close together for BMP options.
1408	Landscaping is too steep and lots too close together for BMP options.
1414	Landscaping is too steep and lots too close together for BMP options.
1424	Landscaping is too steep and lots too close together for BMP options.
1426	Landscaping is too steep and lots too close together for BMP options.
1495	Lots too close together for BMP options.
1496	Landscaping is too steep and lots too close together for BMP options.
1497	Lots too close together for BMP options.
1498	Landscaping is too steep and lots too close together for BMP options.
1500	Landscaping is too steep and lots too close together for BMP options.
1502	Landscaping is too steep and lots too close together for BMP options.
1504	Landscaping is too steep and lots too close together for BMP options.
1506	Landscaping is too steep and lots too close together for BMP options.
1508	Landscaping is too steep and lots too close together for BMP options.
1510	Landscaping is too steep and lots too close together for BMP options.
1512	Landscaping is too steep and lots too close together for BMP options.
1514	Landscaping is too steep and lots too close together for BMP options.
1516	Landscaping is too steep and lots too close together for BMP options.
1518	Landscaping is too steep and lots too close together for BMP options.
1520	Landscaping is too steep and lots too close together for BMP options.
1522	Landscaping is too steep and lots too close together for BMP options.
1524	Landscaping is too steep and lots too close together for BMP options.
1526	Landscaping is too steep and lots too close together for BMP options.
1537	Lots too close together for BMP options.
1539	Lots too close together for BMP options.
1541	Lots too close together for BMP options.
1543	Lots too close together for BMP options.
1544	Lots too close together for BMP options.
1545	Lots too close together for BMP options.
1546	Lots too close together for BMP options.
1547	Lots too close together for BMP options.
1548	Lots too close together for BMP options.
1550	Lots too close together for BMP options.
1553	Lots too close together for BMP options.
1555	Lots too close together for BMP options.
1557	Lots too close together for BMP options.
1558	Lots too close together for BMP options.
1559	Lots too close together for BMP options.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
1561HD	Lots too close together for BMP options.
1573	Landscaping is too steep and lots too close together for BMP options.
16	No external downspouts.
17	Surrounded by pavement graded towards catch basin(s).
1792	Lots too close together for BMP options.
1793	Lots too close together for BMP options.
1794	Lots too close together for BMP options.
1795	Lots too close together for BMP options.
1796	Lots too close together for BMP options.
1798	Lots too close together for BMP options.
17A	Not a building.
18	No external downspouts.
1800	Lots too close together for BMP options.
1801	Landscaping is steep between neighboring houses.
1802	Landscaping is steep between neighboring houses.
1803	Landscaping is steep between neighboring houses.
1804	Landscaping is steep between neighboring houses.
1805	Landscaping is steep between neighboring houses.
1806	Landscaping is steep between neighboring houses.
1807	Landscaping is steep between neighboring houses.
1890	Landscaping is too steep and lots too close together for BMP options.
1892	Landscaping is too steep and lots too close together for BMP options.
1893	Landscaping is too steep and lots too close together for BMP options.
1894	Landscaping is too steep and lots too close together for BMP options.
1895	Landscaping is too steep and lots too close together for BMP options.
1896	Landscaping is too steep and lots too close together for BMP options.
1897	Landscaping is too steep and lots too close together for BMP options.
1898	Landscaping is too steep and lots too close together for BMP options.
19	Not a building.
1913	Lots too close together for BMP options.
1915	Lots too close together for BMP options.
1916	Lots too close together for BMP options.
1922	Lots too close together for BMP options.
1924	Lots too close together for BMP options.
1926	Lots too close together for BMP options.
2000	Lots too close together for BMP options.
2002	Lots too close together for BMP options.
2004	Lots too close together for BMP options.
2010	Lots too close together for BMP options.
2014	Lots too close together for BMP options.
2016	Lots too close together for BMP options.
2018	Lots too close together for BMP options.
2022	Landscaping is too steep and lots too close together for BMP options.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2023	Landscaping is too steep and lots too close together for BMP options.
2024	Landscaping is too steep and lots too close together for BMP options.
2025	Landscaping is too steep and lots too close together for BMP options.
2026	Landscaping is too steep and lots too close together for BMP options.
2028	Landscaping is too steep and lots too close together for BMP options.
2030	Landscaping is too steep and lots too close together for BMP options.
2031	Landscaping is too steep and lots too close together for BMP options.
203192	Not a building.
2032	Landscaping is too steep and lots too close together for BMP options.
2033	Landscaping is too steep and lots too close together for BMP options.
2034	Landscaping is too steep and lots too close together for BMP options.
2036	Landscaping is too steep and lots too close together for BMP options.
2037	Landscaping is too steep and lots too close together for BMP options.
2038	Landscaping is too steep and lots too close together for BMP options.
2039	Landscaping is too steep and lots too close together for BMP options.
2040	Landscaping is too steep and lots too close together for BMP options.
2041	Landscaping is too steep and lots too close together for BMP options.
2042	Landscaping is too steep and lots too close together for BMP options.
2043	Landscaping is too steep and lots too close together for BMP options.
