CONTOUR
ENGINEERING • LLC

STORMWATER OPERATIONS AND MAINTENANCE MANUAL

FOR

VALLEY AVE YARD

CITY OF PUYALLUP, WASHINGTON

OCTOBER 2023
REVISED NOVEMBER 2023

Prepared For:
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Seattle, WA 98108

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11/17/2023

Project # 22-247

THIS MANUAL MUST BE KEPT WITH THE CURRENT OWNER OR OPERATOR. THIS MANUAL MUST BE MADE AVAILABLE FOR INSPECTION BY THE CITY OF PUYALLUP.

TABLE OF CONTENTS

PAGE

Operations and Maintenance Manual for Stormwater Conveyance and Treatment Systems

Project Description

This Operation and Maintenance Manual accompanies the development plans to construct a new contractor yard in Puyallup, Washington. The contractor yard will consist of a 62,768 SF paved area with associated stormwater infrastructure and landscaping. No structures are proposed as part of this development. The project site is located along Valley Ave on three tax parcels 0420163040, 0420163041 and 0420163042 within the Southwest ¼ of Section 16, Township 20 North, Range 4 East, W.M.

The proposed project will construct a contractor yard. The project activities will include excavating and filling the site to a suitable elevation to allow for stormwater facilities to operate by gravity, paving the site, and placing the stormwater conveyance, treatment, and flow control facilities on site. There are two existing single-family residences onsite that will be removed and one building with a detached garage on tax parcel 0420163042 will remain. This project also proposes to connect the remaining building to the City water line and sanitary sewer system. A summary of the existing and proposed surfaces is included below.

A combination of City of Puyallup Design Standards Manual and the Washington Department of Ecology *2019 Stormwater Management Manual for Western Washington* establishes the methodology and design criteria used for this project. All storm drainage design has been done in accordance with the above regulations.

See Appendix 'A' for Vicinity Map of the project area.

The following is a list of pertinent site information associated with the proposed project:

Parcel #: ~~042016~~ 0420163077 ~~63041,~~ and 0420163042
Zoning: Limited Manufacturing (ML)
Owner: 1124 Valley Ave LLC
Contact: Kermit Jorgensen
(206) 787-1475
Disturbed Area: 1.87 AC

This operations and maintenance manual is provided to assist the owner(s) and/or operator of some maintenance practices necessary to maintain stormwater conveyance and water quality devices on-site.

Description of the Stormwater System

Stormwater associated with the project site is collected by three (3) BioPods Biofilter System Surface Vaults along the southern curb of the new paved area. These BioPod

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units provide enhanced water quality treatment for the stormwater runoff associated with the new addition to the site. After treatment, stormwater is conveyed to an underground detention system comprised of several rows of StormTech Chambers. The detention system is located in the north central portion of the site. The detention system stores and slowly releases stormwater to the municipal storm system through a control structure located just East of the chamber detention system. The control structure will discharge to the existing storm main line within Valley Avenue northwest.

Maintenance and Inspection

The maintenance and inspections of the various storm systems will be the sole responsibility of the owner(s) or owner(s) association, in addition to maintaining accurate records of inspections and maintenance actions taken. The checklists and guidelines that follow should be utilized as a minimum guide to the maintenance procedures of the site. The following are all the components of the sites stormwater system that will require maintenance and suggested inspection interval:

- BioPod Biofilter System
    - Before and after the rainfall seasons (April & November), and after any major storms (>1-inch within 24 hours)
- Catch basins and drains
    - Before and after the rainfall seasons (April & November), and after any major storms (>1-inch within 24 hours)
- Detention Tank
    - A monthly inspection during the rainy season (October – April) and after any major storm event (>1-inch within 24 hours) for the items listed on the checklist contained within Appendix C.
- Control Structure
    - A monthly inspection during the rainy season (October – April) and after any major storm event (>1-inch within 24 hours) for the items listed on the checklist contained within Appendix C.
    - Annual inspection for structural damage or missing components.
- Fencing and Landscaping
    - Before and after the rainfall seasons (April & November), and after any major storms (>1-inch within 24 hours)
- Conveyance System
    - Shall be inspected for sediment and blockages on a bi-annual basis, after large storm events and/or if any signs of possible issues arise.
    - All conveyance lines shall be "jetted" out or equivalent on a yearly basis and/or if blockages arise.

See Appendix A for a figure illustrating the locations of all items to be maintained onsite.

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Instructions for Use of Maintenance Checklists

Appendix C contains maintenance checklists for the components that are part of your drainage system, as well as for some components that you may not have. Ignore the requirements that do not apply to your system. You should plan to complete a checklist for all system components based upon the suggested inspection intervals from the previous section. These intervals may be altered as site conditions allow. During inspections, check off the problems that you looked for and add comments discussing problems found and actions taken.

The owner/operator should familiarize themselves with the BMPs contained in Appendix D.

BioPod Maintenance Requirements

Maintenance includes removing trash, degraded mulch, and accumulated debris from the filter surface and replacing the mulch layer. Use inspections to determine the site-specific maintenance schedules and requirements. Follow maintenance procedures given in the BioPod System Inspection & Maintenance Guide.

The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, site-specific maintenance frequency should be established during the first two or three years of operation.

Old Castle designs their BioPod systems for a target maintenance interval of at least twice a year. Maintenance includes removing accumulated sediment and trash from the surface area of the media, removing the mulch above the media, replacing the mulch, providing plant health evaluation, and pruning the plant if deemed necessary.

Conduct maintenance following manufacturer's guidelines. See Appendix B for the products Inspection & Maintenance Guide.

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MAINTENANCE PROGRAM LOG SHEET

Use copies of this log sheet to keep track of when maintenance checks occur and what items, if any are repaired or replaced. The completed sheets will serve as a record of past maintenance activities and will provide valuable information on how your facilities are operating. Keep all log sheets in a designated area so other can easily access them.

Name of Inspector: _____

Inspector's Signature: _____

Date of Inspection: _____

Facility and Component Checked	Observations (list things that should be done)	Follow-up Actions Taken	Date Action Taken

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APPENDIX A

Vicinity map and Drainage Plan

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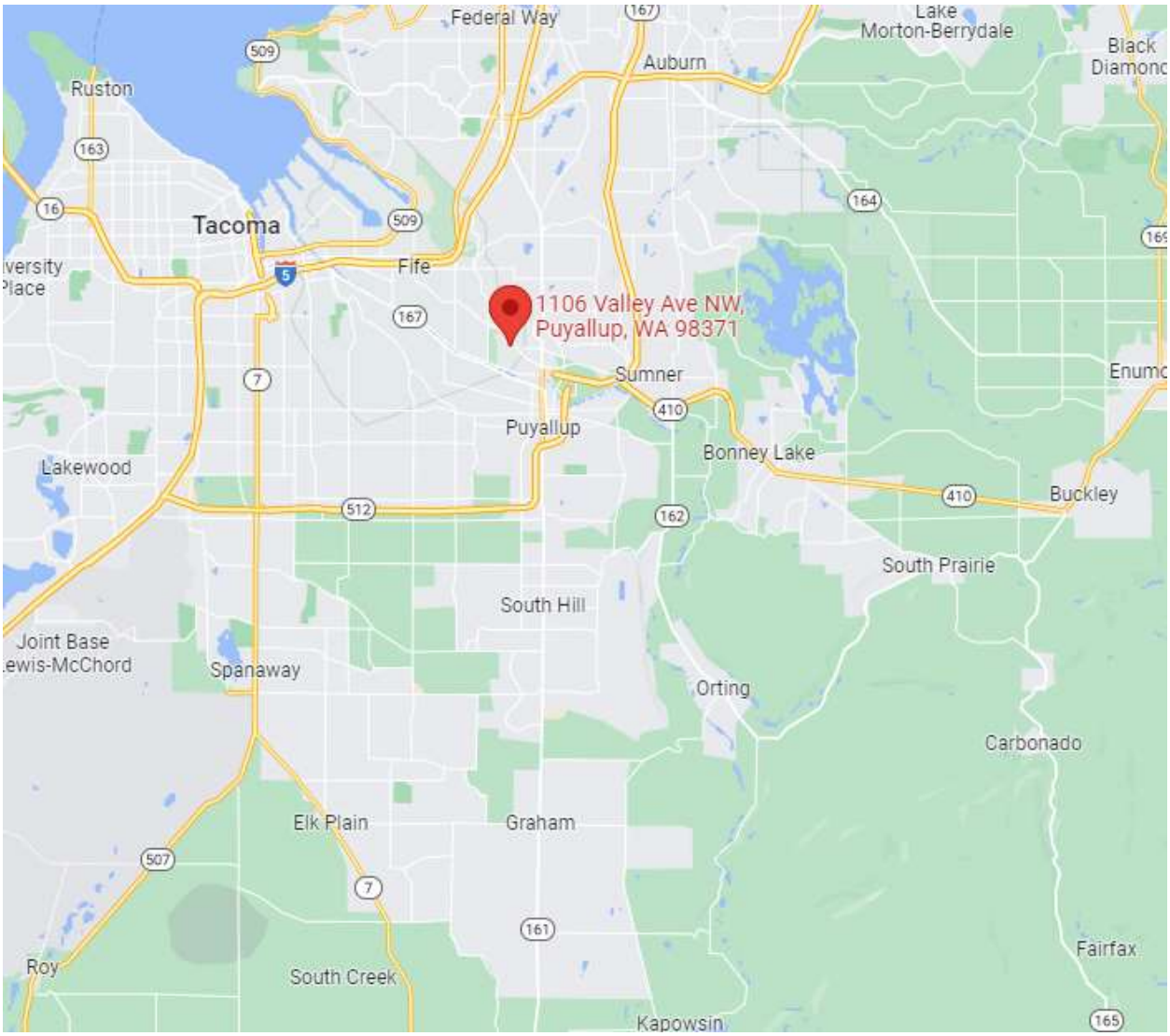


Vicinity Map

VALLEY AVE YARD

A PORTION OF SECTION 16, TOWNSHIP 20 NORTH, RANGE 04 EAST, W.M., CITY OF PUYALLUP, WASHINGTON

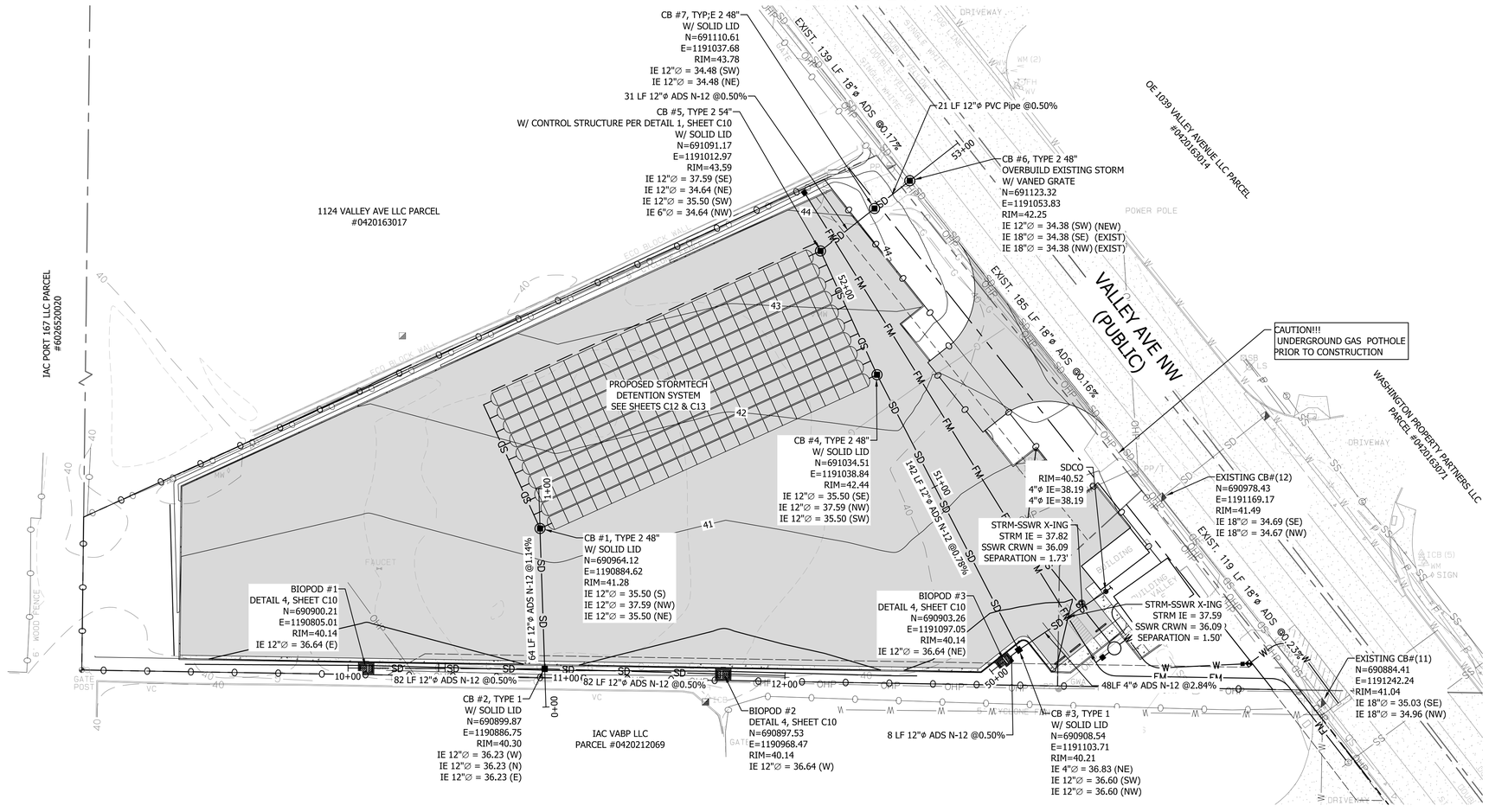
DRAINAGE PLAN

GRAPHIC SCALE

0 30 60

1 INCH = 30 FEET (22"x34")

1 INCH = 60 FEET (11"x17")



STORMWATER NOTES

1. ALL WORK IN CITY RIGHT-OF-WAY REQUIRES A PERMIT FROM THE CITY OF PUYALLUP. PRIOR TO ANY WORK COMMENCING, THE GENERAL CONTRACTOR SHALL ARRANGE FOR A PRECONSTRUCTION MEETING AT THE DEVELOPMENT SERVICES CENTER TO BE ATTENDED BY ALL CONTRACTORS THAT WILL PERFORM WORK SHOWN ON THE ENGINEERING PLANS, REPRESENTATIVES FROM ALL APPLICABLE UTILITY COMPANIES, THE PROJECT OWNER AND APPROPRIATE CITY STAFF. CONTACT ENGINEERING SERVICES TO SCHEDULE THE MEETING (253) 841-5568. THE CONTRACTOR IS RESPONSIBLE TO HAVE THEIR OWN APPROVED SET OF PLANS AT THE MEETING.
2. AFTER COMPLETION OF ALL ITEMS SHOWN ON THESE PLANS AND BEFORE ACCEPTANCE OF THE PROJECT, THE CONTRACTOR SHALL OBTAIN A "PUNCH LIST" PREPARED BY THE CITY'S INSPECTOR DETAILING REMAINING ITEMS OF WORK TO BE COMPLETED. ALL ITEMS OF WORK SHOWN ON THESE PLANS SHALL BE COMPLETED TO THE SATISFACTION OF THE CITY PRIOR TO ACCEPTANCE OF THE WATER SYSTEM AND PROVISION OF SANITARY SEWER SERVICE.
3. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (HEREINAFTER REFERRED TO AS THE "STANDARD SPECIFICATIONS"), WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND AMERICAN PUBLIC WORKS ASSOCIATION, WASHINGTON STATE CHAPTER, LATEST EDITION, UNLESS SUPERSEDED OR AMENDED BY THE CITY OF PUYALLUP CITY STANDARDS FOR PUBLIC WORKS ENGINEERING AND CONSTRUCTION (HEREINAFTER REFERRED TO AS THE "CITY STANDARDS").
4. A COPY OF THESE APPROVED PLANS AND APPLICABLE CITY DEVELOPER SPECIFICATIONS AND DETAILS SHALL BE ON SITE DURING CONSTRUCTION.
5. ANY REVISIONS MADE TO THESE PLANS MUST BE REVIEWED AND APPROVED BY THE DEVELOPER'S ENGINEER AND THE ENGINEERING SERVICES STAFF PRIOR TO ANY IMPLEMENTATION IN THE FIELD. THE CITY SHALL NOT BE RESPONSIBLE FOR ANY ERRORS AND/OR OMISSIONS ON THESE PLANS.
6. THE CONTRACTOR SHALL HAVE ALL UTILITIES VERIFIED ON THE GROUND PRIOR TO ANY CONSTRUCTION. CALL (811) AT LEAST TWO WORKING DAYS IN ADVANCE. THE OWNER AND HIS/HER ENGINEER SHALL BE CONTACTED IMMEDIATELY IF A CONFLICT EXISTS.
7. ANY STRUCTURE AND/OR OBSTRUCTION WHICH REQUIRE REMOVAL OR RELOCATION RELATING TO THIS PROJECT, SHALL BE DONE SO AT THE DEVELOPER'S EXPENSE.
8. DURING CONSTRUCTION, ALL EXISTING AND NEWLY INSTALLED DRAINAGE STRUCTURES SHALL BE PROTECTED FROM SEDIMENTS.
9. ALL STORM MANHOLES SHALL CONFORM TO CITY STANDARD DETAIL NO. 02.01.01. FLOW CONTROL MANHOLE/OIL WATER SEPARATOR SHALL CONFORM TO CITY STANDARD DETAIL NO. 02.01.06 AND 02.01.07.
10. MANHOLE RING AND COVER SHALL CONFORM TO CITY STANDARD DETAIL 06.01.02.
11. CATCH BASINS TYPE I SHALL CONFORM TO CITY STANDARD DETAIL NO.02.01.02 AND 02.01.03 AND SHALL BE USED ONLY FOR DEPTHS LESS THAN 5 FEET FROM TOP OF THE GRATE TO THE INVERT OF THE STORM PIPE.
12. CATCH BASINS TYPE II SHALL CONFORM TO CITY STANDARD DETAIL NO.02.01.04 AND SHALL BE USED FOR DEPTHS GREATER THAN 5 FEET FROM TOP OF THE GRATE TO THE INVERT OF THE STORM PIPE.
13. CAST IRON OR DUCTILE IRON FRAME AND GRATE SHALL CONFORM TO CITY STANDARD DETAIL NO.02.01.05. GRATE SHALL BE MARKED WITH "DRAINS TO STREAM". SOLID CATCH BASIN LIDS (SQUARE UNLESS NOTED AS ROUND) SHALL CONFORM TO WSDOT STANDARD PLAN B-30.20-04 (OLYMPIC FOUNDRY NO. SM60 OR EQUAL). VANED GRATES SHALL CONFORM TO WSDOT STANDARD PLAN B-30.30-03 (OLYMPIC FOUNDRY NO. SM60V OR EQUAL).
14. STORMWATER PIPE SHALL BE ONLY PVC, CONCRETE, DUCTILE IRON, OR DUAL WALLED POLYPROPYLENE PIPE.
    a. THE USE OF ANY OTHER TYPE SHALL BE REVIEWED AND APPROVED BY THE ENGINEERING SERVICES STAFF PRIOR TO INSTALLATION.
    b. PVC PIPE SHALL BE PER ASTM D3034, SDR 35 FOR PIPE SIZE 15-INCH AND SMALLER AND F679 FOR PIPE SIZES 18 TO 27 INCH. MINIMUM COVER ON PVC PIPE SHALL BE 3.0 FEET.
    c. CONCRETE PIPE SHALL CONFORM TO THE WSDOT STANDARD SPECIFICATIONS FOR CONCRETE UNDERDRAIN PIPE. MINIMUM COVER ON CONCRETE PIPE SHALL NOT LESS THAN 3.0 FEET.
    d. DUCTILE IRON PIPE SHALL BE CLASS 50, CONFORMING TO AWWA C151. MINIMUM COVER ON DUCTILE IRON PIPE SHALL BE 1.0 FOOT.
    e. POLYPROPYLENE PIPE (PP) SHALL BE DUAL WALLED, HAVE A SMOOTH INTERIOR AND EXTERIOR CORRUGATIONS AND MEET WSDOT 9-05.24(1). 12-INCH THROUGH 30-INCH PIPE SHALL MEET OR EXCEED ASTM F2736 AND AASHTO M330, TYPE S, OR TYPE D. 36-INCH THROUGH 60-INCH PIPE SHALL MEET OR EXCEED ASTM F2881 AND AASHTO M330, TYPE S, OR TYPE D. TESTING SHALL BE PER ASTM F1417. MINIMUM COVER OVER POLYPROPYLENE PIPE SHALL BE 3-FEET.
15. TRENCHING, BEDDING, AND BACKFILL FOR PIPE SHALL CONFORM TO CITY STANDARD DETAIL NO. 06.01.01. PER DETAIL 2 SHEET C12.
16. STORM PIPE SHALL BE A MINIMUM OF 10 FEET AWAY FROM BUILDING FOUNDATIONS AND/OR ROOF LINES.
17. ALL STORM DRAIN MAINS SHALL BE TESTED AND INSPECTED FOR ACCEPTANCE AS OUTLINED IN SECTION 406 OF THE CITY OF PUYALLUP SANITARY SEWER SYSTEM STANDARDS.
18. ALL TEMPORARY SEDIMENTATION AND EROSION CONTROL MEASURES, AND PROTECTIVE MEASURES FOR CRITICAL AREAS AND SIGNIFICANT TREES SHALL BE INSTALLED PRIOR TO INITIATING ANY CONSTRUCTION ACTIVITIES.