2044	Landscaping is too steep and lots too close together for BMP options.
2045	Landscaping is too steep and lots too close together for BMP options.
2047	Landscaping is too steep and lots too close together for BMP options.
2048	Landscaping is too steep and lots too close together for BMP options.
2050	Landscaping is too steep and lots too close together for BMP options.
2054	Landscaping is too steep and lots too close together for BMP options.
2055	Landscaping is too steep and lots too close together for BMP options.
2056	Landscaping is too steep and lots too close together for BMP options.
2057	Landscaping is too steep and lots too close together for BMP options.
2058	Landscaping is too steep and lots too close together for BMP options.
2059	Landscaping is too steep and lots too close together for BMP options.
2060	Landscaping is too steep and lots too close together for BMP options.
2061	Landscaping is too steep and lots too close together for BMP options.
2062	Landscaping is too steep and lots too close together for BMP options.
2063	Landscaping is too steep and lots too close together for BMP options.
2064	Landscaping is too steep and lots too close together for BMP options.
2065	Landscaping is too steep and lots too close together for BMP options.
2066	Landscaping is too steep and lots too close together for BMP options.
2067	Landscaping is too steep and lots too close together for BMP options.
2068	Landscaping is too steep and lots too close together for BMP options.
2069	Landscaping is too steep and lots too close together for BMP options.
210	Lots too close together for BMP options.
2100	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2101	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2102	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2105	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2107	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2109	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2110	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2111	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
212	Lots too close together for BMP options.
2120	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2122	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2126	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2128	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
213 S	Already drains to landscaping.
2131	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2132	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2134	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2136	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2140	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2141	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2151	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2152	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
216	Lots too close together for BMP options.
2160	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2161	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2162	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2163	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2164	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2165	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
2166	Minimal landscaping, adverse slope towards building, and some downspouts are already disconnected.
218	Lots too close together for BMP options.
22	Surrounded by pavement graded towards catch basin(s).
220	Lots too close together for BMP options.
2200	Downspouts at potentially feasible locations surrounded by pavement.
2201	Downspouts at potentially feasible locations surrounded by pavement.
2202	Downspouts at potentially feasible locations surrounded by pavement.
2204	Downspouts at potentially feasible locations surrounded by pavement.
2206	Downspouts at potentially feasible locations surrounded by pavement.
2207	Downspouts at potentially feasible locations surrounded by pavement.
2209	Downspouts at potentially feasible locations surrounded by pavement.
2212	Landscaping is sloped towards building and lots too close together for BMP options.
2213	Landscaping is sloped towards building and lots too close together for BMP options.
2215	Landscaping is sloped towards building and lots too close together for BMP options.
226	Not a building.
22A	Not a building.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2301	Landscaping is sloped towards building and lots too close together for BMP options.
2302	Landscaping is too steep and lots too close together for BMP options.
2303	Landscaping is sloped towards building and lots too close together for BMP options.
2304	Landscaping is too steep and lots too close together for BMP options.
2305	Landscaping is sloped towards building and lots too close together for BMP options.
2306	Landscaping is too steep and lots too close together for BMP options.
2307	Landscaping is sloped towards building and lots too close together for BMP options.
2308	Landscaping is too steep and lots too close together for BMP options.
2309	Landscaping is sloped towards building and lots too close together for BMP options.
2310	Landscaping is too steep and lots too close together for BMP options.
2312	Landscaping is too steep and lots too close together for BMP options.
2315	Lots too close together for BMP options.
2318	Landscaping is too steep and lots too close together for BMP options.
2319	Lots too close together for BMP options.
2321	Lots too close together for BMP options.
2322	Landscaping is too steep and lots too close together for BMP options.
2323	Lots too close together for BMP options.
2324	Landscaping is too steep and lots too close together for BMP options.
2329	Landscaping is sloped towards building and lots too close together for BMP options.
2330	Landscaping is too steep and lots too close together for BMP options.
2331	Landscaping is sloped towards building and lots too close together for BMP options.
2332	Landscaping is too steep and lots too close together for BMP options.