ROADWAY NOTES

1. ALL WORK IN CITY RIGHT-OF-WAY REQUIRES A PERMIT FORM THE CITY OF PUYALLUP. PRIOR TO ANY WORK COMMENCING, THE GENERAL CONTRACTOR SHALL ARRANGE FOR A PRECONSTRUCTION MEETING AT THE DEVELOPMENT SERVICES CENTER TO BE ATTENDED BY ALL CONTRACTORS THAT WILL PERFORM WORK SHOWN ON THE ENGINEERING PLANS, REPRESENTATIVES FROM ALL APPLICABLE UTILITY COMPANIES, THE PROJECT OWNER AND APPROPRIATE CITY STAFF. CONTACT ENGINEERING SERVICES TO SCHEDULE THE MEETING (253_841-5568. THE CONTRACTOR IS RESPONSIBLE TO HAVE THEIR OWN APPROVED SET OF PLANS AT THE MEETING.
2. AFTER COMPLETION OF ALL ITEMS SHOWN ON THESE PLANS AND BEFORE ACCEPTANCE OF THE PROJECT, THE CONTRACTOR SHALL OBTAIN A "PUNCH LIST" PREPARED BY THE CITY'S INSPECTOR DETAILING REMAINING ITEMS OF WORK TO BE COMPLETED. ALL ITEMS OF WORK SHOWN ON THESE PLANS SHALL BE COMPLETED TO THE SATISFACTION OF THE CITY PRIOR TO ACCEPTANCE OF THE WATER SYSTEM AND PROVISION OF SANITARY SEWER SERVICE.
3. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (HEREINAFTER REFERRED TO AS THE "STANDARD SPECIFICATIONS"), WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND AMERICAN PUBLIC WORKS ASSOCIATION, WASHINGTON STATE CHAPTER, LATEST EDITION, UNLESS SUPERSEDED OR AMENDED BY THE CITY OF PUYALLUP CITY STANDARDS FOR PUBLIC WORKS ENGINEERING AND CONSTRUCTION (HEREINAFTER REFERRED TO AS THE "CITY STANDARDS").
4. A COPY OF THESE APPROVED PLANS AND APPLICABLE CITY DEVELOPER SPECIFICATIONS AND DETAILS SHALL BE ON SITE DURING CONSTRUCTION.
5. ANY REVISIONS MADE TO THESE PLANS MUST BE REVIEWED AND APPROVED BY THE DEVELOPER'S ENGINEER AND THE ENGINEERING SERVICES STAFF PRIOR TO ANY IMPLEMENTATION IN THE FIELD. THE CITY SHALL NOT BE RESPONSIBLE FOR ANY ERRORS AND/OR OMISSIONS ON THESE PLANS.
6. THE CONTRACTOR SHALL HAVE ALL UTILITIES VERIFIED ON THE GROUND PRIOR TO ANY CONSTRUCTION. CALL (811) AT LEAST TWO WORKING DAYS IN ADVANCE. THE OWNER AND HIS/HER ENGINEER SHALL BE CONTACTED IMMEDIATELY IF A CONFLICT EXISTS.
7. ANY STRUCTURE AND/OR OBSTRUCTION WHICH REQUIRES REMOVAL OR RELOCATION RELATING TO THIS PROJECT, SHALL BE DONE SO AT THE DEVELOPER'S EXPENSE.
8. MONUMENTS SHALL BE INSTALLED AT ALL STREET INTERSECTIONS, AT ANGLE POINTS, AND POINTS OF CURVATURE IN EACH STREET. ALL BOUNDARY MONUMENTS MUST BE INSTALLED ACCORDING TO THE WASHINGTON STATE SUBDIVISION LAWS.
9. CURB AND GUTTER INSTALLATION SHALL CONFORM TO CITY STANDARD DETAIL 01.02.09.
10. SIDEWALKS AND DRIVEWAYS SHALL BE INSTALLED AS LOTS ARE BUILT ON. SIDEWALKS AND DRIVEWAYS SHALL CONFORM TO CITY STANDARD DETAIL 01.02.01, 01.02.02 AND 01.02.12. IF ASPHALT IS DAMAGED DURING REPLACEMENT OF CURB AND GUTTER, THE REPAIR SHALL CONFORM TO CITY STANDARD DETAIL 01.02.10.
11. THE SURROUNDING GROUND (5 FEET BEYOND THE BASE) FOR ALL POWER TRANSFORMERS, TELEPHONE/TV PEDESTALS, AND STREET LIGHT MAIN DISCONNECTS SHALL BE GRADED TO A POSITIVE 2 PERCENT SLOPE FROM TOP OF CURB.
12. SIGNAGE AND TRAFFIC CONTROL DEVICES ARE SAFETY ITEMS AND SHALL BE INSTALLED PRIOR TO ISSUANCE OF ANY CERTIFICATE OF OCCUPANCY OR PLAT APPROVAL. HOWEVER, IN LARGER DEVELOPMENTS, EXACT LOCATIONS OF STOP AND YIELD SIGNS MAY NEED TO BE DETERMINED AFTER FULL BUILDOUT WHEN TRAFFIC PATTERNS HAVE BEEN ESTABLISHED. IN THIS CASE, CONTRACTOR SHALL PROVIDE INDICATED "CITY-PLACED" SIGNS, SIGNPOSTS, AND BRACKETS TO THE CITY SIGN SPECIALIST (253) 841-5471 FOR LATER INSTALLATION BY THE CITY. ALL SIGNAGE SHALL BE IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
13. PRIOR TO ANY SIGN OR STRIPING INSTALLATION OR REMOVAL THE CONTRACTOR SHALL CONTACT THE CITY SIGN SPECIALIST (253) 841-5471 TO ARRANGE FOR AN ON-SITE MEETING TO DISCUSS PLACEMENT AND UNIFORMITY.
14. NEW OR REVISED STOP SIGNS OR YIELD SIGNS SHALL BE ADVANCE WARNED USING THE PROCEDURE OUTLINED IN THE MUTCD. ADVANCE WARNING SIGNS AND FLAGS SHALL BE MAINTAINED BY INSTALLER FOR 30 DAYS AND THEN REMOVED.

DETENTION CHAMBERS SUMMARY

BOTTOM OF SYSTEM ELEVATION	= 34.64
MAX DESIGN WATER SURFACE	= 39.14
TOP OF SYSTEM ELEVATION	= 40.14
TOP OF GRAVEL	= 35.39
DESIGN STORAGE VOLUME	= 35,327 CF

OUTLET CONTROL STRUCTURE

RIM ELEVATION	= 43.59
RISER DIAMETER	= 18 INCH
RESTRICTOR PLATE DIAMETER	= 0.625 INCH
ORIFICE #2 DIAMETER	= 0.875 INCH
ORIFICE #2 ELEVATION	= 37.44
ORIFICE #3 DIAMETER	= 0.75 INCH
ORIFICE #3 ELEVATION	= 37.84
TOP OF RISER	= 39.14

DRAINAGE NOTES

1) CATCH BASIN NORTHING/EASTING LOCATION SPECIFIED IS TO CENTER OF STRUCTURE.
2) ALL CATCH BASINS SHALL BE MARKED WITH "DUMP NO WASTE" STENCIL.
3) PIPE ZONE BEDDING AND BACK FILL PER DETAIL 2, SHEET C12
4) TYPE 1 AND 2 CATCH BASINS AND OUTLET CONTROL STRUCTURE DETAILS 1-3, SHEET C11.
5) STORMTECH DETENTION SYSTEM PER SHEET C12 AND DETAIL 1 SHEET C13

ACRONYMS

ME	MATCH EXISTING
EG	EXISTING GRADE
FG	FINISH GRADE
PC	POINT OF CURVATURE
PT	POINT OF TANGENCY
MP	MID POINT
FL	FLOWLINE
TC	TOP OF CURB
BC	BOTTOM OF CURB
TW	TOP OF WALL
BW	BOTTOM OF WALL
CL	CENTERLINE
ROW	RIGHT OF WAY

APPROVED

BY _____
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE _____

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE. THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS. FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.

VERIFICATION NOTE

ALL EXISTING UTILITIES IN THE CONSTRUCTION AREA SHALL BE IDENTIFIED AND VERIFIED FOR DEPTH AND LOCATION PRIOR TO ANY CONSTRUCTION ACTIVITIES SO TO IDENTIFY ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

PRIOR TO ANY CONSTRUCTION ACTIVITIES, VERIFY EXISTING TOPOGRAPHY IS CONSISTENT WITH WHAT IS SHOWN ON PLANS AND IF THERE ARE ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION ACTIVITIES. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG

REVISION	DESCRIPTION	DATE	BY

CONTOUR ENGINEERING • LLC
CIVIL ENGINEERS ~ SURVEYORS ~ LAND PLANNERS
Phone: 253-857-5454 ~ Fax: 253-509-0044 ~ info@contourpllc.com
Mailing Address: P.O. Box 949, Gig Harbor, WA 98335
Physical Address: 4706 97th Street NW, Suite 100, Gig Harbor, WA 98332

BRETT M. ALLEN — STATE OF WASHINGTON — 37835 — REGISTERED PROFESSIONAL ENGINEER

2023-11-17

SHEET TITLE: DRAINAGE PLAN

VALLEY AVE YARD

CLIENT: 1124 VALLEY AVE, LLC
550 S MICHIGAN STREET
SEATTLE, WA 98108

CONTACT: KERMIT JORGENSEN PHONE: (206) 787-1475

DESIGNER: K. MAUREN
ENGINEER: B. ALLEN
DRAWN: K. MAUREN
S 16 T 20N R 04E WM
DATE: 2023-08-10
REVISED: –.–.––

PROJECT: 21-247
DWG NAME: 21-247-C

SHEET	REV.
C9	0
9 OF 17	

APPENDIX B

Product Maintenance Guides

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APPENDIX C

Stormwater Infrastructure Maintenance Checklists

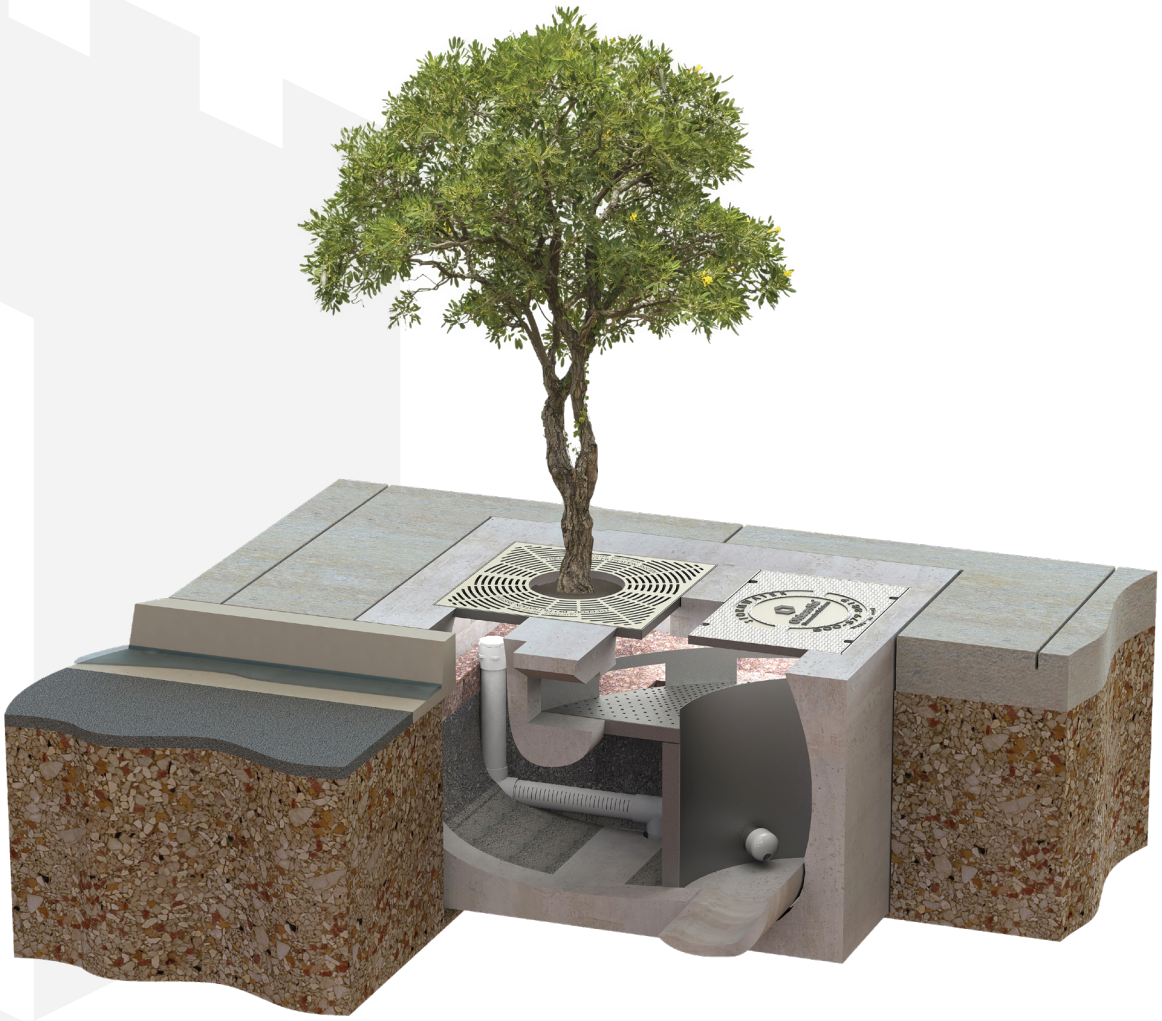
APPENDIX D

Standard Commercial BMPs

BIOPOD™ SYSTEM

with StormMix™ Media

Inspection & Maintenance Guide



Oldcastle Infrastructure™
A CRH COMPANY

BIOPOD™ BIOFILTER WITH STORMMIX™ BIOFILTRATION MEDIA

DESCRIPTION

The BioPod™ Biofilter System (BioPod) is a storm water biofiltration treatment system used to remove pollutants from storm water runoff. Impervious surfaces and other urban and suburban landscapes generate a variety of contaminants that can enter storm water and pollute downstream receiving waters unless treatment is provided. The BioPod system uses proprietary StormMix™ biofiltration media to capture and retain pollutants including total suspended solids (TSS), metals, nutrients, gross solids, trash and debris as well as petroleum hydrocarbons.

FUNCTION

The BioPod system uses engineered, high-flow rate filter media to remove storm water pollutants, allowing for a smaller footprint than conventional bioretention systems. Contained within a compact precast concrete vault, the BioPod system consists of a biofiltration chamber and an optional integrated high-flow bypass. The biofiltration chamber is filled with horizontal layers of aggregate, biofiltration media and mulch. Storm water passes vertically down through the mulch and biofiltration media for treatment. The mulch provides pretreatment by retaining most of the solids or sediment. The biofiltration media provides further treatment by retaining finer sediment and dissolved pollutants. The aggregate allows the media bed to drain evenly for discharge through an underdrain pipe or by infiltration.

INSPECTION & MAINTENANCE OVERVIEW

State and local regulations require all storm water management systems to be inspected on a regular basis and maintained as necessary to ensure performance and protect downstream receiving waters. Without maintenance, excessive pollutant buildup can limit system performance by reducing the operating capacity of the system and increasing the potential for scouring of pollutants during periods of high flow.

Some configurations of the BioPod may require periodic irrigation to establish and maintain vegetation. Vegetation will typically become established about two years after planting. Irrigation requirements are ultimately dependent on climate, rainfall and the type of vegetation selected.

INSPECTION & MAINTENANCE FREQUENCY

Periodic inspection is essential for consistent system performance and is easily completed. Inspection is typically conducted a minimum of twice per year, but since pollutant transport and deposition varies from site to site, a site-specific maintenance frequency should be established during the first two or three years of operation.

INSPECTION EQUIPMENT

The following equipment is helpful when conducting BioPod inspections:

- Recording device (pen and paper form, voice recorder, iPad, etc.)
- Suitable clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
- PPE as required for entry
- Traffic control equipment (cones, barricades, signage, flagging, etc.)
- Manhole hook or pry bar
- Flashlight
- Tape measure
- Socket

INSPECTION PROCEDURES

BioPod inspections are visual and are conducted without entering the unit. To complete an inspection, safety measures including traffic control should be deployed before the access covers or tree grates are removed. Once the covers have been removed, the following items should be checked and recorded (see form provided on page 6) to determine whether maintenance is required:

- If the BioPod unit is equipped with an internal bypass, inspect the inlet rack (or inlet chamber on underground units) and outlet chamber and note whether there are any broken or missing parts. In the unlikely event that internal parts are broken or missing, contact Oldcastle Storm water at (800) 579-8819 to determine appropriate corrective action.
- Note whether the curb inlet, inlet pipe, or inlet rack is blocked or obstructed.
- If the unit is equipped with an internal bypass, observe, quantify and record the accumulation of trash and debris in the inlet rack or inlet chamber. The significance of accumulated trash and debris is a matter of judgment. Often, much of the trash and debris may be removed manually at the time of inspection if a separate maintenance visit is not yet warranted.
- If it has not rained within the past 24 hours, note whether standing water is observed in the biofiltration chamber.
- Finally, observe, quantify and record presence of invasive vegetation and the amount of trash and debris and sediment load in the biofiltration chamber. Erosion of the mulch and biofiltration media bed should also be recorded. Often, much of the invasive vegetation and trash and debris may be removed manually at the time of inspection if a separate maintenance visit is not yet warranted. Sediment load may be rated light, medium or heavy depending on the conditions. Loading characteristics may be determined as follows:
  - **Light sediment load** – sediment is difficult to distinguish among the mulch fibers at the top of the mulch layer; the mulch appears almost new.
  - **Medium sediment load** – sediment accumulation is apparent and may be concentrated in some areas; probing the mulch layer reveals lighter sediment loads under the top 1" of mulch.
  - **Heavy sediment load** – sediment is readily apparent across the entire top of the mulch layer; individual mulch fibers are difficult to distinguish; probing the mulch layer reveals heavy sediment load under the top 1" of mulch.

MAINTENANCE INDICATORS

Maintenance should be scheduled if any of the following conditions are identified during inspection:

- The concrete structure is damaged or the tree grate or access cover is damaged or missing
- The inlet obstructed
- Standing water is observed in the biofiltration chamber more than 24 hours after a rainfall event (use discretion if the BioPod is located downstream of a storage system that attenuates flow)
- Trash and debris in the inlet rack cannot be easily removed at the time of inspection
- Trash and debris, invasive vegetation or sediment load in the biofiltration chamber is heavy or excessive erosion has occurred

MAINTENANCE EQUIPMENT

The following equipment is helpful when conducting BioPod maintenance:

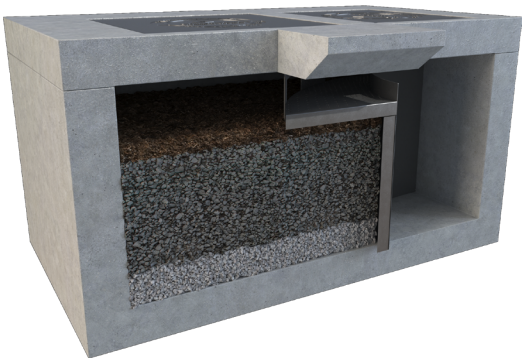
- Suitable clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
- PPE as required for entry
- Traffic control equipment (cones, barricades, signage, flagging, etc.)
- Manhole hook or pry bar
- Flashlight
- Tape measure
- Rake, hoe, shovel and broom
- Bucket
- Pruners
- Vacuum truck (optional)
- Socket

MAINTENANCE PROCEDURES

Maintenance should be conducted during dry weather when no flows are entering the system. In most cases, maintenance may be conducted without entering. Entry may be required to maintain BioPod Underground units, depending on system depth. Once safety measures such as traffic control are deployed, the access covers may be removed and the following activities may be conducted to complete maintenance:

- Remove all trash and debris from the curb inlet and inlet rack manually or by using a vacuum truck as required.
- Remove all trash and debris and invasive vegetation from the biofiltration chamber manually or by using a vacuum truck as required.
- If the sediment load is medium or light but erosion of the biofiltration media bed is evident, redistribute the mulch with a rake or replace missing mulch as appropriate. If erosion persists, rocks may be placed in the eroded area to help dissipate energy and prevent recurring erosion.
- If the sediment load is heavy, remove the mulch layer using a hoe, rake, shovel and bucket, or by using a vacuum truck as required. If the sediment load is particularly heavy, inspect the surface of the biofiltration media once the mulch has been removed. If the media appears clogged with sediment, remove and replace one or two inches of biofiltration media prior to replacing the mulch* layer.
- Prune vegetation as appropriate and replace damaged or dead plants as required.
- Replace the tree grate and/or access covers and sweep the area around the BioPod to leave the site clean.
- All material removed from the BioPod during maintenance must be disposed of in accordance with local environmental regulations. In most cases, the material may be handled in the same manner as disposal of material removed from sumped catch basins or manholes.

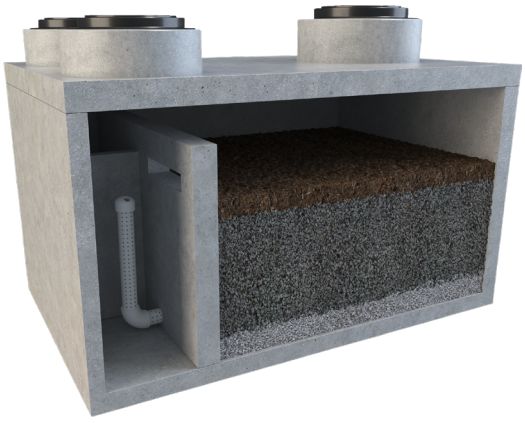
* Natural, shredded hardwood mulch should be used in the BioPod. Timely replacement of the mulch layer according to the maintenance indicators described above should protect the biofiltration media below the mulch layer from clogging due to sediment accumulation. However, whenever the mulch is replaced, the BioPod should be visited 24 hours after the next major storm event to ensure that there is no standing water in the biofiltration chamber. Standing water indicates that the biofiltration media below the mulch layer is clogged and must be replaced. Please contact Oldcastle Infrastructure at (800) 579-8819 to purchase the proprietary StormMix™ biofiltration media.



BIOPOD SURFACE

BIOPOD TREE

BIOPOD PLANTER



BIOPOD UNDERGROUND

BIOPOD INSPECTION & MAINTENANCE LOG

BioPod Model _____ Inspection Date _____

Location _____

Condition of Internal Components *NOTES:*

☐ **GOOD** ☐ **DAMAGED** ☐ **MISSING**

Curb Inlet or Inlet Rack Blocked *NOTES:*

☐ **YES** ☐ **NO**

Standing Water in Biofiltration Chamber *NOTES:*

☐ **YES** ☐ **NO**

Trash and Debris in Inlet Rack *NOTES:*

☐ **YES** ☐ **NO**

Trash and Debris in Biofiltration Chamber *NOTES:*

☐ **YES** ☐ **NO**

Invasive Vegetation in Biofiltration Chamber *NOTES:*

☐ **YES** ☐ **NO**

Sediment in Biofiltration Chamber *NOTES:*

☐ **LIGHT** ☐ **MEDIUM** ☐ **HEAVY**

Erosion in Biofiltration Chamber *NOTES:*

☐ **YES** ☐ **NO**

Maintenance Requirements

☐ **YES - Schedule Maintenance** ☐ **NO - Schedule Re-Inspection**

NOTES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APPENDIX C

Stormwater Infrastructure Maintenance Checklists

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Catch Basin

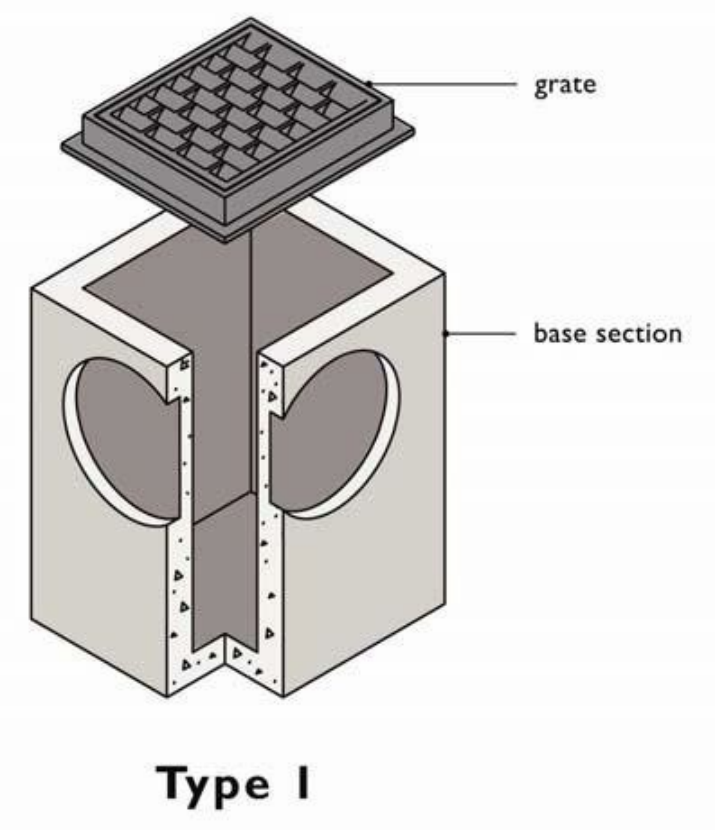
A catch basin is an underground concrete structure typically fitted with a slotted grate to collect stormwater runoff and route it through underground pipes. Catch basins can also be used as a junction in a pipe system and may have a solid lid. There are two types.

A Type 1 catch basin is a rectangular box with approximate dimensions of 3'x2'x5'. Type 1 catch basins are utilized when the connected conveyance pipes are less than 18 inches in diameter and the depth from the gate to the bottom of the pipe is less than 5 feet.

A Type 2 catch basin, also commonly referred to as a storm manhole, is listed separately under "Manhole" in this book.

Catch basins typically provide a storage volume (sump) below the outlet pipe to allow sediments and debris to settle out of the stormwater runoff. Some catch basins are also fitted with a spill control device (inverted elbow on outlet pipe) intended to contain large quantities of grease or debris.

Catch basins are frequently associated with all stormwater facilities.



Key Operations and Maintenance Considerations

- The most common tool for cleaning catch basins is an industrial vacuum truck with a tank and vacuum hose (e.g. Vactor® truck) to remove sediment and debris from the sump.
- A catch basin may be an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a catch basin, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

Catch Basin			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
General	Trash and 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%.	No trash or debris located immediately in front of catch basin or on grate opening.
		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.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	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.)	Top slab is free of holes and cracks.
		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.	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.

	Basin Walls/ Bottom	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.	Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	Catch basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Vegetation Inhibiting System	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants. Sheen, obvious oil, or other contaminants present. • Identify and remove source	No contaminants or pollutants present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread. One or more bolts are missing.	Mechanism opens with proper tools. All bolts are seated and no bolts are missing. Cover is secure.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure (Intent is to keep cover from sealing off access to maintenance).	Cover can be removed by one maintenance person.
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 and meets design standards.
Oil/Debris Trap (If Applicable)	Dislodged	Oil or debris trap is misaligned with or dislodged from the outlet pipe.	Trap is connected to and aligned with outlet pipe.

Compost-Amended Soil

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including: water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition.

Compaction from construction can reduce the soil's natural ability to provide these functions. Compost-amended soils are intended to replace these lost functions by establishing a minimum soil quality and depth in the post-development landscape.

Sufficient organic content is a key to soil quality. Soil organic matter can be attained through numerous amendments such as compost, composted woody material, biosolids, and forest product residuals. The full benefits of compost-amended soils are realized when desired soil media depths are maintained and soil compaction is minimized.

Key Operations and Maintenance Considerations

- Replenish soil media as needed (as a result of erosion) and address compacted, poorly draining soils.
- Site uses should protect vegetation and avoid soil compaction. Care should be taken to prevent compaction of soils via vehicular loads and/or excessive foot traffic, especially during wet conditions.
- The table below provides the recommended maintenance frequencies, standards, and procedures for compost-amended soils. The level of routine maintenance required and the frequency of corrective maintenance actions may increase for facilities prone to erosion due to site conditions such as steep slopes or topography tending to concentrate flows.

Compost-Amended Soil			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Soil Media	Soils Waterlogged or Not Infiltrating	Soils become waterlogged, or otherwise do not appear to be infiltrating.	Soils have been aerated or amended such that infiltration occurs and soils to not remain completely saturated, per design specifications.
	Erosion/Scouring	Areas of potential erosion are visible, such as gullies or scouring.	Any eroded areas have been repaired, and sources of erosion addressed to prevent further soil erosion.
Vegetation	Vegetation in Poor Health	Less than 75% of planted vegetation is healthy with a generally good appearance.	At least 75% of planted vegetation is healthy with generally good appearance. Any conditions found that were deleterious to plant health have been corrected where possible. Routine maintenance schedule has been updated as necessary to ensure continued plant health and satisfactory appearance.
	Poisonous Plants and Noxious Weeds	Any poisonous plants 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.	No danger of poisonous vegetation where maintenance personnel or the public might normally be. Eradication of Class A weeds as required by State law. Control of other listed weeds as directed by local policies. Apply requirements of adopted IPM policy for the use of herbicides.
	Other Weeds Present	Other weeds (not listed on City/State noxious weed lists) are present on site.	Weeds have been removed per the routine maintenance schedule, following IPM protocols.

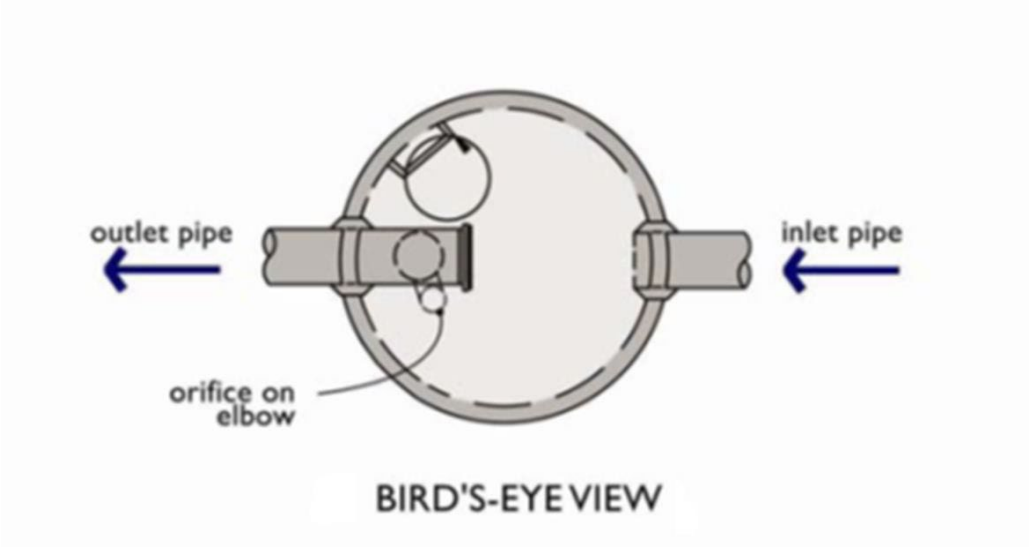
Control Structure/Flow Restrictor

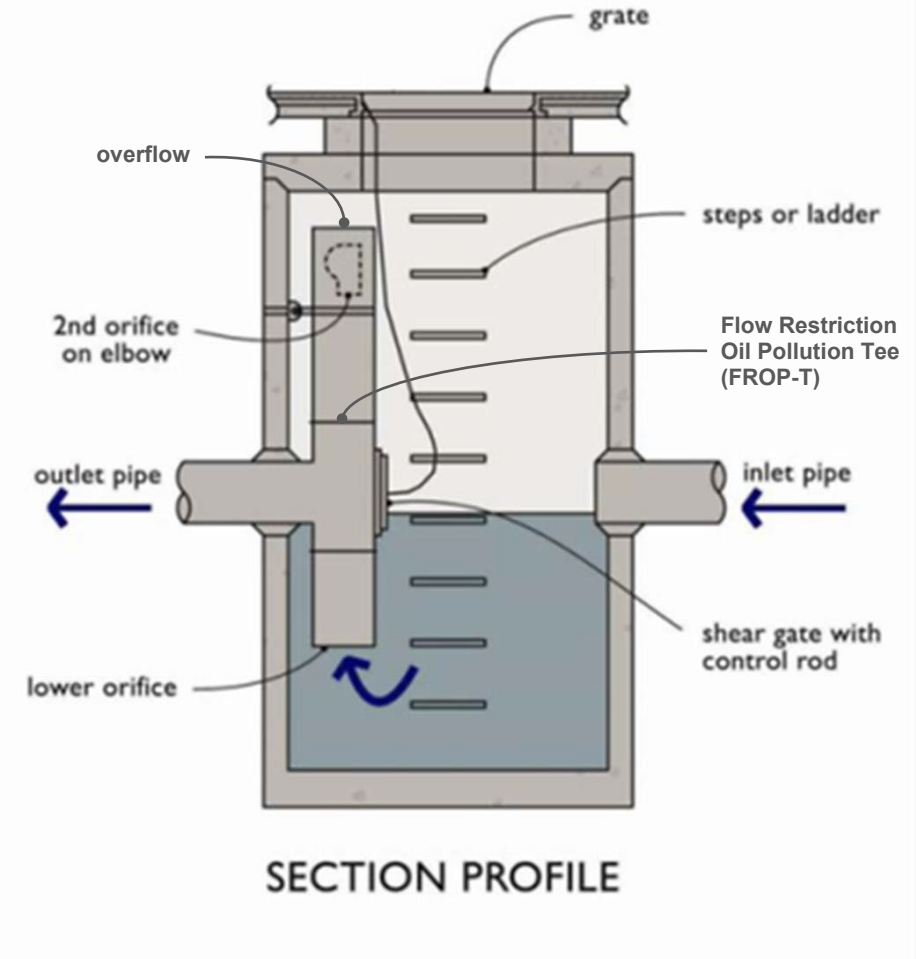
Flow control structures and flow restrictors direct or restrict flow in or out of facility components. Outflow controls on detention facilities are a common example where flow control structures slowly release stormwater at a specific rate. The flow is regulated by a combination of orifices (holes with specifically sized diameters) and weirs (plates with rectangular or "V" shaped notch). Lack of maintenance of the control structure can result in the plugging of an orifice. If these flow controls are damaged, plugged, bypassed, or not working properly, the facility could overtop or release water too quickly.

Control structures have a history of maintenance-related problems and it is imperative to establish a good maintenance program for them to function properly. Sediment typically builds up inside the structure, which blocks or restricts flow to the outlet. To prevent this problem, routinely clean out these structures and conduct regular inspections to detect the need for non-routine cleanout.

Facility objects that are typically associated with a control structure/flow restrictor include:

- detention ponds
- media cartridge filters
- closed detention system
- conveyance stormwater pipe





Key Operations and Maintenance Considerations

- Conduct regular inspections of control structures to detect the need for non-routine cleanout, especially if construction or land-disturbing activities occur in the contributing drainage area.
- The most common tool for cleaning control structures/flow restrictors is a truck with a tank and vacuum hose (Vactor® truck) to remove sediment and debris from the sump.
- A control structure is an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a control structure, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

Control Structure/Flow Restrictor			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Structure	Trash and debris	Trash or debris of more than ½ cubic foot which is located immediately in front of the structure opening or is blocking capacity of the structure by more than 10%.	No Trash or debris blocking or potentially blocking entrance to structure.
		Trash or debris in the structure that exceeds 1/3 the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the structure.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Sediment	Sediment exceeds 60% of the depth from the bottom of the structure to the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section or is within 6 inches of the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section.	Sump of structure contains no sediment.
	Damage to frame and/or top slab	Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering structure through cracks, or maintenance person judges that structure is unsound.	Structure is sealed and structurally sound.
		Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering structure through cracks.	No cracks more than 1/4 inch wide at the joint of inlet/outlet pipe.
	Settlement/ misalignment	Structure has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Damaged pipe joints	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering the structure at the joint of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of inlet/outlet pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Ladder rungs missing or unsafe	Ladder is unsafe due to missing rungs, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
FROP-T Section	Damage	T section is not securely attached to structure wall and outlet pipe structure should support at least 1,000 lbs of up or down pressure.	T section securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight or show signs of deteriorated grout.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes—other than designed holes—in the structure.	Structure has no holes other than designed holes.
Shear Gate	Damaged or missing	Shear gate is missing.	Replace shear gate.
		Shear gate is not watertight.	Gate is watertight and works as designed.

		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
Orifice Plate	Damaged or missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
	Deformed or damaged lip	Lip of overflow pipe is bent or deformed.	Overflow pipe does not allow overflow at an elevation lower than design
Inlet/Outlet Pipe	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.
Metal Grates (If Applicable)	Unsafe grate opening	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.	Grate free of trash and debris.
	Damaged or missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. Any open structure requires urgent maintenance.	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

Conveyance Pipe

Storm sewer pipes convey stormwater. Inlet and outlet stormwater pipes convey stormwater in, through, and out of stormwater facilities.

Pipes are built from many materials. Pipes are cleaned to remove sediment or blockages when problems are identified. Stormwater pipes must be clear of obstructions and breaks to prevent localized flooding. All stormwater pipes should be in proper working order and free of the possible defects listed below.

Key Operations and Maintenance Considerations

- The most common tool for cleaning stormwater conveyance pipes is a truck with a tank, vacuum hose, and a jet hose (Vactor® truck) to flush sediment and debris from the pipes.

Conveyance Pipe			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
General	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants. Sheen, obvious oil, or other contaminants present. • Identify and remove source.	No contaminants or pollutants present.
	Obstructions, Including Roots	Root enters or deforms pipe, reducing flow.	Roots have been removed from pipe (using mechanical methods; do not put root-dissolving chemicals in storm sewer pipes). If necessary, vegetation over the line removed.
	Sediment and Debris	Sediment depth is greater than 20% of pipe diameter.	Pipe has been cleaned and is free of sediment/ debris. (Upstream debris traps installed where applicable.)
	Debris Barrier or Trash Rack Missing	Stormwater pipes > than 18 inches need debris barrier.	Debris barrier present on all stormwater pipes 18 inches and greater.
	Damage to protective coating or corrosion	Protective coating is damaged; rust or corrosion is weakening the structural integrity of any part of pipe.	Pipe repaired or replaced.
	Damaged	Any dent that decreases the cross section area of pipe by more than 20% or is determined to have weakened structural integrity of the pipe.	Pipe repaired or replaced.

Fencing/Gates/Bollards/Water Quality Sign

Stormwater facilities such as detention ponds or treatment wetlands often have fences to protect them from damage and keep children away from ponds or hazardous areas. Some facilities are required to have informational signs telling the public that the site is a stormwater facility.

Fencing/Gates/Bollards/Water Quality Sign			
Drainage System Feature	**Potential Defect**	**Conditions When Maintenance Is Needed**	**Minimum Performance Standard**
Fencing (Site)	Site erosion or holes under fence	Erosion or holes more than 4 inches high and 12-18 inches wide permitting access through an opening under a fence.	No access under the fence.
Fencing (Wood Posts, Boards, and Cross Members)	Missing or damaged parts	Missing or broken boards, post out of plumb by more than 6 inches or cross members broken	No gaps on fence due to missing or broken boards, post plumb to within 1½ inches, cross members sound.
	Weakened by rotting or insects	Any part showing structural deterioration due to rotting or insect damage	All parts of fence are structurally sound.
	Damaged or failed post foundation	Concrete or metal attachments deteriorated or unable to support posts.	Post foundation capable of supporting posts even in strong wind.
Fencing (Metal Posts, Rails, and Fabric)	Damaged parts	Post out of plumb more than 6 inches.	Post plumb to within 1½ inches.
		Top rails bent more than 6 inches.	Top rail free of bends greater than 1 inch.
		Any part of fence (including post, top rails, and fabric) more than 1 foot out of design alignment.	Fence is aligned and meets design standards.
		Missing or loose tension wire.	Tension wire in place and holding fabric.
	Deteriorated paint or protective coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.	Structurally adequate posts or parts with a uniform protective coating.
	Openings in fabric	Openings in fabric are such that an 8-inch diameter ball could fit through.	Fabric mesh openings within 50% of grid size.
Chain Link Fencing Gate	Damaged or missing members	Missing gate.	Gates in place.
		Broken or missing hinges such that gate cannot be easily opened and closed by a maintenance person.	Hinges intact and lubed. Gate is working freely.
		Gate is out of plumb more than 6 inches and more than 1 foot out of design alignment.	Gate is aligned and vertical.
		Missing stretcher bar, stretcher bands, and ties.	Stretcher bar, bands, and ties in place.
	Locking mechanism does not lock gate	Locking device missing, non-functioning or does not link to all parts.	Locking mechanism prevents opening of gate.
	Openings in fabric	Openings in fabric are such that an 8-inch diameter ball could fit through.	Fabric mesh openings within 50% of grid size.

Fencing/Gates/Bollards/Water Quality Sign			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Bollards	Damaged or missing	Bollard broken, missing, does not fit into support hole or hinge broken or missing.	No access for motorized vehicles to get into facility.
	Does not lock	Locking assembly or lock missing or cannot be attached to lock bollard in place.	No access for motorized vehicles to get into facility.
Water Quality Sign	Sign is Damaged or Missing	Water quality sign is leaning more than 8 inches off vertical.	Sign reset to plumb.
		Water quality sign is missing or 20% of the surface is unreadable.	Sign replaced.

Modular Detention Systems

Modular detention systems are passive, flow-through, stormwater detention systems that detain (store) stormwater underground. These detention systems function similarly to a detention pond with the temporary storage volume provided by an underground structure to regulate the storm discharge rate from the site. The structure is typically constructed of modular units that provide void space for stormwater detention surrounded by a structural aggregate, filter fabric, and/or membrane to isolate the detention from surrounding material and support various above-ground uses (such as parking, roadways, etc.). These systems are typically utilized for sites that do not have space available for an above-ground system and are more commonly associated with commercial sites. The modular nature allows them to be installed with various sizes to accommodate site-specific detention volumes and used for sites with irregularly-shaped spaces available for stormwater detention.

Example Proprietary Modular Detention System Installation

(Source: Contech Engineered Solutions)

Key Operations and Maintenance Considerations

- The most common tool for cleaning manufactured modular detention systems is a truck with a tank and vacuum hose (Vactor® truck) to remove sediment and debris.
- Underground detention systems are enclosed spaces where harmful chemicals and vapors can accumulate. Therefore, the inspection and maintenance of these facilities should be conducted by an individual trained and certified to work in hazardous confined spaces.
- Periodic inspections of the inlet and outlet areas to ascertain correct operation of the system.
- Access and maintenance requirements and methods vary by type of system; some maintenance activities may be accomplished without human entry into the system. Check the manufacturer's publications and the site's maintenance plan for details.

Modular Detention Systems			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the depth of the storage area for 1/2 length of storage area or any point depth exceeds 15% of depth. (Example: 72-inch deep storage area would require cleaning when sediment reaches depth of 7 inches for more than 1/2 length of storage area.)	Storage area free of sediment and debris.
	Leaks in Joints Between Storage/ Vault/ Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability.)	All joints between tank/pipe sections are sealed.
	Tears, Cracks, or Leaks in Storage Area Structure	Cracks wider than 1/2 inch and any evidence of soil particles entering the storage area through cracks or tears in top, bottom or walls, or maintenance/inspection personnel determines that the storage area is not structurally sound.	Storage area replaced or repaired to design specifications and is structurally sound. No further evidence of soil particles entering through cracks/tears in enclosure.
	Poor Water Quality	Inspection of discharge water for obvious signs of poor water quality (i.e. obvious oil or other contaminants present).	Effluent discharge from vault clear, without thick visible sheen.
	Other Defects Listed in Manufacturer Specifications or Maintenance Literature	Other damage or defects that prevent the system from functioning to design specifications.	Defects repaired/ corrected per manufacturer's documentation and/ or design specifications.
	Vegetation Encroachment	Root encroachment of tree or shrub have impacted function or integrity of system.	Roots are found in system to be removed and repair system.

Planter Box Media Filters

Planter box media filters are passive, flow-through, stormwater treatment systems. They are comprised of a planter box, treatment media and a tree. Stormwater runoff enters the planter box system through a curb-inlet opening or pipe and flows through a specially designed filter media mixture contained in a landscaped concrete container. The filter media captures pollutants; those pollutants are then decomposed, volatilized, and incorporated into the biomass of the system's micro/macro fauna and flora. Stormwater runoff flows through the media and into an underdrain system at the bottom of the container.

Filterra® units are an example of a proprietary manufactured filter media planter box system. See manufacturer's publications for additional maintenance information.

Facility objects that are typically associated with a manufactured planter box media filter system include:

- conveyance stormwater pipe

Key Operations and Maintenance Considerations

- The main maintenance need is keeping the mulch surface permeable.
- Filter media may become clogged due to a pollutant discharge.
- The main treatment function is due to the tree roots and soil biota. Dead or severely damaged trees must be replaced.
- Trees may need to be trimmed to provide clear sight lines along roads.