2333	Landscaping is sloped towards building and lots too close together for BMP options.
2335	Landscaping is sloped towards building and lots too close together for BMP options.
2337	Landscaping is sloped towards building and lots too close together for BMP options.
2338	Landscaping is too steep and lots too close together for BMP options.
2339	Landscaping is sloped towards building and lots too close together for BMP options.
2343	Landscaping is sloped towards building and lots too close together for BMP options.
2345	Landscaping is sloped towards building and lots too close together for BMP options.
2348OS	Lots too close together for BMP options.
2349	Landscaping is sloped towards building and lots too close together for BMP options.
2350OS	Lots too close together for BMP options.
2351	Lots too close together for BMP options.
2352OS	Lots too close together for BMP options.
2353	Lots too close together for BMP options.
2354OS	Lots too close together for BMP options.
2355	Lots too close together for BMP options.
2360OS	Lots too close together for BMP options.
2361	Lots too close together for BMP options.
2362OS	Lots too close together for BMP options.
2364OS	Lots too close together for BMP options.
2365	Lots too close together for BMP options.
2366OS	Lots too close together for BMP options.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2368OS	Lots too close together for BMP options.
2370OS	Lots too close together for BMP options.
2371OS	Lots too close together for BMP options.
2375OS	Lots too close together for BMP options.
2376OS	Lots too close together for BMP options.
2377OS	Lots too close together for BMP options.
2378OS	Lots too close together for BMP options.
2380OS	Lots too close together for BMP options.
2382OS	Lots too close together for BMP options.
2383OS	Lots too close together for BMP options.
2384OS	Lots too close together for BMP options.
2385OS	Lots too close together for BMP options.
2386OS	Lots too close together for BMP options.
2391OS	Lots too close together for BMP options.
2392OS	Lots too close together for BMP options.
2393OS	Lots too close together for BMP options.
2394OS	Lots too close together for BMP options.
2395OS	Lots too close together for BMP options.
2396OS	Lots too close together for BMP options.
2397OS	Lots too close together for BMP options.
2398OS	Lots too close together for BMP options.
2399OS	Lots too close together for BMP options.
2400OS	Lots too close together for BMP options.
2401OS	Lots too close together for BMP options.
2417	Lots too close together for BMP options.
2419	Lots too close together for BMP options.
2420	Lots too close together for BMP options.
2421	Lots too close together for BMP options.
2422	Lots too close together for BMP options.
2423	Lots too close together for BMP options.
2425	Lots too close together for BMP options.
2426	Lots too close together for BMP options.
2427	Lots too close together for BMP options.
2428	Lots too close together for BMP options.
2430	Lots too close together for BMP options.
2588	Not a building.
2589	Not a building.
26	West side of building already drains to landscaping, no landscaping on east side available for BMPs.
2612	Already drains to landscaping and wastewater pond.
2613	Already drains to landscaping and wastewater pond.
2615	Already drains to landscaping and wastewater pond.
2629	Already drains to landscaping.
27	No external downspouts.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2706	Located at Pier. No vegetation/soil for treatment BMP.
2716	Not a building.
2735	Water table is too shallow for BMPs.
2741	Located at Pier. No vegetation/soil for treatment BMP.
2742	Surrounded by pavement graded towards catch basin(s).
2751	Surrounded by pavement graded towards catch basin(s).
2752	Surrounded by pavement graded towards catch basin(s).
2754	Surrounded by pavement graded towards catch basin(s).
2776	Already drains to landscaping.
2778	Already drains to landscaping.
2779	Surrounded by pavement graded towards catch basin(s).
2780	Surrounded by pavement graded towards catch basin(s).
2795	Surrounded by pavement.
2797	Already drains to landscaping.
2803	Already drains to landscaping.
2813	Surrounded by pavement, landscaping contains utilities.
2814	Surrounded by pavement graded towards catch basin(s).
2816	Surrounded by pavement graded towards catch basin(s).
2817	Not a building.
2821	Already drains to landscaping.
2823	Already drains to landscaping.
2829	Already drains to landscaping.
2831	Already drains to landscaping.
2841	Already drains to landscaping.
2842	Already drains to landscaping.
2843	Already drains to landscaping.
2844	Already drains to landscaping.
2845	Already drains to landscaping.
2846	Already drains to landscaping.
2879	Already drains to landscaping.
2880	Already drains to landscaping.
2882	Not a building.
2883	No external downspouts.
2895	Not a building.
2895A	Not a building.
2896	Not a building.
2902	Not a building.
2904	Already drains to landscaping.
2908	Already drains to landscaping.
2909	Beneath canopy, not exposed to stormwater.
2938	Already drains to landscaping.
2938-1	Site appears to drain to water quality pond, already LID.
2938-2	Already drains to landscaping.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
2938-3	Already drains to landscaping.
2938-4	Site appears to drain to water quality pond, already LID.
2940	Located at Pier. No vegetation/soil for treatment BMP.
2942	Not a building.
3005	Not a building.
305	Lots too close together for BMP options.
307	Lots too close together for BMP options.
308	Lots too close together for BMP options.
309	Lots too close together for BMP options.
311	Lots too close together for BMP options.
312	Lots too close together for BMP options.
313	Lots too close together for BMP options.
315	Lots too close together for BMP options.
316	Lots too close together for BMP options.
317	Lots too close together for BMP options.
319	Lots too close together for BMP options.
320	Already drains to landscaping.
322	Already drains to landscaping.
323	Already drains to landscaping.
324	Already drains to landscaping.
327	Already drains to landscaping.
328	Already drains to landscaping.
33 A	Surrounded by pavement graded towards catch basin(s), west side already drains to landscaping.
34 C	No external downspouts.
343	Already drains to landscaping.
35	Not a building.
357	Not a building.
357-A	Not a building.
357-B	Surrounded by pavement graded towards catch basin(s).
364	Already drains to landscaping.
432	Not a building.
433	Not a building.
434	Not a building.
435	Not a building.
436	Not a building.
437	Not a building.
438	Not a building.
439	Not a building.
440	Not a building.
441	Not a building.
442	Not a building.
443	Not a building.
444	Not a building.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
445	Not a building.
60	Not a building.
613	Already drains to landscaping.
614	Already drains to landscaping.
741	Surrounded by pavement graded towards catch basin(s).
742	Surrounded by pavement graded towards catch basin(s).
743	Surrounded by pavement graded towards catch basin(s).
744	Surrounded by pavement graded towards catch basin(s).
774ECS	Lots too close together for BMP options.
775ECS	Lots too close together for BMP options.
776ECS	Lots too close together for BMP options.
777ECS	Lots too close together for BMP options.
778ECS	Lots too close together for BMP options.
779ECS	Lots too close together for BMP options.
780ECS	Lots too close together for BMP options.
781ECS	Lots too close together for BMP options.
782ECS	Lots too close together for BMP options.
784ECS	Lots too close together for BMP options.
786ECS	Lots too close together for BMP options.
788ECS	Lots too close together for BMP options.
790ECS	Lots too close together for BMP options.
792ECS	Lots too close together for BMP options.
794ECS	Lots too close together for BMP options.
796ECS	Lots too close together for BMP options.
81	Surrounded by pavement graded towards catch basin(s).
869	Already drains to landscaping and wastewater pond.
87	Already drains to landscaping.
870	Already drains to landscaping.
872	Already drains to landscaping.
892	Already drains to landscaping.
892-1	Not a building.
992	Not a building.
CN1051	Lots too close together for BMP options.
CN1053	Lots too close together for BMP options.
CN1055	Lots too close together for BMP options.
CN1057	Lots too close together for BMP options.
CN1063	Lots too close together for BMP options.
CN1065	Lots too close together for BMP options.
CN1067	Lots too close together for BMP options.
CN1100	Landscaping is sloped towards building and lots too close together for BMP options.
CN1101	Landscaping is sloped towards building and lots too close together for BMP options.
CN1103	Landscaping is sloped towards building and lots too close together for BMP options.
CN1104	Landscaping is sloped towards building and lots too close together for BMP options.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
CN1105	Landscaping is sloped towards building and lots too close together for BMP options.
CN1107	Landscaping is sloped towards building and lots too close together for BMP options.
CN1109	Landscaping is sloped towards building and lots too close together for BMP options.
CN1110	Landscaping is sloped towards building and lots too close together for BMP options.
CN1111	Landscaping is sloped towards building and lots too close together for BMP options.
CN1112	Landscaping is sloped towards building and lots too close together for BMP options.
CN1113	Landscaping is sloped towards building and lots too close together for BMP options.
CN1115	Landscaping is sloped towards building and lots too close together for BMP options.
CN1116	Landscaping is sloped towards building and lots too close together for BMP options.
CN1118	Landscaping is sloped towards building and lots too close together for BMP options.
CN112	Landscaping is sloped towards building and lots too close together for BMP options.
CN115	Landscaping is sloped towards building and lots too close together for BMP options.
CN117	Landscaping is sloped towards building and lots too close together for BMP options.
CN1400	Landscaping is too steep and lots too close together for BMP options.
CN1401	Lots too close together for BMP options.
CN1402	Landscaping is too steep and lots too close together for BMP options.
CN1403	Lots too close together for BMP options.
CN1404	Landscaping is too steep and lots too close together for BMP options.
CN1405	Lots too close together for BMP options.
CN1407	Lots too close together for BMP options.
CN1409	Lots too close together for BMP options.
CN1410	Landscaping is too steep and lots too close together for BMP options.
CN1411	Lots too close together for BMP options.
CN1412	Landscaping is too steep and lots too close together for BMP options.
CN1413	Lots too close together for BMP options.
CN1415	Lots too close together for BMP options.
CN1422	Landscaping is too steep and lots too close together for BMP options.
CN1428	Landscaping is too steep and lots too close together for BMP options.
CN1429	Lots too close together for BMP options.
CN1430	Landscaping is too steep and lots too close together for BMP options.
CN1432	Landscaping is too steep and lots too close together for BMP options.
CN1560	Lots too close together for BMP options.
CN1562	Lots too close together for BMP options.
CN1565	Landscaping is downgradient towards house.
CN1567	Landscaping is too steep and lots too close together for BMP options.
CN1568	Lots too close together for BMP options.
CN1569	Landscaping is too steep and lots too close together for BMP options.
CN1570	Lots too close together for BMP options.
CN1571	Landscaping is too steep and lots too close together for BMP options.
CN1572	Lots too close together for BMP options.
CN2049	Landscaping is too steep and lots too close together for BMP options.
CN2051	Landscaping is too steep and lots too close together for BMP options.
CN2053	Landscaping is too steep and lots too close together for BMP options.