Planter Box Media Filter Systems			
Drainage System Feature	Potential Defect	Conditions When Maintenance is Needed	Minimum Performance Standard
Inlet	Excessive Sediment or Trash Accumulation	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions, allowing free distributed flow of water into Filterra
Mulch Cover	Trash and Floatable Debris Accumulation.	Excessive trash and/or debris accumulation.	Mulch cover is free of trash and debris.
	"Ponding" of Water on Mulch Cover	Clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover
	Mulch Depth	Depth of mulch is less than 3 inches.	Total depth of mulch is 3 inches.
Amended Soil	Soil Nutrients	Soil not providing plant nutrients.	Soil providing plant nutrients.
	Bare Spots	Bare spots on soil in bioretention area.	No bare spots, bioretention area covered with vegetation or mulch mixed into the underlying soil.
	Compaction	Poor infiltration due to soil compaction in the bioretention area.	No soil compaction in the bioretention area.
Vegetation	Plants not Growing or in Poor Conditions	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.
	Plant Growth Excessive	Tree growth inhibits traffic visibility and/or pedestrian access.	Trim tree in accordance with typical landscaping and safety.
Structure	Structure has Visible Cracks	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
	Settlement/ Misalignment	Structure has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Structure replaced or repaired to design standards.
	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 vault.)	Top slab is free of holes and cracks.
		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.	Frame is sitting flush on the riser rings or top slab and firmly attached.

Planter Box Media Filter Systems			
Drainage System Feature	Potential Defect	Conditions When Maintenance is Needed	Minimum Performance Standard
Access Manhole	Cover/lid not in place	Cover/lid is missing or only partially in place. Any open manhole requires immediate maintenance.	Manhole access covered.
	Locking mechanism not working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.
Tree Grate (If Applicable)	Grate Opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
	Grate not in Place	Grate does not fit securely on frame (1/4 inch lip or greater).	Grate is flush with sidewalk and/or structure.
	Grate Difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.
High Flow Bypass	Trash and Debris	Trash and debris blocking bypass.	Bypass is unobstructed and free of trash and debris.
	Default Overflow	System is defaulting to high flow bypass.	System does not default to the high flow bypass. Amended soils and mulch replaced and system returned to design standards.

APPENDIX D

Standard Commercial BMPs

Chapter 4 - Best Management Practices for Commercial and Industrial Activities

This chapter coordinates with the worksheet in Chapter 2. That worksheet and the BMPs are organized by the different activities businesses perform. If you perform the listed activity indoors, controlling all discharges from the activity (e.g., process water, washwater, lubricants, solvents, fugitive dust, granular material, blow down waste) such that no exposure to stormwater occurs, then you do not have to institute new BMPs for that activity. However, if you checked the column for activities performed outdoors, match the number from the worksheet to the activities listed in this section to find the BMPs you should utilize. See also Section 1.5 for explanation of required and suggested BMPs.

If you have questions, please contact Pierce County Surface Water Management (253) 798-2725. They can provide assistance over the phone and are also available for consultations at your business site.

Below is a summary of items that each business should consider. Most of these are common sense, housekeeping types of solutions; but if each business would take some action on each of these, the improvement in water quality would be substantial.

1. Avoid the activity or reduce its occurrence

If possible, avoid the activity or do it less frequently. Is there a substitute process or a different material available to get the job done? Can a larger run of a process be performed at one time, thus reducing the number of times per week or month it needs to be repeated? For instance, raw materials could be delivered close to the time of use instead of being stockpiled and exposed to the weather. Perhaps the site could avoid one solvent-washing step altogether. Ecology or the Tacoma-Pierce County Health Department can provide pollution prevention assistance.

2. Move the activity indoors

Sometimes it is fairly easy to move an activity indoors out of the weather. The benefits of this are twofold; preventing runoff contamination, and providing for easier, more controlled cleanup if a spill occurs. An example would be unloading and storing barrels of chemicals inside a garage area instead of doing it outside. Please be aware that moving storage areas indoors may require installation of fire suppression equipment or other building modifications as required by the International Building Code (IBC), the International Fire Code or local ordinances.

3. Cleanup spills quickly

Promptly contain and cleanup solid and liquid pollutant leaks and spills on any exposed soil, vegetation, or paved area. Promptly repair or replace all leaking connections, pipes, hoses, valves, etc. which can contaminate stormwater.

4. Use less material

Do not purchase or use more material than needed. This helps to keep potential disposal, storage, and pollution problems to a minimum too.

5. Use the least toxic materials available

Investigate the use of materials that are less toxic than what is used now. Perhaps a caustic-type detergent or a solvent could be replaced with a more environmentally friendly product. Such a change might allow the site to discharge process water to the sanitary sewer instead of paying for expensive disposal (contact Pierce County Sewer Utilities at (253) 798-3013 to find out about allowable sanitary discharges and pretreatment permits). Remember that even if using a biodegradable product, nothing but uncontaminated water is allowed to enter the stormwater drainage system.

6. Create and maintain vegetated areas near activity locations

Vegetation of various kinds can help filter pollutants out of stormwater, so it is advisable to route stormwater through vegetated areas located near the activity. For instance, many parking lots contain grassy islands, typically formed in a “hump”. By creating those islands as depressions instead of humps, they can be used to treat runoff from the parking lot or roof. For high-use sites, conveyance to an oil removal system may be required. For more information on high-use sites, refer to Volume V, Section 2.1, Step 3. Also, don't forget the erosion control benefits of vegetation at a site.

7. Locate activities as far as possible from surface drainage paths

Activities located as far as possible from known drainage paths, ditches, streams, other water bodies, and drains will be less likely to pollute, since it will take longer for material to reach the drainage feature. This gives more time to react in the event of a spill, or if it is a “housekeeping” issue, may protect the local waters long enough for cleanup of the area around the activity. Don't forget that groundwater issues are always prominent, no matter where the activity is located, so the actions taken on the site on a day-to-day basis are always important, even in dry weather.

8. Keep stormwater drainage systems clean and maintained

Pollutants can concentrate over time in storm drainage structures such as catch basins, ditches, and storm drains. When a large storm event occurs, it can mobilize these pollutants and carry them to receiving waters. Develop and implement maintenance practices, inspections, and schedules for treatment devices (e.g., detention ponds, oil/water separators, vegetated swales). Requirements for cleaning stormwater facilities will be discussed later in Chapter 5, specifically BMP S.9.

Promptly repair or replace all substantially cracked or otherwise damaged paved secondary containment, high-intensity parking, and any other drainage areas that are subjected to pollutant material leaks or spills.

9. Reduce, reuse, and recycle as much as possible

Always look for ways to recycle instead of just disposing. This can save money as well as keep both hazardous and non-hazardous materials out of the landfills. Learn more about other businesses that have made process changes allowing recycling of chemicals by calling Ecology at 1-800-RECYCLE and requesting publication No. 92-45 and No. 90-22. Another unique recycling opportunity for businesses is available through the Industrial Materials Exchange. This free service acts as a waste or surplus "matchmaker," helping one company's waste become another company's asset. For instance, waste vegetable oil can become biofuel for another business. Call Industrial Materials Exchange at (206) 263-8465 to list potentially usable solid or chemical waste in their publication.

10. Be an advocate for stormwater pollution prevention

Help friends, partners, and business associates find ways to reduce stormwater pollution in their activities. Most people want clean water and do not pollute intentionally. Share ideas and the BMPs in this volume to get them thinking about how their everyday activities effect water quality.

11. Report problems

We all must do our part to protect water, fish, wildlife, and our own health by employing proper BMPs, and reporting water quality problems that we observe. In Pierce County to report dumping to sewers, call Pretreatment Inspections at (253) 798-3013, to report incidents involving storm drains or ditches call Surface Water Management at (253) 798-2725. Also contact Ecology's Southwest Regional office at (360) 407-6300.

12. Oversight and training

Assign one or more individuals to be responsible for stormwater pollution control. Hold regular meetings to review the overall operation of the BMPs. Establish responsibilities for inspections, operation and maintenance (O&M), and availability for emergency situations. Train all team members in the operation, maintenance, and inspection of BMPs and reporting procedures.

13. Dust control

Sweep paved material handling and storage areas regularly as needed, to collect and dispose of dust and debris that could contaminate stormwater. Do not hose down pollutants from any area to the ground, storm drain, conveyance ditch, or receiving water unless necessary for dust control purposes to meet air quality regulations and unless the pollutants are conveyed to a treatment system approved by the county.

14. Maintenance

Clean oils, debris, sludge, etc. from all BMP systems regularly, including catch basins, settling/detention basins, oil/water separators, boomed areas, and conveyance systems, to prevent the contamination of stormwater.

Promptly repair or replace all substantially cracked or otherwise damaged paved secondary containment, high-intensity parking, and any other drainage areas that are subjected to pollutant material leaks or spills.

Promptly repair or replace all leaking connections, pipes, hoses, valves, etc. which can contaminate stormwater.

Maintenance standards can be found in Volume I, Appendix I-A.

15. Eliminate illicit connections

An illicit connection is formally defined in the county's NPDES Municipal Stormwater permit, but generally includes any connection to the county stormwater system that is not intended, permitted, or used for collecting and conveying stormwater. A common problem with the stormwater drainage system for Pierce County is the existence of illegal hook-ups to the system. Many businesses and residences hooked internal building drains, sump overflows, process wastewater discharges, and even sanitary sewer and septic system pipes to the storm drain in the past. All businesses and residences in Pierce County must examine their plumbing systems to determine if illicit connections exist. Any time it is found that toilets, sinks, appliances, showers and bathtubs, floor drains, industrial process waters, or other indoor activities are connected to the stormwater drainage system, these connections must be immediately rerouted to the sanitary or septic system, holding tanks, or

process treatment system. Methods to eliminate illicit connections are described in detail in Chapter 5, BMP S.1.

16. Dispose of waste properly

Every business and residence in Pierce County must dispose of solid and liquid wastes and contaminated stormwater properly. There are generally four options for disposal depending on the type of materials. These options include:

- Sanitary sewer and septic systems
- Recycling facilities
- Municipal solid waste disposal facilities
- Hazardous waste treatment, storage, and disposal facilities.

Additional information on disposal is described in Chapter 5, BMP S.2.

Section A1

Cleaning or Washing Activities

A1.1 Cleaning or Washing of Tools, Engines, and Manufacturing Equipment

Description of Pollutant Sources: This activity applies to businesses and public agencies that clean manufacturing equipment such as saws, grinders, screens, and other processing devices outside of buildings, and to businesses engaged in pressure washing of engines, equipment, and portable objects.

Pollutants sources include toxic hydrocarbons, organic compounds, oils and greases, nutrients, heavy metals, pH, suspended solids, biochemical oxygen demand (BOD), and chemical oxygen demand (COD).

Pollutant Control Approach: The preferred approach is to cover and/or contain the cleaning activity or conduct the activity inside a building, to separate the uncontaminated stormwater from the pollutant sources. Washwater must be conveyed to a sanitary sewer after approval by Pierce County, temporarily stored before proper disposal, or recycled, with no discharge to the ground, a storm drain, or surface water. Washwater may be discharged to the ground after proper treatment in accordance with *Ecology guidance WQ-R-95-56, Vehicle and Equipment Washwater Discharges/Best Management Practices Manual November 2012, or most recent update*. The quality of any discharge to the ground after proper treatment must comply with Ecology's Ground Water Quality Standards, Chapter 173-200 WAC. Contact the Ecology Southwest Regional Office for an NPDES permit application for discharge of washwater to surface water or to a storm drain after onsite treatment.

Required BMPs

The following BMPs, or equivalent measures, are required of all businesses and public agencies engaged in cleaning or washing of tools, engines, equipment, and portable objects:

- Illicit connections to the stormwater drainage system must be eliminated. See BMP S.1 in Chapter 5 for detailed information.
- Employees should be educated to control washing operations to prevent stormwater contamination.
- All washwater must discharge to a holding tank, process treatment system, or sanitary sewer, never to the stormwater drainage system. See BMP S.3 in Chapter 5 for detailed information on how this must be accomplished.
- Pressure washing must be done in a designated area (such as a wash pad) provided with a sump drain and stormwater runon prevention (Figures 4.1 and 4.2). See BMPs S.6 and S.7 in Chapter 5 for information on sumps (or holding tanks) and runon prevention. Contact the Pierce County Pretreatment Program (253) 798-3013 for washing operation policy.

(Photo courtesy of Seattle Public Utilities)

Figure 4.1. Wash Pad for Tool and Equipment Washing.

Figure 4.2. Uncovered Washing Area for Tools, Engines, Equipment, and Portable Objects, with Drains to a Sanitary Sewer, Process Treatment, or a Dead-End Sump.

Suggested BMPs

The following BMPs are not required, but they can provide additional pollution control:

- If soaps or detergents are used, use the least toxic cleaner capable of doing the job. Use non-phosphate detergent, if possible, to reduce loadings at your local wastewater treatment plant.
- Limit the amount of water used in washing activities to reduce the potential of runoff carrying pollutants beyond the designated wash pad or capture system.
- Recycle washwater for subsequent washings.

Implement one or more of the stormwater treatment BMPs found in Volume V.

- For discharging washwaters containing soaps and detergents, the use of infiltration, bioretention, biofiltration, wet ponds, and wetlands must not result in the violation of groundwater quality standards.

A1.2 Cleaning or Washing of Cooking Equipment

Description of Pollutant Sources: This activity applies to businesses that clean cooking equipment such as vent filters, grills, and grease traps outside of buildings.

Pollutants of concern consist of oil and grease, nutrients, suspended solids, biochemical oxygen demand (BOD) and chemical oxygen demand (COD).

Pollutant Control Approach: Businesses engaged in this activity that cannot connect discharges to a sanitary sewer, holding tank, or process water treatment system must contact Ecology and obtain a NPDES wastewater permit.

Required BMPs

The following BMPs or equivalent measures are required of all businesses engaged in cleaning or washing of cooking equipment:

- Illicit connections to the stormwater drainage system must be eliminated. See BMP S.1 in Chapter 5 for detailed requirements.
- Employees must be educated about the need to prevent stormwater contamination from washing operations.
- Washwater cannot be discharged to the stormwater drainage system.
- Paved washing areas must be swept daily to collect loose solid materials for proper disposal.
- Greasy buildup on cooking equipment must be removed and properly disposed of prior to washing to reduce the amount of material that can potentially contaminate runoff.
- Move the activity indoors, into either an existing building or a newly constructed building or shed, with drainage to a sanitary sewer, holding tank, or process treatment system (Figure 4.3). See BMP S.3 in Chapter 5 for further information on drainage alternatives. Any connection to the sanitary sewer requires the approval of Industrial Pretreatment Program at (253) 798-3013.

OR

Use a tub or similar device to contain washwater. This water must be recycled for subsequent washing, or disposed of in a holding tank or sanitary sewer.

OR

If the washing activity cannot be moved indoors or contained in a tub, then the washing area must drain to a sanitary sewer, holding tank, or process

treatment system, and provisions must be made to prevent stormwater runon onto the washing area. See BMP S.3 in Chapter 5 for detailed drainage requirements and BMP S.7 for runon prevention schemes. If discharging to a sanitary sewer, permits must be obtained from Industrial Pretreatment Program at (253) 798-3013.

(Photo courtesy of Seattle Public Utilities)

Figure 4.3. Cleaning and Washing Cooking Equipment Indoors.

- If a holding tank is used for storage of washwater, the contents must be pumped out before it is full and disposed of appropriately to a sanitary sewer or wastewater treatment system.

Suggested BMPs

The following BMPs are not required, but they can provide additional pollution protection:

- A cover should be placed over a designated wash area to keep rain from falling on dirty equipment and producing contaminated runoff.

- Implement one or more of the treatment BMPs found in Volume V.

For discharging washwaters containing soaps and detergents, the use of infiltration, bioretention, biofiltration, wet ponds, and wetlands must not result in the violation of groundwater quality standards.

A1.3 Washing, Pressure Washing, and Steam Cleaning of Vehicles / Equipment / Building Structures

Description of Pollutant Sources: Pollutant sources include the commercial cleaning of vehicles, aircraft, vessels, carpets, industrial equipment, and large buildings with low or high pressure water or steam. This includes frequent "charity" car washes at gas stations and commercial parking lots. The cleaning can include hand washing, scrubbing, sanding, etc. Washwater from cleaning activities can contain oil and grease, suspended solids, heavy metals, soluble organics, soaps, and detergents that can contaminate stormwater.

Pollutant Control Approach: The preferred approach is to cover and/or contain the cleaning activity, or conduct the activity inside a building, to separate the uncontaminated stormwater from the washwater sources. Contact the Pierce County Industrial Pretreatment Program (253) 798-3013 for advice and consultation on appropriate treatment and for approvals to discharge to sanitary sewer. Convey washwater to a sanitary sewer after approval by the Pierce County Industrial Pretreatment Program. Provide temporary storage before proper disposal, or recycling. Under this preferred approach, no discharge to the ground, a storm drain, or surface water should occur.

The Industrial Stormwater General Permit prohibits the discharge of process wastewater (e.g., vehicle washing wastewater) to groundwater or surface water. Stormwater that commingles with process wastewater is considered process wastewater.

Facilities not covered under the Industrial Stormwater General Permit that are unable to follow one of the preferred approaches listed above may discharge washwater to the ground after proper treatment in accordance with *Ecology guidance WQ-R-95-56, Vehicle and Equipment Washwater Discharges/Best Management Practices Manual, November 2012, or most recent update*. The quality of any discharge to the ground after proper treatment must comply with Ecology's Ground Water Quality Standards, Chapter 173-200 WAC. Contact the Ecology Southwest Regional Office to discuss permitting options for discharge of washwater to surface water or to a storm drain after onsite treatment.

Required BMPs

Conduct vehicle/equipment washing in one of the following locations:

- At a commercial washing facility in which the washing occurs in an enclosure and drains to the sanitary sewer, or
- In a building constructed specifically for washing of vehicles and equipment, which drains to a sanitary sewer.

Conduct outside washing operation in a designated wash area with the following features:

- In a paved area, construct a spill containment pad to prevent the runon of stormwater from adjacent areas. Slope the spill containment area to collect

washwater in a containment pad drain system with perimeter drains, trench drains, or catchment drains. Size the containment pad to extend out a minimum of four feet on all sides of the washed vehicles and/or equipment.

- Convey the washwater to a sump (like a grit separator) and then to a sanitary sewer (if allowed by the Pierce County Sewer Utility), or other appropriate wastewater treatment or recycle system.

- Collect the washwater from building structures and convey it to appropriate treatment such as a sanitary sewer system if it contains oils, soaps, or detergents. If the washwater does not contain oils, soaps, or detergents (in this case only a low pressure, clean, cold water rinse is allowed), then it could drain to soils that have sufficient natural attenuation capacity for dust and sediment.

- Any discharge to the sanitary sewer requires the approval of Industrial Pretreatment Program at (253) 798-3013. Contact the utility for details on approved systems.

Suggested BMPs

- Mark the wash area at gas stations, multifamily residences, and any other business where non-employees wash vehicles.

- Operators may use a manually operated positive control valve for uncovered wash pads, but a pneumatic or electric valve system is preferable. The valve may be on a timer circuit and opened upon completion of a wash cycle. After draining the sump or separator, the timer would then close the valve.

Note that the purpose of the valve is to convey only washwater and contaminated stormwater to a treatment system.

- Use phosphate-free biodegradable detergents when practicable.

- Consider recycling the washwater.

- Operators may use soluble/emulsifiable detergents in the wash medium, but should use it with care and the appropriate treatment. Carefully consider the selection of soaps and detergents and treatment BMPs. Oil/water separators are ineffective in removing emulsified or water soluble detergents. Another treatment appropriate for emulsified and water soluble detergents may be required.

- At commercial parking lots, where it is not possible to discharge the washwater to a sanitary sewer, a temporary plug or a temporary sump

pump can be used at the storm drain to collect the washwater for offsite disposal.

- New and used car dealerships may wash vehicles in the parking stalls without soap, or if an approved treatment system for the washwater is in place.

Pierce County encourages residents to make use of car wash fundraising programs through the Puget Sound Car Wash Association (206) 622-8425 or online, visit <www.pscarwash.org>; or contact Brown Bear at (206) 774-3742; or contact Classy Chassis at (253) 284-9274.

At industrial sites contact the Ecology Southwest Regional Office for NPDES permit requirements even when not using soaps, detergents, and/or other chemical cleaners in washing trucks.

A1.4 Collection and Disposal of Wastewater in Mobile Interior Washing Operations

Description of Pollutant Sources: This activity applies to businesses that wash carpets and other interior items on a mobile site-to-site basis. The typical fleet washing process includes use of machines that spray the washwater solution onto the carpet or upholstery and then vacuums the dirty solution up into a portable tank with limited capacity.

Pollutants of concern consist of nutrients, suspended solids, organic compounds (such as pesticides and chemicals used for flea and odor control), biochemical oxygen demand (BOD), and chemical oxygen demand (COD).

Pollutant Control Approach: Common practice in the past was to discharge the dirty solution onto the ground or to a drain connected to the stormwater drainage system between site visits. ***These practices are now illegal.*** **Wastewater must be poured into a sanitary sewer drain at the site of collection, the business office, or at another proper location. If discharging to a sanitary sewer, permits must be obtained from Industrial Pretreatment Program at (253) 798-3013. If sanitary sewer disposal is not available or not allowed, the collected wastewater must be returned to the business site for process treatment or transfer to a holding tank.**

Required BMPs

This BMP is required of all businesses doing mobile interior wash activities:

- Absolutely no wastewater from mobile interior wash activities can be disposed of outdoors, or to a drain connected to the stormwater drainage system. This point must be made clear to all employees. Wastewater from mobile washing operations may be permitted for sanitary sewer disposal if it does not contain high concentrations of toxic materials. Some of the chemicals used for flea and odor control are listed by U.S. Environmental Protection Agency (U.S. EPA) as toxics. Industrial Pretreatment Program at (253) 798-3013 will need to know the type of chemicals and amount of water you intend to discharge. If the discharge is approved, they will then issue a permit for your activity. Wastewater must be poured into a sanitary sewer drain at the site of collection, the business office, or at another proper location.

- If sanitary sewer disposal is not available or not allowed, the collected wastewater must be returned to the business site for process treatment or transfer to a holding tank. See BMP S.3 in Chapter 5 for details on these drainage/disposal alternatives.

Suggested BMPs

The following BMPs are not required, but can provide additional pollution protection:

- Use the least toxic detergents and cleaners that will get the job done. Select non-phosphate detergents when possible.
- Limit the amount of water used in interior washing operations. This will save you time, money, and effort when it comes to proper disposal.
- Recycle washwater for more than one use.