Table C-2: Locations Unsuitable for Downspout Disconnection
Naval Air Station Whidbey Island - Seaplane Base
Investigation conducted from 8/1/2023 to 8/4/2023 (Continued)

Facility Number	Disconnection Unsuitability Explanation
CN214	Landscaping is sloped towards building and lots too close together for BMP options.
OWS6-0SP	Not a building.
SPBNEXFUEL	Not a building.

Appendix D:
BMP Maintenance Recommendations Tables,
Tables excerpted from *2019 Stormwater Management Manual for Western Washington*, Volume V – Appendix A, revised July 2019

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Appendix V-A: BMP Maintenance Tables

Ecology intends the facility-specific maintenance standards contained in this section to be conditions for determining if maintenance actions are required as identified through inspection. Recognizing that Permittees have limited maintenance funds and time, Ecology does not require that a Permittee perform all these maintenance activities on all their stormwater BMPs. We leave the determination of importance of each maintenance activity and its priority within the stormwater program to the Permittee. We do expect, however, that sufficient maintenance will occur to ensure that the BMPs continue to operate as designed to protect ground and surface waters. Ecology doesn't intend that these measures identify the facility's required condition at all times between inspections. In other words, exceedance of these conditions at any time between inspections and/or maintenance does not automatically constitute a violation of these standards. However, based upon inspection observations, the Permittee shall adjust inspection and maintenance schedules to minimize the length of time that a facility is in a condition that requires a maintenance action.

Table V-A.1: Maintenance Standards - Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic feet 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 State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department). Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants(Coordinate removal/cleanup with local water quality response agency).	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. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)
	Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies).
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies.
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance and inspection access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering with access or maintenance, do not remove. If dead, diseased, or dying trees are identified. (Use a certified Arborist to determine health of tree or removal requirements).	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard Trees.
Side 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. Any erosion observed on a compacted berm embankment.	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 engineer in the state of Washington should be consulted to resolve source of erosion. Liner repaired or replaced. Liner is fully covered.
Storage Areas	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified 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 visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Ponds Berms (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 berm or outlet works. A licensed engineer in the state of Washington should be consulted to determine the 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. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	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. A licensed engineer in the state of Washington should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Over- flow/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 out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See "Side Slopes of Pond"	See "Side Slopes of Pond"

Table V-A.2: Maintenance Standards - Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic feet 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 State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department). Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants(Coordinate removal/cleanup with local water quality response agency).	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. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)
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 capabilities. Test every 2 to 5 years. If two inches of more of 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 1/2 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.
Side 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. Any erosion observed on a compacted berm embankment.	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 engineer in the state of Washington should be consulted to resolve source of erosion. Liner repaired or replaced. Liner is fully covered.
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. A licensed engineer in the state of Washington should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Over- flow/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 out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See "Side Slopes of Pond"	See "Side Slopes of Pond"
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

Table V-A.5: Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance Is Needed	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%. Trash or debris (in the basin) that exceeds 60 percent 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 six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent 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.	No sediment in 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. (Intent is to make sure no material is running into basin). Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Top slab is free of holes and cracks. 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. Grout fillet has separated or cracked wider than 1/2 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.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Containment and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	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.	Cover/grate is in place, meets design standards, and is secured
	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. (Intent is keep cover from sealing off access to maintenance.)	Mechanism opens with proper tools.
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 free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place, meets the design standards, and is installed and aligned with the flow path.

Table V-A.7: Maintenance Standards - Energy Dissipators

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
External:			
Rock Pad/Splash Block	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 to 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). Intent is to prevent erosion damage.	Trench redesigned or rebuilt to standards.
	Perforations Plugged	Over 1/2 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.
	Receiving Area Over-Saturated	Water in receiving area is causing or has potential of causing landslide problems.	No danger of landslides.
Internal:			
Manhole/Chamber	Worn or Damaged Post, Baffles, Side of Chamber	Structure dissipating flow deteriorates to 1/2 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 V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins

Table V-A.8: Maintenance Standards - Typical Biofiltration Swale

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.	Remove sediment deposits on grass treatment area of the bio-swale. 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 bioretention 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 by-pass 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. Re-plant with plugs of grass from the upper slope: plant in the swale bottom at 8-inch intervals. Or re-seed 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 not impeded. Grass should be mowed to a height of 3 to 4 inches. Remove grass clip-
	Excessive Shading	Grass growth is poor because sunlight does not reach swale.	If possible, trim back over-hanging 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 bio-swale.	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 re-graded and re-seeded. 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 V-A.9: Maintenance Standards - Wet Biofiltration Swale

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
General	Sediment Accumulation	Sediment depth exceeds 2-inches in 10% 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 swale.
	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 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 area clogged with sediment and/or debris.	Remove clogging or blockage in the inlet and outlet areas.
	Trash & Debris	Any trash and debris which exceed 1 cubic feet 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 wet swale.
	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. By-pass excess flows or enlarge swale. Replant eroded areas with fibrous-rooted plants such as Juncus effusus (soft rush) in wet areas or snowberry (Symphoricarpos albus) in dryer areas.