Section A2

Transfer of Liquid or Solid Materials

A2.1 Loading and Unloading Areas for Liquid or Solid Material

Description of Pollutant Sources: Operators typically conduct loading/unloading of liquid and solid materials at industrial and commercial facilities is typically conducted at shipping and receiving, outside storage, fueling areas, etc. Materials transferred can include products, raw materials, intermediate products, waste materials, fuels, scrap metals, etc. Leaks and spills of fuels, oils, powders, organics, heavy metals, salts, acids, alkalis, etc. during transfer are potential causes of stormwater contamination. Spills from hydraulic line breaks are a common problem at loading docks.

Pollutant Control Approach: Cover and contain the loading/unloading area where necessary to prevent runon of stormwater and runoff of contaminated stormwater.

Required BMPs

At All Loading/Unloading Areas:

- A significant amount of debris can accumulate outside, uncovered loading/unloading areas. Sweep these surfaces frequently to remove loose material that could contaminate stormwater. Sweep areas temporarily covered after removal of the containers, logs, or other material covering the ground.

- Place drip pans, storm drain covers or other appropriate temporary containment devices at locations where leaks or spills may occur such as hose connections, hose reels, and filler nozzles. Always use drip pans when making and breaking connections (Figure 4.4). Check loading/unloading equipment such as valves, pumps, flanges, and connections regularly for leaks and repair as needed.

    - Consistent with International Fire Code requirements and to the extent practicable, conduct unloading or loading of solids and liquids in a manufacturing building or under a roof, lean-to, or other appropriate cover.

    - Berm, dike, and/or slope the loading/unloading area to prevent runon of stormwater and to prevent the runoff or loss of any spilled material from the area.

    - Place curbs along the edge of the shoreline, or slope the edge such that the stormwater can flow to an internal stormwater drainage system that leads to an approved treatment BMP. Avoid draining directly to the surface water from loading areas.

    - Pave and slope loading/unloading areas to prevent the pooling of water. Minimize the use of catch basins and drain lines within the interior of the loading/unloading area or place in designated

"alleyways" to avoid being covered by material, containers, or equipment.

- Retain on site the necessary materials for rapid cleanup of spills.

(Photo courtesy of Mark Dilley, Interstate Products, Inc.)

Figure 4.4. Drip Pan for Connections at Loading and Unloading Areas for Liquid Material.

- To minimize the risk of accidental spillage, prepare an "Operations Plan" that describes procedures for loading/unloading. Train the employees, especially fork lift operators, in its execution and post it or otherwise have it readily available to employees and regulatory officials.

- Report spills of reportable quantities to Ecology Southwest Regional Office (refer to Chapter 7 for telephone number).

- Prepare and implement an emergency spill cleanup plan for the facility (BMP A7.15 Spills of Oil and Hazardous Substances) which includes the following BMPs:

- Ensure cleanup of liquid/solid spills in the loading/unloading area immediately if a significant spill occurs, upon completion of the loading/unloading activity, or at the end of the working day.
- Retain and maintain an appropriate oil spill cleanup kit on site for rapid cleanup of material spills (see BMP A7.15 Spills of Oil and Hazardous Substances).
- Ensure that an employee trained in spill containment and cleanup is present during loading/unloading.

At Rail Transfer Areas to Above/Below-ground Storage Tanks:

- Install a drip pan system as illustrated (Figure 4.4) within the rails to collect spills/leaks from tank cars and hose connections, hose reels, and filler nozzles.

Loading/Unloading from/to Marine Vessels:

- Facilities and procedures for the loading or unloading of petroleum products must comply with Coast Guard requirements.

Transfer of Small Quantities from Tanks and Containers:

- Refer to BMPs A4.8 Storage of Liquids in Permanent Aboveground Tanks and A4.7 Storage of Liquid, Food Waste, or Dangerous Waste Containers for requirements on the transfer of small quantities from tanks and containers, respectively.

Suggested BMPs

- For the transfer of pollutant liquids in areas that cannot contain a catastrophic spill, install an automatic shutoff system in case of unanticipated off-loading interruption (e.g., coupling break, hose rupture, overfill).

At Loading and Unloading Docks:

- Install/maintain overhangs or door skirts that enclose the trailer end (Figures 4.5 and 4.6) to prevent contact with rainwater.
- Design the loading/unloading area with berms, sloping, etc. to prevent the runon of stormwater.

At Tanker Truck Transfer Areas to Above/Below-Ground Storage Tanks:

- Pave the area on which the transfer takes place. If any transferred liquid, such as gasoline, is reactive with asphalt, pave the area with Portland cement concrete.

- Slope, berm, or dike the transfer area to a dead-end sump, spill containment sump, spill control oil/water separator, or other spill control device (see also Volume I, Appendix I-A for dead-end sump maintenance guidelines). The minimum spill retention time should be 15 minutes at the highest fuel dispenser nozzle through-put rate or the peak flow rate of the 6-month, 24-hour storm event over the surface of the containment pad, whichever is greater. The volume of the spill containment sump should be a minimum of 50 gallons with an adequate grit sedimentation volume.

Figure 4.5. Loading Docks with an Overhang to Prevent Material Contact with Rainwater.

Figure 4.6. Door Skirts to Enclose the Trailer End of a Truck to Prevent Material Contact with Rainwater.

A2.3 Engine Repair and Maintenance

Description of Pollutant Sources: This activity applies to businesses and public agencies where fuel filters, engine oil, and other fluids such as battery acid, coolants, and transmission and brake fluids are removed and replaced in vehicles and equipment. It also applies to mobile vehicle maintenance operations, such as at construction sites. Related vehicle maintenance activities are covered under the following activity headings in this volume, and other BMPs provided in this volume:

- A1.3 Washing, Pressure Washing, and Steam Cleaning of Vehicles/Equipment/Building Structures
- A2.1 Loading and Unloading Areas for Liquid or Solid Material
- A2.2 Fueling at Dedicated Stations
- A3.7 Painting, Finishing, and Coating of Vehicles, Products, and Equipment
- A4.1 Storage or Transfer (Outside) of Solid Raw Materials, By-Products, or Finished Products
- A4.7 Storage of Liquid, Food Waste, or Dangerous Waste Containers
- A4.8 Storage of Liquids in Permanent Aboveground Tanks
- A4.9 Parking and Storage for Vehicle and Equipment
- A7.15 Spills of Oil and Hazardous Substances

Pollutants of concern include toxic hydrocarbons, toxic organic compounds, oils and greases, pH, and heavy metals.

Pollutant Control Approach: Control of leaks and spills of fluids using good housekeeping and cover and containment BMPs.

Required BMPs

The following BMPs or equivalent measures are required of all businesses and agencies engaged in engine and vehicle repair:

- Employees must be educated about the need for careful handling of automotive fluids. Employees at businesses or agencies who routinely change or handle these fluids must be trained in spill response and cleanup procedures. Inspect all incoming vehicles, parts, and equipment stored temporarily outside for leaks.

- Remove batteries and liquids from vehicles and equipment in designated areas designed to prevent stormwater contamination. Store cracked batteries in a covered non-leaking secondary containment system.

- Empty fuel filters before disposal.

- Spill cleanup materials, such as rags and absorbent materials, must always be kept close at hand when changing oil and other fluids. You can comply more easily with sewer and stormwater requirements by running a 'dry shop', thereby reducing your consumption/discharge of liquids. Soiled rags and other cleanup material must be properly disposed of or cleaned and reused. Contact Pierce County Planning and Public Works Sustainable Resources (253) 798-2179, online at: <https://www.piercecountywa.org/1507/Recycle-Reduce-Waste >, or your local solid waste hauler for proper disposal options.

- No drains inside maintenance buildings may connect to the sanitary sewer without prior written approval by the county, contact the Industrial Pretreatment Program at (253) 798-3013. Interior drains will not be allowed to be connected to the stormwater drainage system.

- Do not hose down the maintenance/repair area. Instead, sweep the area weekly to collect dirt, and wipe up spills with rags and other absorbent materials.

- If the work is done at a mobile location, such as a construction site, a tarpaulin, ground cloth, or drip pans must be used beneath the vehicle or equipment to capture all spills and drips (Figure 4.8). The collected drips and spills must be recycled or disposed of properly. See BMP S.2 in Chapter 5 for disposal options.

Figure 4.8. Drip Pan for Use at Mobile Sites.

- If this activity occurs at a stationary business location, the activity area must be moved indoors. An exception to this requirement would be equipment that is too large to fit under a roofed area. In this case, the outdoor area must be paved, provided with a sump drain, and provision made for stormwater runon prevention. See BMP S.6 and S.7 in Chapter 5 for more on paving, sump drains and holding tanks, and runon prevention. Contact Industrial Pretreatment Program at (253) 798-3013 for information on requirements for disposal to sewer. If you are on a septic tank, sump contents will need to be pumped and disposed of by an oil recycler or hazardous waste company.

- Recycle oil, antifreeze, batteries, and air conditioning coolant.

- Contaminated stormwater runoff from vehicle staging and maintenance areas must be conveyed to an API or coalescent plate oil and water separator followed by a basic treatment BMP (see Volume V), applicable filter, or other equivalent oil treatment system.

Suggested BMPs

- Drain all fluids from wrecked vehicles and 'parts' cars/equipment upon arrival. Recover air conditioning gases.

- Use reusable cloth rags to cleanup drips and small spills instead of disposables: these can be professionally laundered and reused. Do not attempt to launder these at home or at a coin-op laundry.

- Use absorbent pillows or booms in or around storm drains and catch basins to absorb oil and fuel.

A2.4 Mobile Fueling of Vehicles and Heavy Equipment

Description of Pollutant Sources: Mobile fueling, also known as fleet fueling, wet fueling, or wet hosing, is the practice of filling fuel tanks of vehicles by tank trucks that are driven to the yards or sites where the vehicles to be fueled are located.

Historically organizations conducted mobile fueling for off-road vehicles operated for extended periods in remote areas. This includes construction sites, logging operations, and farms. Some organizations conduct mobile fueling of on-road vehicles commercially in the State of Washington.

Note that some local fire departments may have restrictions on mobile fueling.

Pollutant Control Approach: Operators typically need proper training of the fueling operations, and the use of spill/drip control and reliable fuel transfer equipment with backup shutoff valving.

Required BMPs

Organizations and individuals conducting mobile fueling operations must implement the BMPs listed below. The operating procedures for the driver/operator should be simple, clear, effective and their implementation verified by the organization that will potentially be liable for environmental and third party damage.

- Ensure that the Pierce County Fire District approves of all mobile fueling operations. Comply with county and Washington State fire codes.
- In fueling locations that are in close proximity to sensitive aquifers, designated wetlands, wetland buffers, or other waters of the state, approval by Pierce County is necessary to ensure compliance with additional local requirements.
- Ensure compliance with all 49 CFR 178 requirements for DOT 406 cargo tanker. Documentation from a U.S. Department of Transportation Registered Inspector provides proof of compliance.
- Ensure the presence and the constant observation/monitoring of the driver/operator at the fuel transfer location at all times during fuel transfer and implementation of the following procedures at the fuel transfer locations:
    - Locate the point of fueling at least 25-feet from the nearest storm drain or inside an impervious containment with a volumetric holding capacity equal to or greater than 110 percent of the fueling tank volume, or covering the storm drain to ensure no inflow of spilled or leaked fuel. Covers are not required for storm drains that convey the inflow to a spill control separator approved by Pierce County,

including the Pierce County Fire District. Potential spill/leak conveyance surfaces must be impervious and in good repair.

- Place a drip pan or an absorbent pad under each fueling location prior to and during all dispensing operations. The pan (must be liquid tight) and the absorbent pad must have a capacity of at least 5 gallons. There is no need to report spills retained in the drip pan or the pad.
- Manage the handling and operating of fuel transfer hoses and nozzle, drip pan(s), and absorbent pads as needed to prevent spills/leaks of fuel from reaching the ground, storm drains, and receiving waters.
- Avoid extending the fueling hoses across a traffic lane without fluorescent traffic cones, or equivalent devices, conspicuously placed so that all traffic is blocked from crossing the fuel hose.
- Remove the fill nozzle and cease filling the tank when the automatic shut-off valve engages. Do not lock automatic shutoff fueling nozzles in the open position.
- Do not "top off" the fuel receiving equipment.

- Provide the driver/operator of the fueling vehicle with:
  - Adequate flashlights or other mobile lighting to view fuel fill openings with poor accessibility. Consult with the Pierce County Fire District for additional lighting requirements.
  - Two-way communication with his/her home base.
- Train the driver/operator annually in spill prevention and cleanup measures and emergency procedures. Make all employees aware of the significant liability associated with fuel spills.
- The responsible manager shall properly sign and date the fueling operating procedures. Distribute procedures to the operators, retain them in the organization files, and make them available in the event an authorized government agency requests a review.
- Immediately notify the Pierce County Fire District (911) and the Ecology Southwest Regional Office in the event of any spill entering surface or groundwater. Establish a "call down list" to ensure the rapid and proper notification of management and government officials should any significant amount of product be lost off site. Keep the list in a protected but readily accessible location in the mobile fueling truck. The "call down list" should also pre-identify spill response contractors available in the area to ensure the rapid removal of significant product spillage into the environment.

- Maintain a minimum of the following spill cleanup materials in all fueling vehicles, that are readily available for use:
    - Non-water absorbents capable of absorbing at least 15 gallons of diesel fuel
    - A storm drain plug or cover kit
    - A non-water absorbent containment boom of a minimum 10 feet in length with a 12-gallon absorbent capacity (Figure 4.9)
    - A non-spark generating shovel (a steel shovel could generate a spark and cause an explosion in the right environment around a spill)
    - Two, 5-gallon buckets with lids.

Figure 4.9. Spill Containment Boom.

- Use automatic shutoff nozzles for dispensing the fuel. Replace automatic shut-off nozzles as recommended by the manufacturer.
- Maintain and replace equipment on fueling vehicles, particularly hoses and nozzles, at established intervals to prevent failures.
- Include the following fuel transfer site components:
    - Automatic fuel transfer shut-off nozzles
    - An adequate lighting system at the filling point.

Section A3

Production and Application Activities

A3.1 Concrete and Asphalt Mixing and Production at Stationary Sites

Description of Pollutant Sources: This activity applies to businesses and agencies that mix raw materials on site to produce concrete or asphalt. It also applies to subsequent uses such as pouring concrete structures and making other concrete or asphalt products. Mobile concrete pouring and asphalt application are covered under **Activity A3.2** in this section. Requirements for stockpiling of raw materials are covered under **Activity A4.1 Storage or Transfer (Outside) of Solid Raw Materials, By-products or Finished Products.**

Pollutants of concern include toxic hydrocarbons, toxic organic compounds, oils and greases, heavy metals, and pH.

Pollutant Control Approach: Cover and contain processes where possible and prevent stormwater runon and contamination, where feasible.

Any facility categorized under SIC Code 2951 (asphalt paving mixtures and blocks) or SIC Code 3273 (ready-mix concrete) may need to comply with Ecology's NPDES Sand and Gravel General Permit. Contact Ecology at (360) 407-6400 for additional information.

Required BMPs

The following BMPs or equivalent measures are required of all businesses and public agencies active in concrete and asphalt mixing and production:

- Eliminate all illicit connections to the stormwater drainage system. See BMP S.1 in Chapter 5 for a detailed discussion on identifying and eliminating these connections.

- All process water from production, pouring, and equipment cleaning must be discharged to a dead-end sump, process water treatment system, or sanitary sewer (subject to approval by Industrial Pretreatment Program; call (253) 798-3013), or recycled (see also Volume I, Appendix I-A for dead-end sump maintenance guidelines). Never wash fresh concrete or concrete mixer washout into streets, stormwater drainage systems, streams, other water bodies, or to groundwater.

- A BMP maintenance schedule must be established, and employees educated about the need to prevent stormwater contamination through the use and proper maintenance of BMPs.

Suggested BMPs

- The production and pouring area should be swept at the end of each workday to collect loose chunks of aggregate and raw materials for recycling or proper disposal. See BMP S.2 in Chapter 5 for disposal options.

- Sweep all driveways and gutters that show accumulation of materials to minimize the amount that could be carried off site by rain and enter the stormwater drainage system.

- Asphalt plants should use an oil/water separator to treat stormwater runoff. See Volume V of this manual, Runoff Treatment BMPs for more information.

- Production and pouring areas should be protected from stormwater runon. See BMP S.7 in Chapter 5 for methods of runon protection.

- Use absorbent materials in and around storm drains and catch basins to filter out contaminants. See Volume V of this manual, Runoff Treatment BMPs, for more information.

- Pave the mixing, production, and pouring areas. A sump drain in these areas is probably not advisable due to potential clogging problems, but could be used in a curing area. Sweep these areas to remove loose aggregate and recycle or dispose of properly.

- Use storm drain covers or similarly effective containment devices to prevent runoff from entering the stormwater drainage system. Accumulations of dirty runoff must be disposed of properly.

Contact Pierce County Surface Water Management (253) 798-2725 for information about water quality treatment BMPs for these types of operations. Visit Ecology's Web site for accepted water quality treatment at: <https://ecology.wa.gov/Water-Shorelines/Water-quality/Runoff-pollution/Stormwater >.

The use of any treatment BMP must not result in the violation of groundwater or surface water quality standards.

A3.2 Concrete Pouring, Concrete Cutting, and Asphalt Application at Temporary Sites

Description of Pollutant Sources: This activity applies to businesses and public agencies that apply asphalt or pour or cut concrete for building construction and remodeling, road construction, sidewalk, curb and gutter repairs and construction, sealing of driveways and roofs, and other applications. These activities are typically done on a temporary site-to-site basis where permanent BMP measures do not apply. Concrete pouring activities can not only severely alter the pH of receiving waters, but slurry from aggregate washing can harden in storm pipes, thus reducing capacity and creating flooding problems.

Pollutants of concern include toxic hydrocarbons, toxic organic compounds, oils and greases, heavy metals, suspended solids, and pH.

Pollutant Control Approach: Train employees on proper procedures, sweep or shovel aggregate chunks, collect accumulated runoff and solids, and wash equipment in designated areas.

Required BMPs

The following BMPs or equivalent measures are required of all businesses and agencies doing concrete pouring and asphalt application at temporary sites:

- Employees must be educated on the pollution hazards of concrete and asphalt application and cutting.
- Loose aggregate chunks and dust must be swept or shoveled and collected (not hosed down a storm drain) for recycling or proper disposal at the end of each workday, especially at work sites such as streets, driveways, parking lots, sidewalks, curbs, and gutters where rain can readily pick up the loose material and carry it to the nearest stormwater conveyance. Small amounts of excess concrete, grout, and mortar can be disposed of in the trash.
- Storm drain covers or similarly effective containment devices must be placed over all nearby drains at the beginning of each day. Shovel or vacuum slurry and remove from the site. All accumulated runoff and solids must be collected and properly disposed of (see BMP S.2 in Chapter 5 for disposal options) at the end of each workday, or more often if necessary.
- Exposed aggregate washing, where the top layer of unhardened concrete is hosed or scraped off to leave a rough finish, must be done with a mechanism for containment and collection of the discarded concrete slurry.

- Cleaning of concrete application and mixing equipment or concrete vehicles must be done in a designated area where the rinse water is controlled and properly disposed. See Volume II, Section 3.1, BMP C154 for more information.

The use of any treatment BMP must not result in the violation of groundwater or surface water quality standards.

Suggested BMPs

- Avoid the activity when rain is occurring or expected.
- If possible, portable asphalt mixing equipment should be covered by an awning, a lean-to, or another simple structure to avoid contact with rain. See BMP S.4 in Chapter 5 for further details on cover structures.
- Recycle broken concrete and asphalt. Look under Recycling Services in the Yellow Pages of the phone book to find the recycler nearest you.

A3.3 Manufacturing and Postprocessing of Metal Products

Description of Pollutant Sources: This activity applies to businesses such as mills, foundries, and fabricators that manufacture or postprocess metal products. A variety of activities such as machining, grinding, soldering, cutting, welding, quenching, etching, bending, coating, cooling, and rinsing may take place. These businesses may be required to obtain a NPDES permit from Ecology. See Chapter 6 for a discussion of NPDES requirements. Note: Painting, finishing and coating of metal products is covered under **A3.7 Painting, Finishing, and Coating of Vehicles, Boats, Buildings, and Equipment**.

Pollutants of concern include toxic organic compounds, heavy metals, oils and greases, pH, suspended solids, and chemical oxygen demand (COD).

Pollutant Control Approach: Cover and contain operations and apply good housekeeping and preventive maintenance practices to prevent the contamination of stormwater.

Required BMPs

The following BMPs or equivalent measures are required of all businesses engaged in metals manufacturing or postprocessing:

- Eliminate illicit connections to the stormwater drainage system. See BMP S.1 in Chapter 5 for detailed information on identifying and eliminating illicit connections.

- Process wastewater (including contact cooling water, filter backwash, cooling tower blow down, etc.) from processing or production, and stormwater runoff from activity areas, must discharge to the sanitary sewer, holding tank, or process treatment system need an Ecology NPDES permit for discharge to surface water or storm drain. Contact Industrial Pretreatment Program at (253) 798-3013 to obtain permits for discharge to the sewer. See BMP S.3 in Chapter 5 for detailed requirements.

- Employees must be educated in proper handling to control their work with metal products to minimize pollution.

- The activity area must be swept at the end of each workday to collect and dispose of metal fragments and product residues properly. See BMP S.2 in Chapter 5 for disposal alternatives. Do not allow metal fragments, residues, or dust to accumulate in areas exposed to stormwater.

Suggested BMPs

- Limit the amount of water used in quenching and rinsing. Recycle used water where possible.

- Cover the activity area to prevent rain from contacting the process and reduce the amount of runoff that has to be detained or treated. See BMP A3.9.

- Refer to the BMPs under sections A2 Transfer of Liquid or Solid Materials and A4 Storage and Stockpiling Activities, and utilize those BMPs which are applicable for materials storage and maintenance activities in your shop.

A3.4 Wood Treatment Areas

Description of Pollutant Sources: Wood treatment includes both anti-staining and wood preserving using pressure processes or by dipping or spraying. Wood preservatives include creosote, creosote/coal tar, pentachlorophenol, copper naphthenate, arsenic trioxide, malathion, or inorganic arsenicals such as chromated copper arsenate, acid copper chromate, chromate zinc chloride, and fluor-chrome-arsenate-phenol. Anti-staining chemical additives include iodo-prophenyl-butyl carbamate, dimethyl sulfoxide, didecyl dimethyl ammonium chloride, sodium azide, 8-quinolinol, copper (II) chelate, sodium ortho-phenylphenate, 2-(thiocyanomethylthio)-benzothiazole (TCMTB) and methylene bis- (thiocyanate), and zinc naphthenate.

Pollutant sources include drips of condensate or preservative after pressurized treatment, product washwater (in the treatment or storage areas), spills and leaks from process equipment and preservative tanks, fugitive emissions from vapors in the process, blowouts and emergency pressure releases, and kick-back from lumber (phenomenon where preservative leaks as it returns to normal pressure). Potential pollutants typically include the wood treating chemicals, BOD, suspended solids, oil and grease, benzene, toluene, ethylbenzene, phenol, chlorophenols, nitrophenols, heavy metals, and PAH, depending on the chemical additive used.

Pollutant Control Approach: Cover and contain all wood treating areas and prevent all leaching of and stormwater contamination by wood treating chemicals. Wood treating facilities may be covered by the Industrial Stormwater General Permit or by an individual permit. Individual permits covering wood treatment areas include applicable source control BMPs or require the development of BMPs or a SWPPP. Facilities covered under the Industrial Stormwater General Permit must prepare and implement a SWPPP. When developing a SWPPP or BMPs, wood treating facilities should include the applicable source control BMPs listed below.

Required BMPs

- Use dedicated equipment for treatment activities to prevent the tracking of treatment chemicals to other areas on the site.
- Eliminate non-process traffic on the drip pad. Scrub down non-dedicated lift trucks on the drip pad.
- Immediately remove and properly dispose of soils with visible surface contamination (green soil) to prevent the spread of chemicals to groundwater and/or surface water via stormwater runoff.
- If any treated wood is observed to be contributing chemicals to the environment in the treated wood storage area, relocate it on a concrete chemical containment structure until the surface is clean and until it is drip free and surface dry.

- Cover and/or enclose, and contain with impervious surfaces, all wood treatment areas. Slope and drain areas around dip tanks, spray booths, retorts, and any other process equipment in a manner that allows return of treatment chemicals to the wood treatment process.

- Cover storage areas for freshly treated wood to prevent contact of treated wood products with stormwater. Segregate clean stormwater from process water. Convey all process water to an approved treatment system.

- Seal any holes or cracks in the asphalt areas that are subject to wood treatment chemical contamination.

- Elevate stored, treated wood products to prevent contact with stormwater runon and runoff.

- Place dipped lumber over the dip tank or on an inclined ramp for a minimum of 30 minutes to allow excess chemical to drip back to the dip tank.

- Place treated lumber from dip tanks or retorts in a covered paved storage area for at least 24 hours before placement in outside storage. Use a longer storage period during cold weather unless the temporary storage building is heated. Prior to moving wood outside, ensure that the wood is drip free and surface dry.

Suggested BMP

- Consider using preservative chemicals that do not adversely impact receiving surface water and groundwater.

A3.6 Landscaping and Lawn/Vegetation Management

Description of Pollutant Sources: Landscaping can include grading, soil transfer, vegetation removal, pesticide and fertilizer application, and watering. Stormwater contaminants include toxic organic compounds, heavy metals, oils, total suspended solids, coliform bacteria, fertilizers, and pesticides.

Lawn and vegetation management can include control of objectionable weeds, insects, mold, bacteria, and other pests with pesticides. Pesticides include herbicides, rodenticides, insecticides, fungicides, etc. Examples of pesticide uses include:

- Weed control on golf course lawns, access roads, and utility corridors and during landscaping;
- Sap stain and insect control on lumber and logs;
- Rooftop moss removal;
- Killing nuisance rodents;
- Fungicide application to patio decks;
- Residential lawn/plant care.

It is possible to release toxic pesticides such as pentachlorophenol, carbamates, and organometallics to the environment by leaching and dripping from treated parts, container leaks, product misuse, and outside storage of pesticide contaminated materials and equipment. Poor management of the vegetation and poor application of pesticides or fertilizers can cause appreciable stormwater contamination.

Irrigation consists of discharges from irrigation water lines, landscape irrigation, and lawn or garden watering. Excessive watering can lead to discharges of chlorinated potable water runoff into drainage systems; it can also cause erosion; and negatively affect plant health. Improper irrigation can encourage pest problems, leach nutrients, and make a lawn completely dependent on artificial watering. Mosquito breeding habitats may form through excessive watering.

Pollutant Control Approach: Control of fertilizer and pesticide applications, soil erosion, and site debris to prevent contamination of stormwater.

Develop and implement an Integrated Pest Management Plan and use pesticides only as a last resort. Refer to Appendix IV-B Example of an Integrated Pest Management Program for more information. Carefully apply pesticides/herbicides in accordance with label instructions. Maintain appropriate vegetation, with proper fertilizer application where practicable, to control erosion and the discharge of stormwater pollutants. Where

A3.7 Painting, Finishing, and Coating of Vehicles, Boats, Buildings, and Equipment

Description of Pollutant Sources: Surface preparation and the application of paints, finishes, and/or coatings to vehicles, boats, buildings, and/or equipment outdoors can be sources of pollutants. Potential pollutants include organic compounds, oils and greases, heavy metals, and suspended solids.

Pollutant Control Approach: Cover and contain painting and sanding operations and apply good housekeeping and preventive maintenance practices to prevent the contamination of stormwater with painting over sprays and grit from sanding.

Required BMPs

- Train employees in the careful application of paints, finishes, and coatings to reduce misuse and overspray. Use ground or drop cloths underneath outdoor painting, scraping, sandblasting work, and properly clean and temporarily store collected debris daily.
- Do not conduct spraying, blasting, or sanding activities over open water or where wind may blow paint or waste into water.
- Wipe up spills with rags and other absorbent materials immediately. Do not hose down the area to a storm drain, conveyance ditch, or receiving water.
- On marine dock areas, sweep rather than hose down debris. Collect any hose water generated and convey to appropriate treatment and disposal.
- Use an effective runoff control device if dust, grit, washwater, or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the workday. Collect contaminated runoff and solids and properly dispose of such wastes before removing the containment device(s) at the end of the workday.
- Use a ground cloth, pail, drum, drip pan, tarpaulin, or other protective device for activities such as outdoor paint mixing and tool cleaning, or where spills can contaminate stormwater.
- Properly dispose of all wastes and prevent all uncontrolled releases to the air, ground, or water.
- Clean brushes and tools covered with non-water-based paints, finishes, or other materials in a manner that allows collection of used solvents (e.g., paint thinner, turpentine, xylol) for recycling or proper disposal.

- Store toxic materials under cover (tarpaulin, etc.) during precipitation events and when not in use to prevent contact with stormwater.

- Enclose and/or contain all work while using a spray gun or conducting sand blasting and in compliance with applicable Puget Sound Air Pollution Control Agency Air Quality (PSAPCA), Occupational Safety and Health Administration (OSHA), and Washington Industrial Safety and Health Act (WISHA) requirements. Do not conduct outside spraying, grit blasting, or sanding activities during windy conditions that render containment ineffective.

Suggested BMPs

- Incidental cleaning of paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers. Dump pollutants collected in portable containers into a sanitary sewer drain, NOT a stormwater drain.

- Recycle paint, paint thinner, solvents, pressure washwater, and any other recyclable materials.

- Use efficient spray equipment such as electrostatic, air-atomized, high volume/low pressure, or gravity feed spray equipment.

- Purchase recycled paints, paint thinner, solvents, and other products if feasible.

A3.8 Commercial Printing Operations

Description of Pollutant Sources: Materials used in the printing process include inorganic and organic acids, resins, solvents, polyester film, developers, alcohol, vinyl lacquer, dyes, acetates, and polymers. Waste products may include waste inks and ink sludge, resins, photographic chemicals, solvents, acid and alkaline solutions, chlorides, chromium, zinc, lead, spent formaldehyde, silver, plasticizers, and used lubricating oils. With indoor printing operations, the only likely points of potential contact with stormwater are the outside temporary waste material storage area and area where chemicals are offloaded at external unloading bays. Pollutants can include total suspended solids, pH, heavy metals, oil and grease, and COD.

Pollutant Control Approach: Ensure appropriate disposal and NPDES permitting of process wastes. Cover and contain stored raw and waste materials.

Required BMPs

- Discharge process wastewaters to a sanitary sewer (if approved by Pierce County Industrial Pretreatment Program at (253) 798-3013) or to an approved process wastewater treatment system.
- Do not discharge process wastes or wastewaters into storm drains or surface water.
- Determine whether any of these wastes qualify for regulation as dangerous wastes and dispose of them accordingly.
- Store raw materials or waste materials that could contaminate stormwater in covered and contained areas.

Suggested BMPs

- Train all employees in pollution prevention, spill response, and environmentally acceptable materials handling procedures.
- Store materials in proper, appropriately labeled containers. Identify and label all chemical substances.
- Regularly inspect all stormwater management devices and maintain as necessary.
- Try to use press washes without listed solvents, and with the lowest VOC content possible. Do not evaporate ink cleanup trays to the outside atmosphere.
- Place cleanup sludges into a container with a tight lid and dispose of as dangerous waste. Do not dispose of cleanup sludges in the garbage or in containers of soiled towels.

For additional information on pollution prevention the following Ecology publications are recommended: *A Guide for Screen Printers*, publication No. 94-137 and *A Guide for Lithographic Printers*, publication No. 94-139.

A3.11 Application of Pesticides, Herbicides, Fungicides, and Rodenticides for Purposes Other than Landscaping

This activity applies to businesses and government agencies using pesticides, herbicides, fungicides and rodenticides for purposes such as removing moss from rooftops or decks, killing nuisance rodents and some insects (such as termites and carpenter ants) that live outdoors but can invade the home if left unchecked. Businesses and government agencies involved in these activities must comply with Tacoma-Pierce County Health Department regulations and Washington State Department of Agriculture pesticide regulations. See Chapter 6 for more information on these regulations. The BMPs listed are intended to complement other regulations. Application of pesticides for landscaping purposes must follow the BMPs discussed under **A3.6 Landscaping and Lawn/Vegetation Management.**

Pollutants of Concern: Toxic organic compounds, oils, heavy metals, Chemical oxygen demand (COD)

Required BMPs

The following BMPs or equivalent measures are required of all businesses and agencies applying pesticides, herbicides, fungicides and rodenticides for non-landscaping purposes:

- Proper application practices must be used to avoid excessive application. Follow the manufacturers' guidelines and directions carefully.
- Never apply pesticides, herbicides, fungicides or rodenticides when rain is expected, or during rain events.
- Do not apply chemicals when it is windy. Early morning is typically the calmest time of day.
- Employees must be educated regarding the pollution potential of misusing the chemicals they are working with.
- Manage residues properly. Triple rinse or pressure rinse empty containers and mixing and application equipment. Collect all rinse water, and use it for diluting the next batch.

Suggested BMPs

- Use manual pest control measures, such as scraping or using high-pressure sprayers to remove moss from roofs and decks, before resorting to chemicals. Rodent traps can also be highly effective, without endangering pets and children as chemical baits can.
- Integrated Pest Management (IPM)is a comprehensive approach to the use of pesticides. IPM minimizes pesticide application and stresses selection

of proper products and tailored application rates. It is a sensible long-term strategy rather than a hit-and-run operation, and as such is probably the most effective BMP measure that can be utilized under this activity. See BMP S.8 in Chapter 5 for more details on IPM and in Appendix IV-B for an example.

Section A4

Storage and Stockpiling Activities

A4.1 Storage or Transfer (Outside) of Solid Raw Materials, Byproducts, or Finished Products

Description of Pollutant Sources: Some pollutant sources stored outside in large piles, stacks, etc. at commercial or industrial establishments include:

- Solid raw materials
- By-products
- Gravel
- Sand
- Salts
- Topsoil
- Compost
- Logs
- Sawdust
- Wood chips
- Lumber and other building materials
- Concrete
- Metal products

Contact between bulk materials stored outside and stormwater can cause leachate and erosion of the stored materials. Contaminants include total suspended solids, oxygen demanding substances (i.e., BOD and COD), organics, and dissolved salts (sodium, calcium, magnesium chloride, etc.).

Pollutant Control Approach: Provide impervious containment with berms, dikes, etc. and/or cover to prevent runon and discharge of leachate pollutant(s) and total suspended solids.

Required BMPs

- Do not hose down the contained stockpile area to a storm drain or a conveyance to a storm drain or receiving water.
- The source control BMP options listed below are applicable to stockpiles greater than 5 cubic yards of erodible or water soluble materials such as:

- Soil
- Road de-icing salts
- Compost
- Unwashed sand and gravel
- Sawdust
- Outside storage areas for solid materials such as
- Logs
- Bark
- Lumber
- Metal products

Choose one or more of the following Source Controls:

- Store in a building or paved and bermed covered area as shown in Figure 4.12.

Figure 4.12. Covered and Secured Storage Area for Bulk Solids.

- Place temporary plastic sheeting (polyethylene, polypropylene, hypalon, or equivalent) over the material (Figure 4.13); or

- Pave the area and install a stormwater drainage system. Place curbs or berms along the perimeter of the area to prevent the runon of uncontaminated stormwater and to collect and convey runoff to treatment. Slope the paved area in a manner that minimizes the contact between stormwater (e.g., pooling) and leachable materials in compost, logs, bark, wood chips, etc.

- For large uncovered stockpiles, implement containment practices at the perimeter of the site and at any catch basins as needed to prevent erosion and discharge of the stockpiled material offsite or to a storm drain. Ensure that no direct discharge of contaminated stormwater to catch basins exists without conveying runoff through an appropriate treatment BMP.

Figure 4.13. Temporary Plastic Sheeting Anchored over Raw Materials Stored Outdoors.

- Convey contaminated stormwater from the stockpile area to a wet pond, wet vault, settling basin, media filter, or other appropriate treatment system, depending on the contamination.

Suggested BMPs

- Maintain drainage areas in and around storage of solid materials with a minimum slope of 1.5 percent to prevent pooling and minimize leachate formation. Areas should be sloped to drain stormwater to the perimeter for collection, or to internal drainage "alleyways" where no stockpiled material exists.

- Sweep paved storage areas regularly for collection and disposal of loose solid materials.

- If and when feasible, collect and recycle water-soluble materials (leachates).
- Stock cleanup materials such as brooms, dustpans, and vacuum sweepers near the storage area.

A4.2 Storage and Treatment of Contaminated Soils

Description of Pollutant Sources: This activity applies to businesses and agencies that store and treat soils contaminated with toxic organic compounds, petroleum products, or heavy metals. Such contamination typically comes to light when an environmental audit is done or old underground tanks are removed. The soils are usually excavated and taken off site for treatment via aeration and perhaps chemical stabilization. Stormwater runoff that comes in contact with contaminated soil can carry those contaminants along with loose dirt into receiving waters.

Pollutants of concern include toxic organic compounds, oils and greases, and heavy metals.

Pollutant Control Approach: The Tacoma-Pierce County Health Department Waste Management Section at (235) 798-6047 regulates and permits businesses treating contaminated soil. In addition, a permit from the Puget Sound Clean Air Agency is required if the treatment method for removing soil contaminants involves forcing air through, or extracting air from, the soil. Contact these agencies for additional information regarding the appropriate pollutant control approach.

The use of any treatment BMP must not result in the violation of groundwater or surface water quality standards.

A4.5 Recyclers and Scrap Yards

Description of Pollutant Sources: This activity applies to businesses and public agencies that salvage and store scrap metal, scrap equipment, junk appliances and vehicles, empty metal drums, and recyclable items such as cans, bottles, paper products, construction materials, metals, and beverage containers. This does not apply to businesses and agencies that store these items for less than 2 weeks. Businesses engaged in these activities may be required to obtain an NPDES permit for stormwater discharges from Ecology. See the discussion of NPDES requirements in Chapter 6 for more information. For these permit holders, the BMPs listed below should be used to complement NPDES requirements.

Potential sources of pollutants include paper, plastic, metal scrap debris, engines, transmissions, radiators, batteries, and other materials contaminated or that contain fluids. Other pollutant sources include leachate from metal components, contaminated soil, and the erosion of soil. Activities that can generate pollutants include the transfer, dismantling, and crushing of vehicles and scrap metal; the transfer and removal of fluids; maintenance and cleaning of vehicles, parts, and equipment; and storage of fluids, parts for resale, solid wastes, scrap parts, and materials, equipment and vehicles that contain fluids, generally in uncovered areas.

Potential pollutants typically found at these facilities include: toxic hydrocarbons, polychlorinated biphenyls (PCBs), other toxic organic compounds, heavy metals, oils and greases, suspended solids, oxygen demanding substances (i.e., BOD and COD), ethylene and propylene glycol, and acidic pH.

Required BMPs

- For facilities subject to Ecology's industrial stormwater general permit refer to BMP Guidance Document No. 94-146 "Vehicle Recyclers: A Guide for Implementing the Industrial Stormwater General National Pollutant Discharge Elimination System (NPDES) Permit Requirements," Ecology, March 2011, Web site: <https://fortress.wa.gov/ecy/publications/documents/94146.pdf>.

- For facilities not subject to Ecology's industrial stormwater general permit, apply the BMPs in BMP Guidance Document No. 94-146 (see above), as well as the following required BMPs where applicable, depending on the pollutant sources existing at those facilities:

    - Gasoline, engine fluids, freon, and other contaminated liquids must be drained from scrapped items in a designated area and disposed of or recycled properly before the items are placed in the scrap storage area. See BMP S.2 in Chapter 5 for acceptable disposal options. The designated fluid draining area must be covered and paved, or if not covered, must be paved and sloped to a drain and holding tank. See

BMP S.3 in Chapter 5 for drainage alternatives. Batteries must also be removed and recycled properly prior to storage.

- Employees must be educated about the need for stormwater pollution protection, and proper maintenance of BMPs. They also must have training in spill cleanup procedures, and appropriate cleanup materials must be stocked near the fluid draining area.

- Catch basins on the property must be cleaned as needed. See BMP S.9 in Chapter 5 for more details.

- If the storage area is small, the scrap or recycling materials must be covered. See BMPs S.4 and S.5 in Chapter 5 for further details on coverings.

OR

- If the storage area cannot be covered, a stormwater treatment system consisting of a wet pond/vault, infiltration basin with underdrains, filtration system, or vegetated biofilter preceded by an oil/water separator must be provided to treat runoff from the entire material storage area. See Volume V for detailed information on these treatment methods.

Suggested BMPs

- The material storage area can be paved and sloped to a drain and holding tank. See BMP S.6 in Chapter 5 for details on this drainage strategy.

- Use of a containment dike, curb, or berm can help prevent contaminated runoff from leaving the site, and can function to direct runoff to one of the treatment methods mentioned under the Required BMPs. See BMP S.7 in Chapter 5 for more details.

- Chemical addition can be used to enhance settling or adjust pH in a wet pond/vault or filtration system. See Volume II, Section 3.2, BMP C252 for details on pH adjustment.

- Recycle, reuse, or let others use your scrap materials.

A4.6 Treatment, Storage, or Disposal of Dangerous Wastes

This activity applies to businesses and public agencies that are permitted by Ecology to treat, store, or dispose of dangerous wastes. Ecology regulates these facilities with specific requirements, which include the need for a NPDES permit. Detailed BMPs are not included in this volume since site requirements for these facilities are well beyond the level of typical BMP applications. See Chapter 6 for reference information.

The Tacoma-Pierce County Health Department also administers some aspects of dangerous waste treatment, storage, and disposal. Call (253) 798-6047 for more information.

A4.7 Storage of Liquid or Dangerous Waste Containers

Description of Pollutant Sources: Steel and plastic drums with volumetric capacities of 55 gallons or less are typically used at industrial facilities for container storage of liquids and powders. The BMPs specified below apply to container(s) located outside a building. Use these BMPs when temporarily storing accumulated food wastes, vegetable or animal grease, used oil, liquid feedstock or cleaning chemicals, or Dangerous Wastes (liquid or solid), unless the business is permitted by Ecology to store the wastes. Leaks and spills of pollutant materials during handling and storage are the primary sources of pollutants. Oil and grease, acid/alkali pH, oxygen demanding substances (i.e., BOD and COD) are potential pollutant constituents.

Pollutant Control Approach: Store containers in impervious containment under a roof or other appropriate cover, or in a building. For storage areas on site for less than 30 days, consider using a portable temporary secondary system in lieu of a permanent system as described above.

Required BMPs

- Place tight-fitting lids on all containers.
- Place drip pans beneath all mounted container taps and at all potential drip and spill locations during filling and unloading of containers.
- Inspect container storage areas regularly for corrosion, structural failure, spills, leaks, overfills, and failure of piping systems. Check containers daily for leaks/spills. Replace containers, and replace and tighten bungs in drums, as needed.
- Businesses accumulating Dangerous Wastes that do not contain free liquids need only to store these wastes in a sloped designated area with the containers elevated or otherwise protected from stormwater runon.
- Secure drums when stored in an area where unauthorized persons may gain access in a manner that prevents accidental spillage, pilferage, or any unauthorized use (Figure 4.15).
- If the material is a Dangerous Waste, the business owner must comply with any additional Ecology requirements as specified in Chapter 6, Section 6.2, R.2.
- Storage of reactive, ignitable, or flammable liquids must comply with the International Fire Code.
- Cover dumpsters or keep them under cover, such as a lean-to, to prevent the entry of stormwater. Replace or repair leaking garbage dumpsters.

- Drain dumpsters and/or dumpster pads to sanitary sewer. Dumpster drains must not discharge to stormwater systems. Keep dumpster lids closed. Install waterproof liners.

(Photo courtesy of Mark Dilley, Interstate Products, Inc.)

Figure 4.15. Outdoor Drum Storage Unit with Locking Doors.

- Keep containers with Dangerous Waste, food waste, or other potential pollutant liquids inside a building unless this is impracticable due to site constraints or International Fire Code requirements.

- Store containers in a designated area that is covered, bermed, or diked; paved; and impervious in order to contain leaks and spills. Slope the secondary containment to drain into a dead-end sump for the collection of leaks and small spills (see also Volume I, Appendix I-A for dead-end sump maintenance guidelines).

- For liquid wastes, surround the containers with a dike as illustrated in Figure 4.16. The dike must be of sufficient height to provide a volume of either 10 percent of the total enclosed container volume or 110 percent of the volume contained in the largest container, whichever is greater.