Table V-A.11: Maintenance Standards - Wetponds

Maintenance Component	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 CF per 1000-SF 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 accumulation in pond bottom that exceeds the depth of sediment zone plus 6-inches, usually in the first cell.	Sediment removed from the pond bottom.
	Oil Sheen on Water	exceeds 6-inches, or where continued erosion is prevalent.	Oil removed from the water using oil-absorbent pads or vactor truck. Source of oil located and corrected. If chronic low levels of oil persist, plant wetland plants such as Juncus effusus (soft rush) which can uptake small concentrations of oil.
	Erosion	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 specifications.

Table V-A.21: Maintenance Standards - Bioretention Facilities (Swale, Planter Box)

Maintenance Component	Recommended Frequency (See Notes)		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Facility Footprint				
Earthen side slopes and berms	B, S		Erosion (gullies/rills) greater than 2 inches deep around inlets, outlet, and alongside slopes.	• 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		Settlement 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 larger berms)
	A		Any evidence of rodent holes or water piping in berm.	• Eradicate rodents (see "Pest control"). • Fill holes and compact (may require consultation with engineer, particularly for larger berms).
Concrete sidewalls	A		Cracks of failure of concrete sidewalls	• Repair/ seal cracks. • Replace if repair is insufficient.
Rockery sidewalls	A		Rockery side walls are insecure	Stabilize rockery sidewalls (may require consultation with engineer, particularly for walls 4 feet or greater in height)
Facility area		All maintenance visits (at least biannually)	Trash and debris present	Clean out trash and debris
Facility bottom area	A, S		Accumulated sediment to extent that infiltration rate is reduced (see "Ponded water") or surface storage capacity significantly impacted	• 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 resettlement 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
Low permeability check dams and weirs	A, S		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 or top of weir damaged or not level	Restore to level position

Table V-A.21: Maintenance Standards - Bioretention Facilities (Swale, Planter Box)

Maintenance Component	Recommended Frequency (See Notes)		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Ponded water	B, S		Excessive 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	Determine cause and resolve in the following order: 1. Confirm leaf or debris buildup in the bottom of the facility is not impeding infiltration. If necessary, remove leaf litter/debris. 2. Ensure that underdrain (if present) is not clogged. If necessary, clear underdrain. 3. Check for other water inputs (e.g., groundwater, illicit connections). 4. Verify that the facility is sized appropriately 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 an engineer is recommended.
Bioretention soil mix	As needed		Bioretention soil mix protection is needed when per- forming maintenance requiring entrance into the facility footprint.	• 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. As an example, boards may be placed across soil to distribute loads and minimize compaction. • 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 fore-casted	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	• 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	• 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.

Table V-A.21: Maintenance Standards - Bioretention Facilities (Swale, Planter Box)

Maintenance Component	Recommended Frequency (See Notes)		Condition when Maintenance is Needed (Standards)	Action 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)
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 or debris	Remove sediment or debris/dispose
Underdrain pipe	Clean pipe as needed	Clean orifice at least biannually (may need more frequent cleaning during wet season)	• Plant roots, sediment or debris reducing capacity of underdrain • Prolonged surface ponding (see "Ponded Water")	• 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 (unless project O&M manual or record drawing stipulates more or less than 75% survival rate).	• Determine cause of poor vegetation growth and correct condition • Replant as necessary to obtain 75% survival rate or greater. Refer to original planting plan, or approved jurisdictional species list for appropriate plant replacements (See Appendix 3 - Bioretention Plant List, in the LID Technical Guidance Manual for Puget Sound, (Hinman and Wulkan, 2012)). • 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	• Remove any diseased plants or plant parts and dispose of in an approved location (e.g., commercial landfill) to avoid risk of spreading the disease to other plants. • Disinfect gardening tools after pruning to prevent the spread of disease • See the *Pacific Northwest Plant Disease Management Handbook* (Pscheidt and Ocamb, 2016) for information on disease recognition and for additional resources. • Replant as necessary according to recommendations provided for "facility bottom area and upland slope vegetation".

Table V-A.21: Maintenance Standards - Bioretention Facilities (Swale, Planter Box)

Maintenance Component	Recommended Frequency (See Notes)		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Trees and shrubs		All pruning seasons (timing varies by species)	Pruning as needed	• Prune trees and shrubs in a manner appropriate for each species. Pruning should be performed by landscape professionals familiar with proper pruning techniques. • All pruning of mature trees should be performed by or under the direct guidance of an ISA certified arborist
	A		Large trees and shrubs interfere with operation of the facility or access for maintenance	• Prune trees and shrubs using most current ANSI A300 standards and ISA BMPs. • Remove trees and shrubs, if necessary.
	Fall and Spring		Standing dead vegetation is present	• 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 in 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. Consultation with a landscape architect is recommended.
	Fall and Spring		Planting beneath mature trees	• When working around and below mature trees, follow the most current ANSI A300 standards and ISA BMPs to the extent practicable (e.g., 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)	• 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	• Maintain appropriate height for sight clearance • When continued, regular pruning (more than one time/ growing season) 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).