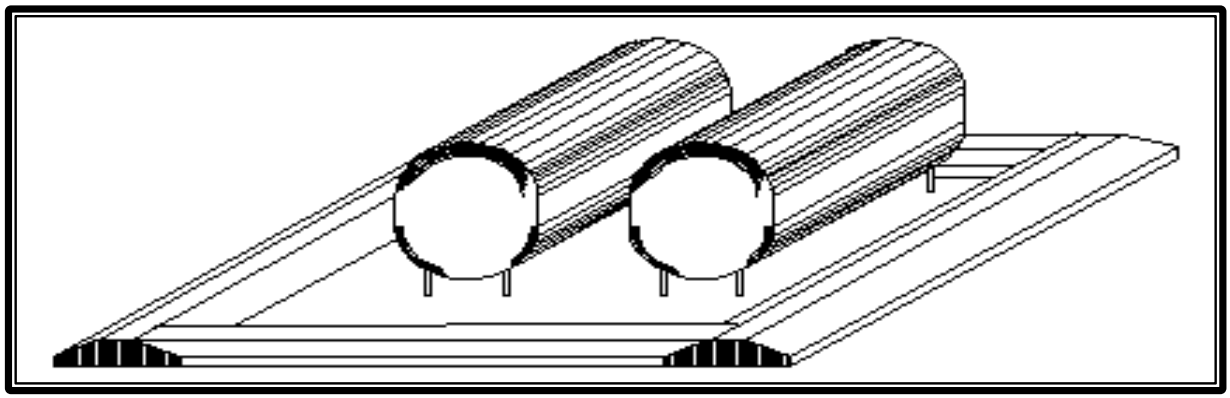


Figure 4.16. Containment Berm Used to Control Liquid-Material Leaks or Spills.

- Where material is temporarily stored in drums, use a containment system, as illustrated, in lieu of the above system (Figure 4.17).

(Photo courtesy of Seattle Public Utilities)

Figure 4.17. Temporary Secondary Containment.

- Place containers mounted for direct removal of a liquid chemical for use by employees inside a containment area as described above. Use a drip pan during liquid transfer (Figure 4.18).

Figure 4.18. Mounted Containers with Drip Pans.

- For contaminated stormwater in the containment area, connect the sump outlet to a sanitary sewer, if approved by Pierce County Industrial Pretreatment Program at (253) 798-3013, or to appropriate treatment such as an API or coalescent plate oil/water separator, or other appropriate system (see Volume V). Equip the sump outlet with a normally closed valve to prevent the release of spilled or leaked liquids, especially flammables (in compliance with International Fire Codes), and dangerous liquids. Open this valve only for the conveyance of contaminated stormwater to treatment.

- Another option for discharge of contaminated stormwater is to pump it from a dead-end sump or catchment to a tank truck or other appropriate vehicle for offsite treatment and/or disposal.

A4.8 Storage of Liquids in Permanent Aboveground Tanks

Description of Pollutant Sources: Aboveground tanks containing liquids (excluding uncontaminated water) may be equipped with a valved drain, vent, pump, and bottom hose connection. Aboveground tanks may be heated with steam heat exchangers equipped with steam traps. Leaks and spills can occur at connections and during liquid transfer. Oil and grease, organics, acids, alkalis, and heavy metals in tank water and condensate drainage can also cause stormwater contamination at storage tanks.

Pollutant Control Approach: Install secondary containment or a double-walled tank. Slope the containment area to a drain with a sump. Operators may need to discharge stormwater collected in the containment area to treatment such as an **API** or **coalescent plate** oil/water separator, or equivalent BMP. Add safeguards against accidental releases including protective guards around tanks to protect against vehicle or forklift damage, and tag valves to reduce human error. *Tank water and condensate discharges are process wastewater that may need an NPDES permit.*

Required BMPs

- Inspect the tank containment areas regularly for leaks/spills, cracks, corrosion, etc. to identify problem components such as fittings, pipe connections, and valves.
- Place adequately sized drip pans beneath all mounted taps and drip/spill locations during filling/unloading of tanks. Operators may need valved drain tubing in mounted drip pans.
- Vacuum sweep and clean the tank storage area regularly, if paved.
- Replace or repair tanks that are leaking, corroded, or otherwise deteriorating.
- All installations shall comply with the International Fire Code and the National Electric Code.
- Locate permanent tanks in impervious (Portland cement concrete or equivalent) secondary containment surrounded by dikes as illustrated in Figure 4.19, or use Underwriters Laboratory approved double-walled tanks. The dike must be of sufficient height to provide a containment volume of either 10 percent of the total enclosed tank volume or 110 percent of the volume contained in the largest tank, whichever is greater.
- Slope the secondary containment to drain to a dead-end sump, or equivalent, for the collection of small spills (see also Volume I, Appendix I-A for dead-end sump maintenance guidelines).

- Include a tank overfill protection system to minimize the risk of spillage during loading.

(Photo courtesy of Seattle Public Utilities)

Figure 4.19. Aboveground Storage Tanks with Secondary Containment.

- For an uncovered tank containment area, equip the outlet from the spill-containment sump with a shutoff valve. The shutoff valve is normally closed and operators may open it manually or automatically, only to convey contaminated stormwater to approved treatment or disposal or convey uncontaminated stormwater to a storm drain. Evidence of contamination can include the presence of visible sheen, color, or turbidity in the runoff, or existing or historical operational problems at the facility. Use simple pH tests with litmus or pH paper for areas subject to acid or alkaline contamination.

- At petroleum tank farms, convey stormwater contaminated with floating oil or debris in the contained area through an API or coalescent plate type oil/water separator (Volume V) or other approved treatment prior to discharge to storm drain or surface water.

A4.9 Parking and Storage for Vehicles and Equipment

Description of Pollutant Sources: Parked vehicles at public and commercial parking lots, such as retail store, fleet vehicle (including rent-a-car lots and car dealerships), equipment sale and rental parking lots, and parking lot driveways, can be sources of toxic hydrocarbons and other organic compounds, oils and greases, metals, and suspended solids.

Required BMPs

- An oil removal system such as an API or coalescent plate oil and water separator, or equivalent BMP (see Volume V), approved by Pierce County, is applicable for parking lots meeting the threshold vehicle traffic intensity level of a high-use site. For more information on high-use sites, refer to Volume V, Section 2.1, Step 3.

- If washing a parking lot, discharge the washwater to a sanitary sewer (if allowed by Pierce County Industrial Pretreatment Program at (253) 798-3013) or other approved wastewater treatment system, or collect washwater for offsite disposal.

- Do not hose down the area to a storm drain or receiving water. Vacuum sweep parking lots, storage areas, and driveways regularly to collect dirt, waste, and debris.

A4.10 Storage of Pesticides, Fertilizers, or Other Products That Can Leach Pollutants

This activity applies to businesses, public agencies and farms that store non-liquid pesticides, fertilizers, or a variety of other products, such as treated lumber, metal building materials, and metal tools, that have the potential to leach pollutants into underlying soil or stormwater runoff. The main problem with the potential pollutants from these sources is their solubility, which means they are difficult or impossible to filter out of runoff. If there is any question as to whether materials on your site have the potential to leach pollutants into stormwater runoff or underlying soil, call Pierce County Surface Water Management at (253) 798-2725 or Tacoma Stormwater Source Control Unit at (253) 591-5588 and ask to speak to a water quality person. Note that the storage of liquid pesticides is covered under activity **A4.7 Storage of liquid chemicals, waste oils, solvents or petroleum products in portable containers**.

Pollutants of Concern: Toxic organic compounds, oils, heavy metals, nutrients, fecal bacteria, oxygen demanding substances (i.e., BOD and COD), Biochemical oxygen demand (BOD), suspended solids.

Required BMPs

The following BMPs or equivalent measures are required of all businesses, public agencies and farms engaged in storage of pesticides, fertilizers or finished products that can leach pollutants:

- Employees must be trained on the proper storage, handling, application and disposal of fertilizers and pesticides, from keeping bags intact to storing in a covered or contained area.

- Store pesticides and fertilizers in enclosed impervious containment areas that prevent precipitation or unauthorized personnel from coming into contact with the materials.

- Outdated or banned pesticides must be disposed of at an approved hazardous waste facility.

- Sweep paved storage areas as needed. Collect and dispose of spilled materials. Do not hose storage areas to a storm drain or conveyance ditch.

- Do not discharge pesticide contaminated stormwater or spills/leaks of pesticides to storm drain or to the sanitary sewer. Contaminated stormwater must be collected and disposed of properly. Unused or spilled/leaked pesticides must be disposed of according to the label.

For fertilizers or pesticides:

- Containers and bags must be covered, intact, and off the ground.

- Store all material so that it cannot come into contact with water.
- Immediately clean up any spilled fertilizer or pesticides.
- Keep pesticide and fertilizer contaminated waste materials in designated covered and contained areas, and dispose of properly.
- Store and maintain spill cleanup materials near the storage area.
- Comply with WAC 16-228-1220 and Chapter 16-229 WAC.

Suggested BMPs

Contained storage areas should drain to a sump or a holding tank. Note that this only applies to finished products other than treated lumber. The sump should have an outlet pipe for discharges to the stormwater drainage system. The sump must be cleaned at least once per year, and solid materials and residues collected in the bottom of the sump must be properly disposed of. See BMP S.2 in Chapter 5 for information on disposal options.

See BMPs S.4 and S.5 in Chapter 5 for further information on coverings of pesticides, fertilzers, and finished products that can leach pollutants. Stormwater runon prevention must be provided for the covered area, or the stored materials must be raised off the ground. See BMP S.7 in Chapter 5 for more information on runon prevention options.

Storage areas for treated lumber should be paved, and either covered or sloped to drain to a dead-end sump or treatment system (see also Volume I, Appendix I-A for dead-end sump maintenance guidelines). Material collected from the sump must be disposed of as a hazardous waste (it may be economical to install an evaporation system for the uncovered area). Stormwater runon must be prevented from entering the covered area if the lumber is not elevated off the ground. See BMPs S.4 and S.7 in Chapter 5 for more information on roof covers and runon prevention.

- Paved storage areas for finished products should be swept weekly and collected materials disposed of properly. Small amounts of fertilizers can be disposed of in the regular garbage after double wrapping in plastic.
- Use less pesticide or fertilizer, or store less finished product, so that the size of the designated storage areas can be smaller and stormwater contamination potential is reduced.

- If it is not feasible to use the source-control BMPs listed above, one or more of the following stormwater treatment BMPs should be used (see Volume V for more information on each BMP):
    - Infiltration with underdrains to prevent groundwater contamination
    - Filtration
    - Wet pond with nutrient control, for fertilizer storage only
    - Constructed wetland
    - Vegetated biofilter.

Section A5

Construction and Demolition Activities

A5.1 Construction Demolition

Description of Pollutant Sources: This activity applies to removal of existing buildings and other structures by controlled explosions, wrecking balls, or manual methods, and subsequent clearing of the rubble. The loose debris can contaminate stormwater. Demolitions will also need to verify if asbestos is present and my require additional permits to remove.

Pollutants of concern include toxic organic compounds, hazardous wastes, high pH, heavy metals, and suspended solids.

Pollutant Control Approach: Do not expose hazardous materials to stormwater. Regularly cleanup debris that can contaminate stormwater. Protect the stormwater drainage system from dirty runoff and loose particles. Sweep paved surfaces daily. Educate employees about the need to control site activities.

Required BMPs

The following BMPs or equivalent measures are required of all businesses and public agencies engaged in building demolition:

- Identify, remove, and properly dispose of hazardous substances from the building before beginning construction demolition activities that could expose them to stormwater. Such substances could include PCBs, asbestos, lead paint, mercury switches, and electronic waste.

- Educate employees about the need to control site activities to prevent stormwater pollution, and also train them in spill cleanup procedures.

- Keep debris containers, dumpsters, and debris piles covered.

- Storm drain covers or a similarly effective containment device must be placed on all nearby drains to prevent dirty runoff and loose particles from entering the stormwater drainage system (Figure 4.20). Covers shall be placed at the beginning of the workday and the accumulated materials collected and disposed of before removing the covers at the end of the workday. If storm drains are not present, dikes, berms, or other methods must be used to protect overland discharge paths from runoff. See BMPs S.2 and S.7 in Chapter 5 for more information on runoff control and disposal options.

(Photo courtesy of Mark Dilley, Interstate Products, Inc.)

Figure 4.20. Commercially Available Gutter Guard Being Replaced.

- Sweep gutters, sidewalks, driveways, and other paved surfaces in the immediate area of the demolition must be swept at the end of each workday to collect and properly dispose of loose debris and garbage.

- Lightly spray water (such as from a hydrant or water truck) throughout the site to help control windblown fine materials such as soil, concrete dust, and paint chips. Control the amount of dust control water so that runoff from the site does not occur, yet dust control is achieved. Do not use oils for dust control.

Check with Pierce County PPW (253) 798-3739 and Puget Sound Clean Air Agency to obtain required permits. Additional information is available at the following Web sites: <<https://www.piercecountywa.org/903/Apply-for-a-Permit>, <www.pscleanair.gov/>.

Suggested BMPs

- If possible, a wall or screen should be constructed to prevent stray building materials and dust from escaping the area during demolition. Size and orient the wall or screen to capture wind-blown materials and contain them onsite.

- Schedule demolition to take place at a dry time of the year to prevent stormwater runoff from the demolition site.

A5.2 Building Repair, Remodeling, Painting, and Construction

Description of Pollutant Sources: This activity refers to activities associated with construction of buildings and other structures, remodeling of existing buildings and houses, and general exterior building repair work. Concrete pouring is covered under **A3.2 Concrete Pouring and Asphalt Application at Temporary Sites**.

Pollutants of concern include toxic hydrocarbons, toxic organics, suspended solids, heavy metals, pH, oils, and greases.

Pollutant Control Approach: Employees must be educated about the need to control site activities. Control leaks, spills, and loose material. Utilize good housekeeping practices.

Required BMPs

The following BMPs or equivalent measures are required of all businesses engaged in building repair, remodeling, painting, or construction:

- Identify, remove and properly dispose of hazardous substances from the building before beginning repairing or remodeling activities that could expose them to stormwater. Such substances could include PCBs, asbestos, lead paint, mercury switches, and electronic waste.
- Employees must be educated about the need to control site activities to prevent stormwater pollution, and also trained in spill cleanup procedures.
- Spill cleanup materials, appropriate to the chemicals being used on site, must be available at the work site at all times.
- The work site must be cleaned up at the end of each workday, with materials such as solvents put away indoors or covered and secured so that vandals will not have access to them.
- The area must be swept daily to collect loose litter, paint chips, grit, and dirt.
- Absolutely no substance can be dumped on pavement, on the ground, or in or toward storm drains, regardless of its content, unless it is clean water only.
- For wood treating activities drop cloths must be placed where space and access permit before the work begins. Additional drip pans must be used in areas where drips are likely to occur that cannot be protected with a drop cloth.

- Ground or drop cloths must be used underneath scraping, sandblasting work. Ground cloths, buckets, or tubs must also be used anywhere that work materials are laid down.

- Incidental cleaning of paint brushes and other tools that are covered with water-based paints must be cleaned in sinks connected to sanitary sewers or in portable containers that can subsequently be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based finishes or other materials must be cleaned in a manner that enables collection of used solvents for recycling or proper disposal and cannot be discharged to the sanitary sewer. See BMP S.2 in Chapter 5 for disposal options.

- Storm drain covers or similarly effective devices must be used if dust, grit, washwater, or other pollutants may escape the work area. This is particularly necessary on rainy days. The cover or containment device shall be placed over the storm drain at the beginning of the workday, and accumulated dirty runoff and solids must be collected and disposed of before removing the cover at the end of the day.

- Refer to Activity A1.3 Washing and Steam Cleaning Vehicles/Equipment/Building Structures for best management practices associated with power washing buildings.

Suggested BMPs

The following BMPs are not required, but can provide additional pollution protection:

- Recycle materials whenever possible.

- Light spraying of water on the work site can control some of the dust and grit that can blow away. Oils must never be used for dust control. Never spray to the point of runoff from the site.

- Activities such as tool cleaning should occur over a ground cloth or within a containment device such as a tub.

- Consider using filtered vacuuming to collect waste that may be hard to sweep, such as dust on a drop cloth.

- If conducting work in wet weather conditions, consider setting up temporary cover when scraping or pressure-washing lead based paint.

Section A6

Dust Control and Soil and Sediment Control

A6.1 Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots

Description of Pollutant Sources: Dust can cause air and water pollution problems particularly at demolition sites, disturbed land areas, and unpaved roadways and parking lots.

Pollutant Control Approach: Minimize dust generation and apply environmentally friendly and government approved dust suppressant chemicals, if necessary.

Required BMPs

- Sprinkle or wet down soil or dust with water as long as it does not result in a wastewater discharge (Figure 4.21).

Figure 4.21. Dust Suppression by Water Spray.

- Use in the recommended manner, only local and/or state government approved dust suppressant chemicals such as those listed in Ecology publication No. 96-433, "Techniques for Dust Prevention and Suppression." See BMP C126, Polyacrylamide for Soil Erosion Protection, in Volume II of this manual.

- Avoid excessive and repeated applications of dust suppressant chemicals. Time the application of dust suppressants to avoid or minimize their wash-off by rainfall or human activity such as irrigation.

- Apply stormwater containment to prevent the conveyance of sediments and/or dust suppressant chemicals into storm drains or receiving waters.

- The use of motor oil for dust control is prohibited. Take care when using lignin derivatives and other high BOD chemicals in areas susceptible to contaminating surface water or groundwater.

- Consult with the Ecology Southwest Regional Office and the County Planning and Public Works-PPW department on discharge permit requirements if the dust suppression process results in a wastewater discharge to the ground, groundwater, storm drain, or surface water.

Suggested BMPs for Roadways and Other Trafficked Areas

- Consider limiting use of off-road recreational vehicles on dust generating land.

- Consider graveling or paving unpaved permanent roads and other trafficked areas at municipal, commercial, and industrial areas.

- Consider paving or stabilizing shoulders of paved roads with gravel, vegetation, or Pierce County approved chemicals.

- Encourage use of alternate paved routes, if available.

- Vacuum sweep fine dirt and skid control materials from paved roads soon after winter weather ends or when needed.

- Consider using pre-washed traction sand to reduce dust emissions.

Suggested BMPs for Dust Generating Areas

- Prepare a dust control plan. Helpful references include: Control of Open Fugitive Dust Sources (EPA-450/3-88-088) and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004).

- Limit exposure of soil (dust source) as much as feasible.

- Stabilize dust-generating soil by growing and maintaining vegetation, mulching, topsoiling, and/or applying stone, sand, or gravel.

- Apply windbreaks in the soil such as trees, board fences, tarpaulin curtains, bales of hay, etc.

Additional information on dust control can be found in Volume II of this manual.

A6.2 Dust Control at Manufacturing Sites

Description of Pollutant Sources: Industrial material handling activities can generate considerable amounts of dust that is typically removed using exhaust systems. Dusts can be generated at cement and concrete product mixing facilities, and wherever powdered materials are handled. Particulate materials that are of concern to air pollution control agencies include grain dust, sawdust, coal, gravel, crushed rock, cement, and boiler fly ash. Air emissions can contaminate stormwater. The objective of this BMP is to reduce the stormwater pollutants caused by dust generation and control.

Pollutant Control Approach: Prevent dust generation and emissions where feasible, regularly cleanup dust that can contaminate stormwater, and convey dust contaminated stormwater to proper treatment.

Required BMPs

- Clean powder material handling equipment and vehicles.
- Regularly sweep dust accumulation areas that can contaminate stormwater. Conduct sweeping using vacuum filter equipment to minimize dust generation and to ensure optimal dust removal.
- Use in the recommended manner, approved dust suppressants such as those listed in Ecology publication "Techniques for Dust Prevention and Suppression," No. 96-433 (Ecology 1996). Application of some products may not be appropriate in close proximity to receiving waters or conveyances close to receiving waters. For more information, check with the Ecology Southwest Regional Office or Pierce County.

Suggested BMPs

- In manufacturing operations, train employees to handle powders carefully to prevent generation of dust.
- Use dust filtration/collection systems such as bag house filters, cyclone separators, etc. to control vented dust emissions that could contaminate stormwater. Control of zinc dusts in rubber production is one example.
- Use water spray to flush dust accumulations to sanitary sewers where allowed by Pierce County or to other appropriate treatment system. Contact Industrial Pretreatment Program at (253) 798-3013 for details.
- Install sedimentation basins, wet ponds, wet vaults, vegetated filter strips, or equivalent sediment removal BMPs. Refer to Volume V for more information about these BMPs.

- Additional information on dust control can be found in Volume II of this manual.

A6.3 Soil Erosion and Sediment Control at Industrial Sites

Description of Pollutant Sources: Industrial activities on soil areas, exposed and disturbed soils, steep grades, etc. can be sources of sediments that can contaminate stormwater runoff.

Pollutant Control Approach: Limit the exposure of erodible soil, stabilize or cover erodible soil where necessary to prevent erosion, and/or provide treatment for stormwater contaminated with total suspended solids caused by eroded soil.

Required BMPs

Apply one or more of the following cover practices:

- Vegetative cover such as grass, trees, or shrubs on erodible soil areas
- Covering with mats such as clear plastic, jute, or synthetic fiber
- Preservation of natural vegetation including grass, trees, shrubs, and vines

Apply one or more of the following structural practices:

- Vegetated swale
- Dike
- Silt fence
- Check dam
- Sedimentation basin
- Properly grading

For design information, refer to Volume II, Standards and Specifications for BMPs.

Section A7

Other Activities

A7.6 Mining and Quarrying of Sand, Gravel, Rock, Minerals, Peat, Clay, and Other Materials

Description of Pollutant Sources: This activity applies to surface excavation and onsite storage of sand, gravel, and other materials that are mined. All mining operations that have stormwater runoff from the site are required to apply for a NPDES permit with Ecology. Ecology has specific BMPs required by the permit. Some additional BMPs to help meet Ecology's discharge performance standards are listed below.

Pollutants of concern are suspended solids, nutrients, pH, and metals.

Pollutant Control Approach: Provide containment and or cover for any onsite storage areas to prevent runon and discharge of suspended solids and other pollutants.

Suggested BMPs

- If the material is appropriate, use excavated spoil material to form compacted berms along downslope sides of the site to contain runoff. Berms should be seeded to promote growth of grass or other vegetation to limit erosion from the berms. Safety considerations must be examined to prevent flooding due to berm failure.

- Semi-permanent stockpiles should be seeded to promote vegetation growth to limit erosion from the stockpiles.

- Use detention ponds to promote settling of suspended solids, or infiltration basins to filter suspended solids, to cleanup runoff before it leaves the site. See Volume V for a further discussion of treatment BMPs.

- Use anchored tarps to cover stockpiles at small-scale mining operations if there is a potential for contaminated stormwater to leave the site.

A7.8 De-icing and Anti-icing Operations for Airports and Streets

Description of Pollutant Sources: De-icing and/or anti-icing compounds are used on highways, streets, airport runways, and on aircraft to control ice and snow. Typically ethylene glycol and propylene glycol are de-icing chemicals used on aircraft. De-icing chemicals commonly used on highways and streets include calcium magnesium acetate (CMA), calcium chloride, magnesium chloride, sodium chloride, urea, and potassium acetate. The de-icing and anti-icing compounds become pollutants when they are conveyed to storm drains or to surface water after application. Leaks and spills of these chemicals can also occur during their handling and storage.

BMPs for Airport De/anti-icing Operations

Pollutant Control Approach for Aircraft: Spent glycol discharges in aircraft application areas are regulated process wastewaters under Ecology's Industrial Stormwater General Permit. BMPs for aircraft anti-icing chemicals must be consistent with aviation safety and the operational needs of the aircraft operator.

Refer to 40 CFR Part 449 for EPA effluent limitations guidelines and new source performance standards to control discharges of pollutants from airport deicing operations.

Required BMPs for Aircraft:

- Conduct aircraft de-icing or anti-icing applications in impervious containment areas. Collect aircraft de-icing spent chemicals, such as glycol, draining from aircraft in de-icing or anti-icing application areas and convey to a sanitary sewer, treatment, or other approved disposal or recovery method. Contact the Industrial Pretreatment Program at (253) 798-3013 to obtain permit for discharges to sanitary sewer. Divert de-icing runoff from paved gate areas to appropriate collection areas or conveyances for proper treatment or disposal.

- Do not discharge spent de-icing chemicals or stormwater contaminated with aircraft de-icing chemicals from application areas including gate areas, into storm drains. No discharge to surface water or groundwater, directly or indirectly, should occur.

- Transfer de-icing and anti-icing chemicals on an impervious containment pad, or equivalent spill/leak containment area, and store in secondary containment areas (see Storage of Liquids in Aboveground Tanks).

Suggested BMPs for Aircraft:

- Establish a centralized aircraft de/anti-icing facility, if feasible and practicable, or in designated areas of the tarmac equipped with separate collection drains for the spent de-icing liquids.

Note the applicable containment BMP of aircraft de/anti-icing applications, and applicable treatment BMPs for anti-icing spent chemicals such as glycols.

- Consider installing an aircraft de/anti-icing chemical recovery system, or contract with a chemical recycler, if practicable.

Required BMPs for Airport Runways/Taxiways:

- Avoid excessive application of all de/anti-icing chemicals, which could contaminate stormwater.

- Store and transfer de/anti-icing materials on an impervious containment pad or an equivalent containment area and/or under cover in accordance with BMP Storage or Transfer (Outside) of Solid Raw Materials, By-Products, or Finished Products in this volume. Consider other material storage and transfer approaches only if the anti-icing material cannot reach surface or groundwater.

Suggested BMPs for Airport Runways/Taxiways:

- Include limits on toxic materials and phosphorous in the specifications for de/anti-icing chemicals, where applicable.

- Consider using anti-icing materials rather than de-icing if it will result in less adverse environmental impact.

- Select cost-effective de/anti-icing chemicals that cause the least adverse environmental impact.

BMPs for Streets/Highways

Required BMPs for Streets/Highways:

- Select de/ anti-icing chemicals that cause the least adverse environmental impact. Apply only as needed using minimum quantities.

- Where practicable, use roadway de-icing, such as calcium magnesium acetate, potassium acetate, or similar materials that cause less adverse environmental impact than urea and sodium chloride.

- Store and transfer de/anti-icing materials on an impervious containment pad in accordance with BMP Storage or Transfer (Outside) of Solid Raw Materials, By-Products, or Finished Products in this volume.

- Sweep/cleanup accumulated de/and anti-icing materials and grit from roads as soon as possible after the road surface clears.

Suggested BMPs for Streets/Highways:

- Intensify roadway cleaning in early spring to help remove particulates from road surfaces.

- Include limits on toxic metals in the specifications for anti-icing chemicals.

A7.9 Roof Vents and Building Drains at Manufacturing and Commercial Buildings

Description of Pollutant Sources: Stormwater runoff from roofs and sides of manufacturing and commercial buildings can be sources of pollutants caused by leaching of roofing materials, vent emissions to the roof and/or the accumulation of pollutants on roofs, and other air emission sources. Processes of special concern are stone cutting, metal grinding, spray painting, painting stripping, galvanizing and electroplating. Pollutants from these processes may build up on roofs and may pollute stormwater roof runoff.

Vapors and entrained liquid and solid droplets/particles have been identified as potential pollutants in roof/building runoff. Metals, solvents, acidic/alkaline pH, oxygen demanding substances (i.e., BOD and COD), and organics are some of the pollutant constituents identified.

Ecology has performed a study on zinc in industrial stormwater. The study is presented in Ecology Publication 08-10-025 *Suggested Practices to reduce Zinc Concentrations in Industrial Stormwater Discharges*, Web site: <fortress.wa.gov/ecy/publications/publications/0810025.pdf>. The user should refer to this document for more details on addressing zinc in stormwater.

Pollutant Control Approach: Evaluate the potential sources of stormwater pollutants and apply source control BMPs where feasible.

Required BMPs

- Identify processes that are vented and may contribute pollutants to the roof. Pollutants of concern include and are not limited to:
    - Metal dust
    - Grease from food preparation
    - Solvents
    - Hydrocarbons
    - Fines
    - Stone dust
- Look for chemical deposition around vents, pipes, and other surfaces.
- Install and maintain appropriate source control measures such as air pollution control equipment (filters, scrubbers, and other treatment).
    - Check that your scrubber solution is appropriate for the chemistry of the fumes.

  - Install vent covers and drip pans where there are none.
  - Prevent leaks in pipefittings and containment vessels with routine maintenance.

- Consider instituting operational or process changes to reduce pollution.
- If proper installation and maintenance of air pollution control equipment does not prevent pollutant fallout on your roof, additional treatment of the roof runoff may be necessary.
  - Install/provide appropriate devices for roof runoff before it is discharged off site. This may include approved water quality treatment BMPs or structural stormwater treatment systems.
- Maintain air filters and pollution control equipment on a regular basis to ensure they are working properly. (The smell of odors from outside the building indicates that the pollution control equipment may need maintenance or evaluation.)
- When cleaning accumulated emissions from roof tops, collect the washwater and loose materials using a sump pump, wet vacuum or similar device. The collected runoff may be discharge to the sanitary sewer, subject to approval by the Pierce County Industrial Pretreatment Program at (253) 798-3013 or have a waste disposal company remove it.
- If leachates and/or emissions from buildings are suspected sources of stormwater pollutants, then sample and analyze the stormwater draining from the building.
- Sweep the area routinely to remove any zinc residuals.
- If a roof/building stormwater pollutant source is identified, implement appropriate source control measures such as air pollution control equipment, selection of materials, operational changes, material recycle, process changes, etc.
- Bare galvanized metal shall not be used for materials that convey stormwater, such as roofs, canopies, siding, gutters, downspouts, roof drains, and pipes. Any galvanized materials shall have an inert, non-leachable finish, such as a baked enamel, fluorocarbon paint (such as Kynar or Hylar), factory-applied epoxy, pure aluminum, or asphalt coating. Acrylic paint, polyester paint, field-applied, and Galvalume coatings are not acceptable. Paint/coat the galvanized surfaces as described in Ecology Publication # 08-10-025.

A7.10 Urban Streets

Description of Pollutant Sources: Streets can be the sources of vegetative debris, paper, fine dust, vehicle liquids, tire wear residues, heavy metals (lead and zinc), soil particles, ice control salts, domestic wastes, lawn chemicals, and vehicle combustion products. Street surface contaminants have been found to contain significant concentrations of particle sizes less than 250 microns (Sartor and Boyd 1972).

Pollutant Control Approach: Conduct efficient street sweeping where and when appropriate to minimize the contamination of stormwater. Do not wash street debris into storm drains.

Suggested BMPs

- For maximum stormwater pollutant reductions on curbed streets and high volume parking lots, use efficient vacuum sweepers.

  Note: High-efficiency street sweepers utilize strong vacuums and the mechanical action of main and gutter brooms combined with an air filtration system that only returns clean air to the atmosphere (i.e., filters very fine particulates). They sweep dry and use no water since they do not emit any dust.

  High-efficiency vacuum sweepers have the capability of removing, 80 percent or more of the accumulated street dirt particles whose diameters are less than 250 microns (Sutherland 1998). This assumes pavements under good condition and reasonably expected accumulation conditions.

- For moderate stormwater pollutant reductions on curbed streets, use regenerative air sweepers or tandem sweeping operations.

  Note: A tandem sweeping operation involves a single pass of a mechanical sweeper followed immediately by a single pass of a vacuum sweeper or regenerative air sweeper.

  - *A regenerative air sweeper blows air down on the pavement to entrain particles and uses a return vacuum to transport the material to the hopper.*

  - *These operations usually use water to control dust. This reduces their ability to pick up fine particulates.*

  These types of sweepers have the capability of removing approximately 25 to 50 percent of the accumulated street dirt particles whose diameters are less than 250 microns (Sutherland 1998). This assumes pavements under good conditions and typical accumulation conditions.

- For minimal stormwater pollutant reductions on curbed streets, use mechanical sweepers.

    - *Note: The industry refers to mechanical sweepers as broom sweepers and uses the mechanical action of main and gutter brooms to throw material on a conveyor belt that transports it to the hopper.*

    - *These sweepers usually use water to control dust. This reduces their ability to pick up fine particulates.*

  Mechanical sweepers have the capability of removing only 10 to 20 percent of the accumulated street dirt particles whose diameters are less than 250 microns (Sutherland 1998). This assumes pavements under good condition and the most favorable accumulation conditions.

- Conduct vacuum sweeping at optimal frequencies. Optimal frequencies are those scheduled sweeping intervals that produce the most cost-effective annual reduction of pollutants normally found in stormwater and can vary depending on land use, traffic volume, and rainfall patterns.

- Train operators in those factors that result in optimal pollutant removal. These factors include sweeper speed, brush adjustment and rotation rate, sweeping pattern, maneuvering around parked vehicles, and interim storage and disposal methods.

- Consider the use of periodic parking restrictions in low to medium density single-family residential areas to ensure the sweeper's ability to sweep along the curb.

- Establish programs for prompt vacuum sweeping, removal, and disposal of debris from special events that will generate higher than normal loadings.

- Disposal of street sweeping solids must comply with "Recommendations for Management of Street Wastes" described in Appendix IV-C of this volume.

- Inform citizens about the importance of eliminating yard debris, oil, and other wastes in street gutters in order to reduce street pollutant sources.

A7.12 Maintenance of Public and Utility Corridors and Facilities

Description of Pollutant Sources: Passageways and equipment at petroleum product, natural gas, and water pipelines and electrical power transmission corridors and rights-of-way can be sources of pollutants, such as herbicides used for vegetation management and eroded soil particles from unpaved access roads. At pump stations, waste materials generated during maintenance activities may be temporarily stored outside. Additional potential pollutant sources include the leaching of preservatives from wood utility poles, PCBs in older transformers, water that is removed from underground transformer vaults, and leaks/spills from petroleum pipelines. The following are potential pollutants: oil and grease, total suspended solids, oxygen demanding substances (i.e., BOD and COD), organics, PCB, pesticides, and heavy metals.

Pollutant Control Approach: Control of fertilizer and pesticide applications, soil erosion, and site debris that can contaminate stormwater.

Required BMPs

- Implement BMPs included in Chapter 4, Section 4.3, A3.6 Landscaping and Lawn/Vegetation Management and in Chapter 6, Section 6.2, R.6 Pesticide Regulations.

- When removing water or sediments from electric transformer vaults, determine the presence of contaminants before disposing of the water and sediments. This includes inspecting for the presence of oil or sheen, and determining from records or testing if the transformers contain PCBs. If records or tests indicate that the sediments or water are contaminated above applicable levels, manage these media in accordance with applicable federal and state regulations, including the federal PCB rules (40 CFR 761) and the state MTCA cleanup regulations (Chapter 173-340 WAC). Water removed from the vaults can be discharged in accordance with the federal 40 CFR 761.79, and state regulations (Chapter 173-201A WAC and Chapter 173-200 WAC), or via the sanitary sewer if the requirements, including applicable permits, for such a discharge are met. (See also Chapter 6, Section 6.2-R2).

- Within utility corridors, prepare maintenance procedures to minimize the erosion of soil. An implementation schedule may provide for vegetative, gravel, or equivalent cover that minimizes bare or thinly vegetated ground surfaces within the corridor.

- Provide maintenance practices to prevent stormwater from accumulating and draining across and/or onto roadways. Convey stormwater through roadside ditches and culverts. The road should be crowned, outsloped, water barred, or otherwise left in a condition not conducive to erosion. Appropriately maintaining grassy roadside ditches discharging to surface

waters is an effective way of removing some pollutants associated with sediments carried by stormwater.

- Maintain ditches and culverts at an appropriate frequency to ensure that plugging and flooding across the roadbed, with resulting overflow erosion, does not occur.

- Apply the appropriate BMPs from Section A4 of this volume, Storage Activities, for the storage of waste materials that can contaminate stormwater.

Suggested BMPs

- When selecting utility poles for a specific location, consider the potential environmental effects of the pole or poles during storage, handling, and end-use, as well as its cost, safety, efficacy, and expected life. Use wood products treated with chemical preservatives made in accordance with generally accepted industry standards such as the American Wood Preservers Association Standards. Consider alternative materials or technologies if placing poles in or near an environmentally sensitive area, such as a wetland or a drinking water well. Alternative technologies include poles constructed with material(s) other than wood, such as fiberglass composites, metal, or concrete. Consider other technologies and materials, such as sleeves or caissons for wood poles, when they are determined to be practicable and available.

- As soon as practicable, remove all litter from wire cutting/replacing operations.

- Implement temporary erosion and sediment control in areas cleared of trees and vegetation and during the construction of new roads.

A7.13 Maintenance of Roadside Ditches

Description of Pollutant Sources: Common road debris including eroded soil, oils, vegetative particles, and heavy metals can be sources of stormwater pollutants.

Pollutant Control Approach: Maintain roadside ditches to preserve the condition and capacity for which they were originally constructed, and to minimize bare or thinly vegetated ground surfaces. Maintenance practices should provide for ESC (refer to Activity A3.6 Landscaping and Lawn/Vegetation Management).

Required BMPs

- Inspect roadside ditches regularly to identify sediment accumulations and localized erosion.
- Clean ditches on a regular basis, as needed. Keep ditches free of rubbish and debris.
- Vegetation in ditches often prevents erosion and cleanses runoff waters. Remove vegetation only when flow is blocked or excess sediments have accumulated. Conduct ditch maintenance (seeding, fertilizer application, harvesting) in late spring and/or early fall, where possible. This allows re-establishment of vegetative cover by the next wet season, thereby minimizing erosion of the ditch as well as making the ditch effective as a biofilter.
- In the area between the edge of the pavement and the bottom of the ditch, commonly known as the "bare earth zone," use grass vegetation, wherever possible. Establish vegetation from the edge of the pavement, if possible, or at least from the top of the slope of the ditch.
- Maintain diversion ditches on top of cut slopes constructed to prevent slope erosion by intercepting surface drainage to retain their diversion shape and capability.
- Do not leave ditch cleanings on the roadway surfaces. Sweep, collect, and dispose of dirt and debris remaining on the pavement at the completion of ditch cleaning operations.
- Roadside ditch cleanings contaminated by spills or other releases known or suspected to contain dangerous waste must be handled following the Dangerous Waste Regulations (Chapter 173-303 WAC). If testing determines materials are not dangerous waste but contaminants are present, consult with the Tacoma-Pierce County Health Department (253) 798-6047 for disposal options.
- Inspect culverts on a regular basis for scour or sedimentation at the inlet and outlet, and repair as necessary. Give priority to those culverts

conveying perennial and/or salmon-bearing streams and culverts near streams in areas of high sediment load, such as those near subdivisions during construction.

Suggested BMPs

- Install biofiltration swales and filter strips to treat roadside runoff wherever practicable and use engineered topsoils wherever necessary to maintain adequate vegetation. These systems can improve infiltration and stormwater pollutant control upstream of roadside ditches. Refer to Volume V of this manual for additional information about biofiltration swales and filter strips.

- Consider screening roadside ditch cleanings not contaminated by spills or other releases and not associated with a stormwater treatment system such as a bioswale may be screened to remove litter. Separate screenings into soil and vegetative matter (leaves, grass, needles, branches, etc.) categories. Compost or dispose of the vegetative matter in a municipal waste landfill. Consult the Tacoma-Pierce County Health Department (253) 798-6047 to discuss use or disposal options for the soil portion. For more information, please see “Recommendations for Management of Street Wastes,” in Appendix IV-C of this volume.

A7.14 Maintenance of Stormwater Drainage and Treatment Facilities

Description of Pollutant Sources: Facilities include roadside catch basins on arterials and within residential areas, conveyance systems, detention facilities such as ponds and vaults, oil and water separators, bioretention, biofilters, settling basins, infiltration systems, and all other types of stormwater treatment systems presented in Volume V. Oil and grease, hydrocarbons, debris, heavy metals, sediments, and contaminated water are found in catch basins, oil and water separators, settling basins, etc.

Pollutant Control Approach: Provide maintenance and cleaning of debris, sediments, and oil from stormwater collection, conveyance, and treatment systems to obtain proper operation.

Required BMPs

Maintain stormwater treatment facilities per the operations and maintenance (O&M) procedures presented in Volume I, Appendix I-A, in addition to the following BMPs:

- Inspect and clean treatment BMPs, conveyance systems, and catch basins (Figure 4.23) as needed, and determine necessary O&M improvements.

Figure 4.23. Catch Basin Cleaning with a Vacuum Truck.

- Promptly repair any deterioration threatening the structural integrity of stormwater facilities. These include replacement of clean-out gates, catch basin lids, and rock in emergency spillways.

- Ensure adequacy of storm drain capacities and prevent heavy sediment discharges to the sanitary sewer system.

- Regularly remove debris and sludge from BMPs used for peak-rate control, treatment, etc. and truck to an appropriate local or state government approved disposal site.

- Clean catch basins in accordance with the information provided in Volume I, Appendix I-A. Additional information is also included in Chapter 5 of this volume, BMP S.9 Cleaning Catch Basins.

- Clean woody debris in a catch basin as frequently as needed to ensure proper operation of the catch basin.

- Include notifications, e.g., "Only Rain Down the Drain/Puget Sound Starts Here," "Dump No Waste – Drains to Groundwater," "Streams," "Lakes." Emboss on or adjacent to all storm drain inlets *where practical* (Figure 4.24).

(Photo courtesy of Seattle Public Utilities)

Figure 4.24. "Dump No Waste" Storm Drain Stencil.

- Disposal of sediments and liquids from catch basins must comply with "Recommendations for Management of Street Wastes" described in Appendix IV-C of this volume.

- Select additional applicable BMPs from this chapter depending on the pollutant sources and activities conducted at the facility. Those BMPs include:
    - A4.7 – Storage of Liquid, Food Waste, or Dangerous Waste Containers
    - A6.3 – Soil ESC at Industrial Sites
    - A7.10 – Urban Streets
    - A7.15 – Spills of Oil and Hazardous Substances.
- Eliminate illicit connections to the stormwater drainage system. See BMP S.1 in Chapter 5 for details on detecting and eliminating these connections.

A7.15 Spills of Oil and Hazardous Substances

Description of Pollutant Sources: Federal law requires owners or operators of facilities engaged in drilling, producing, gathering, storing, processing, transferring, distributing, refining or consuming oil and/or oil products to have a Spill Prevention and Emergency Cleanup Plan (SPECP). The SPECP is required if the above ground storage capacity of the facility is 1,320 gallons or more of oil. Additionally, the SPECP is required if any single container with a capacity in excess of 660 gallons and which, due to their location, could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR.

Part 110, into or upon the navigable waters of the United States or adjoining shorelines'

{40 CFR 112.1(b)}. Onshore and offshore facilities, which, due to their location, could not reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines are exempt from these regulations {40 CFR 112.1(1)(i)}. State Law requires owners of businesses that produce dangerous wastes are also required by state law to have a SPECP. These businesses should refer to Chapter 6, Section 6.2, R-2. The federal definition of oil is oil of any kind or any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

Pollutant Control Approach: Maintain, update, and implement a Spill Prevention and Emergency Cleanup Plan.

Required BMPs

- Prepare a Spill Prevention and Emergency Cleanup Plan (SPECP), which includes:
    - A description of the facility including the owner's name and address.
    - The nature of the activity at the facility.
    - The general types of chemicals used or stored at the facility.
    - A site plan showing the location of storage areas for chemicals, the locations of storm drains, the areas draining to them, and the location and description of any devices to stop spills from leaving the site such as positive control valves.
    - Cleanup procedures.
    - Notification procedures to be used in the event of a spill, such as notifying key personnel. Agencies such as Ecology, Pierce County Fire District, Washington State Patrol, Pierce County, U.S. Coast Guard, and the U.S. EPA shall be notified.

  - The name of the designated person with overall spill cleanup and notification responsibility.

- Train key personnel in the implementation of the SPECP. Prepare a summary of the plan and post it at appropriate points in the building, identifying the spill cleanup coordinators, location of cleanup kits, and phone numbers of regulatory agencies to contact in the event of a spill.

- Update the SPECP regularly.

- Immediately notify Ecology and Pierce County if a spill may reach sanitary sewer or storm drain, groundwater, or surface water, in accordance with federal and Ecology spill reporting requirements.

- Immediately cleanup spills. Do not use emulsifiers for cleanup unless there is an appropriate disposal method for the resulting oily wastewater. Do not wash absorbent material down a floor drain or into a storm drain.

- Locate emergency spill containment and cleanup kit(s) in high potential spill areas. The contents of the kit shall be appropriate for the type and quantities of chemical liquids stored at the facility (Figure 4.25).

(Photo courtesy of Seattle Public Utilities)

Figure 4.25. Example of Spill Kit Contents.

Suggested BMP

- Spill kits should include appropriately lined drums, absorbent pads, and granular or powdered materials for neutralizing acids or alkaline liquids

where applicable. In fueling areas: Package absorbent material in small bags for easy use and make available small drums for storage of absorbent and/or used absorbent. Deploy spill kits in a manner that allows rapid access and use by employees.