Table V-A.21: Maintenance Standards - Bioretention Facilities (Swale, Planter Box)

Maintenance Component	Recommended Frequency (See Notes)		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Ornamental grasses (perennial)		Winter and Spring	Dead material from previous year's growing cycle or dead collapsed foliage	• 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	• 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)		• By law, class A & B noxious weeds must be removed, bagged and disposed as garbage immediately • Reasonable attempts must be made to remove and dispose of class C noxious weeds • Herbicides and pesticides may be prohibited in some jurisdictions • Apply mulch after weed removal (see "Mulch"); herbicides not to be used in order to protect water quality
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 • Follow IPM protocols for weed management (see "Additional Maintenance Resources" section for more information on IPM protocols)
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	• 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	• 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 (an aggressive grower under perfect growing conditions should be transplanted to a location where it will not impact flow) • 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 • Consultation with a landscape architect is recommended 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	• Supplement mulch with hand tools to a depth of 2 to 3 inches • Replenish mulch per O&M manual. Often coarse 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

Table V-A.21: Maintenance Standards - Bioretention Facilities (Swale, Planter Box)

Maintenance Component	Recommended Frequency (See Notes)		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Watering				
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 (first year)		Once every 1-2 weeks or as needed during prolonged dry periods	Trees, shrubs and groundcovers in first year of establishment period	• 10 to 15 gallons per tree • 3 to 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 several more passes. With this method, each pass increases soil absorption and allows more water to infiltrate 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 (second and third years)		Once every 2-4 weeks or as needed during prolonged dry periods	Trees, shrubs and groundcovers in second or third year of establishment period	• 10 to 15 gallons per tree • 3 to 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 several more passes. With this method, each pass increases soil absorption and allows more water to infiltrate prior to runoff
Summer watering (after establishment)		As needed	Established vegetation (after 3 years)	• 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

Table V-A.21: Maintenance Standards - Bioretention Facilities (Swale, Planter Box)

Maintenance Component	Recommended Frequency (See Notes)		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Pest Control				
Mosquitoes	B, S		Standing water remains for more than 3 days after the end of storm	• Identify the cause of the standing water and take appropriate actions to address the problem (see "Ponded water") • To facilitate maintenance, manually remove standing water and direct to the storm drainage system (if runoff is from non pollution-generating surfaces) or sanitary sewer system (if runoff is from pollution-generating surfaces) after getting approval from sanitary sewer authority. • Use of pesticides or Bacillus thuringiensis israelensis (Bti) may be considered only as a temporary measure while addressing the standing water cause. If overflow to a surface water will occur within 2 weeks after pesticide use, apply for coverage under the Aquatic Mosquito Control NPDES General Permit.
Nuisance animals	As needed		Nuisance animals causing erosion, damaging plants, or depositing large volumes of feces	• 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 IPM protocols for specific nuisance animal issues (see "Additional Maintenance Resources" section for more information on IPM protocols) • 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 vegetation management		Signs of pests, such as wilting leaves, chewed leaves and bark, spotting or other indicators	• Reduce hiding places for pests by removing diseased and dead plants • For infestations, follow IPM protocols (see "Additional Maintenance Resources" section for more information on IPM protocols).

Note that the inspection and routine maintenance frequencies listed above are recommended by Ecology. They do not supersede or replace the municipal stormwater permit requirements for inspection frequency required of municipal stormwater permittees for "stormwater treatment and flow control BMPs/facilities".

Recommended Frequency Notes: A = Annually; B = Biannually (twice per year); M = Monthly; W = At least one visit should occur during the wet season (for debris/clog related maintenance, this inspection/maintenance visit should occur in the early fall, after deciduous trees have lost their leaves); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

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Appendix E:
Maintenance Standards for Rain Gardens,
Table excerpted from *Guidance Document: Western Washington Low Impact Development (LID) Operation and Maintenance (O&M)*, revised July 2013

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Table 6: Maintenance Standards and Procedures for Rain Gardens

Maintenance Component	Recommended Frequency (See Notes)		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Rain Garden Footprint				
Earthen side slopes	B		Persistent soil erosion on slopes	If erosion persists, water may be flowing into the garden too rapidly. In this case, the slope of the pipe or swale directing water to the garden, or the amount of water may need to be reduced (see "Erosion control at inlet")
Rockery sidewalls	A		Rockery side walls are insecure	Stabilize rockery sidewalls (may require consultation with engineer, particularly for walls 4 feet or greater in height)
Rain Garden Footprint		B	Trash and debris present	Clean out trash and debris
Rain garden bottom area	A		Visible sediment deposition in the rain garden that reduces drawdown time of water in the rain garden	• Remove sediment accumulation • If sediment is deposited from water entering rain garden, determine the source and stabilize area
		During/after fall leaf drop	Accumulated leaves in garden (may reduce infiltration capacity of rain garden or clog overflow)	Remove leaves
Ponded water	B, S		Excessive ponding water: Ponded water remains in the basin more than 3 days after the end of a storm	Confirm leaf, debris or sediment buildup in the bottom of the rain garden is not impeding infiltration. If necessary, remove leaf litter/debris/sediment. If this does not solve the problem, consultation with a professional with rain garden expertise is recommended to evaluate the following: • Check for other water inputs (e.g., groundwater, illicit connections). • Verify that the facility is sized appropriately for the contributing area. Confirm that the contributing area has not increased. • Determine if the soil is clogged by sediment accumulation at the surface or if the soil has become overly compacted
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
Pipe inlet/outlet	A		Pipe capacity is reduced by sediment or debris (can cause backups and flooding)	Clear pipes of sediment and debris
	A		Damaged/cracked drain pipes	• Repair/seal cracks • Replace when repair is insufficient
Erosion control at inlet	A		Rock or cobble is removed or missing and concentrated flows are contacting soil	Maintain a cover of rock or cobbles to protect the ground where concentrated water flows into the rain garden from a pipe or swale
Vegetation				
Vegetation (general)		As needed	Dying, dead, or unhealthy plants	• Maintain a healthy cover of plants • Remove any diseased plants or plant parts and dispose of in commercial landfill to avoid risk of spreading the disease to other plants • Disinfect gardening tools after pruning to prevent the spread of disease • Re-stake trees if they need more support, but plan to remove stakes and ties after the first year • Cars can damage roots – protect root areas of trees and plants from vehicle traffic
		As needed	Vegetation inhibits sight distances and sidewalks	Keep sidewalks and sight distances on roadways clear
		As needed	Broken, dead, or sucker vegetation is present	Remove broken or dead branches and suckers
		As needed	Vegetation is crowding inlets and outlets	Keep water inlets and outlets in the rain garden clear of vegetation
	One time March through June		• Yellowing: possible Nitrogen (N) deficiency • Poor growth: possible Phosphorous (P) deficiency • Poor flowering, spotting or curled leaves, or weak roots or stems: possible Potassium (K) deficiency	• Test soil to identify specific nutrient deficiencies • Consult with a professional knowledgeable in the area of natural amendments or refer to Natural Lawn and Garden Care resources and avoid synthetic fertilizers • Consider selecting different plants for soil conditions

Table 6: Maintenance Standards and Procedures for Rain Gardens

Maintenance Component	Recommended Frequency (See Notes)		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Weeds		As needed, preceding seed dispersal	Problem weeds are present	• Remove weeds by hand, especially in spring when the soil is moist and the weeds are small • Dig or pull weeds out by the roots before they go to seed • Apply mulch after weeding (see “Mulch”)
Mulch				
Mulch		Following weeding	Bare spots (without mulch cover) are present or mulch depth less than 2 inches	• Supplement mulch with hand tools to a depth of 2 to 3 inches • Use coarse compost in the bottom of the rain garden and arborist wood chips on side slopes and rim (above typical water levels) • Keep all mulch away from woody stems
Watering				
Summer watering (first year)		Once every 1-2 weeks or as needed during prolonged dry periods	Trees, shrubs and groundcovers in first year of establishment period	• 10 to 15 gallons per tree • 3 to 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 several more passes. With this method, each pass increases soil absorption and allows more water to infiltrate 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 (second and third years)		Once every 2-4 weeks or as needed during prolonged dry periods	Trees, shrubs and groundcovers in second or third year of establishment period	• 10 to 15 gallons per tree • 3 to 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 several more passes. With this method, each pass increases soil absorption and allows more water to infiltrate prior to runoff
Summer watering (after establishment)		As needed	Established vegetation (after 3 years)	• 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
Pest Control				
Mosquitoes	B, S		Standing water remains for more than 3 days after the end of storm	• Identify the cause of the standing water and take appropriate actions to address the problem (see "Ponded water") • To facilitate maintenance, manually remove standing water and direct to the storm drainage system (if runoff is from non pollution-generating surfaces) or sanitary sewer system (if runoff is from pollution-generating surfaces) after getting approval from sanitary sewer authority. • Use of pesticides or Bacillus thuringiensis israelensis (Bti) may be considered only as a temporary measure while addressing the standing water cause. If overflow to a surface water will occur within 2 weeks after pesticide use, apply for coverage under the Aquatic Mosquito Control NPDES General Permit.

Note that the inspection and routine maintenance frequencies listed above are recommended by Ecology. They do not supersede or replace the municipal stormwater permit requirements for inspection frequency required of municipal stormwater permittees for "stormwater treatment and flow control BMPs/facilities".

Recommended Frequency Notes: A = Annually; B = Biannually (twice per year); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).

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