# Appendix C Stormwater Operations, Maintenance & Source Control Manual

## Retention Requirement

*A copy of this Manual shall be retained onsite or within reasonable access to the site, and shall be transferred with the property to the new owner. To facilitate retention and transmission, this document is published as a stand-alone text titled* Operations, Maintenance, and Source Control Manual.

*A log of maintenance activity that indicate what actions were taken shall also be kept and be available for inspection.*

**Cascade Christian School – Elementary Portables**
**811 21st ST SE**
**Puyallup, WA 98372**
**Parcel #: 0420352148**
**Owner: Cascade Christian Schools**

# Stormwater Operations, Maintenance & Source Control Manual

Stormwater Owner's designated Facility Manager:
_____
Address: _____
_____
Phone Cell: _____
Email: _____


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# Introduction to Maintenance and Source Control Manuals

This Stormwater Operations, Maintenance, and Source Control Manual is a required element of the overall Stormwater Drainage Narrative submitted as supporting documentation for permits required by the jurisdiction for the construction of the proposed Project, and as an aid and a reference to the property owner and future facility manager. The manual and appendices contain forms, checklists, and other aids for use after construction and throughout the operations period.

To keep stormwater quality intact and infrastructure in good condition, new projects use both Operational and Source Control Best Management Practices (BMPs) to preclude damage to the stormwater systems and Maintenance practices to preserve the function of the stormwater components. Routine, scheduled maintenance extends the time between major repairs or replacements.

This manual describes what maintenance conditions to check for, and how often to check, for the various facilities that make up the stormwater system on this site. Private facility owners are responsible for ensuring that their stormwater facilities are maintained and continue to function as designed. Maintenance may be done in-house, by a maintenance contractor, or a mix of parties.
Stormwater management facilities are most effective coupled with good operations procedures. Good operations, such as educating facility users of proper storage and disposal of chemicals and potential pollutants, procedures for spill cleanup, proper use of fertilizers and other vegetation management products, and maintenance of equipment to prevent release of pollutants to the stormwater system, are termed Source Control BMPs. Source control BMPS are addressed for the expected activates shown below:

## S421 BMPs for Parking and Storage of Vehicles and Equipment

**Description of Pollutant Sources:** 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, including oils and greases, metals, and suspended solids.

If the use of the site changes, the selection of source controls will need to be updated to match.

This is completed using the format set forth in Volume V of the *2019 Department of Ecology (DOE) Stormwater Management Manual for Western Washington,* as adopted and amended by the City of Puyallup.

Since these reports draw heavily on reference documents, lists, and standards, in certain areas of the report, typical items may be included in the text to indicate that they were considered but ~~struck through~~ to show that they are not applicable to this project. Correspondingly, lists may also have <u>underlined</u> or **Bold** text to indicated selected items.

Version:

# 1. Maintenance Importance and Intent

Private facility owners are responsible for ensuring that their stormwater facilities are maintained and continue to function as designed. This section addresses the operations, maintenance, and source control deriving from the areas of concern constructed by the proposed project, and is intended to be a living document used by both the facility owner, the tenant/site operator, and the individuals performing the work, even if a third party.

> "The importance of maintenance for the proper functioning of stormwater control facilities cannot be over-emphasized. A substantial portion of failures (clogging of filters, resuspension of sediments, loss of storage capacity, etc.) are due to inadequate maintenance. Stormwater BMP maintenance is essential to ensure that BMPs function as intended throughout their full life cycle."

The fundamental goal of maintenance activities is to ensure the entire flow regime designed for this site continues to function as designed. For this site these include:

- Maintain ability to safely convey design stormwater flows.
- Maintain stormwater runoff quality.
- Clearly identify systems so they can be protected.
- Keep maintenance costs low.
- Prevent large-scale or expensive stormwater system failures.
- Prevent water quality violations or damage to downstream features.

The intent of this section and manual is to pass on to the responsible party(s) all the information critical to understand the design of the system, risks and considerations for proper use, suggestions for maintenance frequencies, and cost so that realistic budgets can be established.

**Annual Cost of Maintenance**

Costs to maintain the facilities vary by type, but the budgeting rule of thumb is that annual costs will be 5 to 10% of the Stormwater facility's total capital cost if provided by contractors. Once vegetation is established (where used), routine measures are estimated to have an annual cost of $200 to $600 per acre of facility, with the remaining costs credited toward funding eventual replacement of decayed stormwater features.

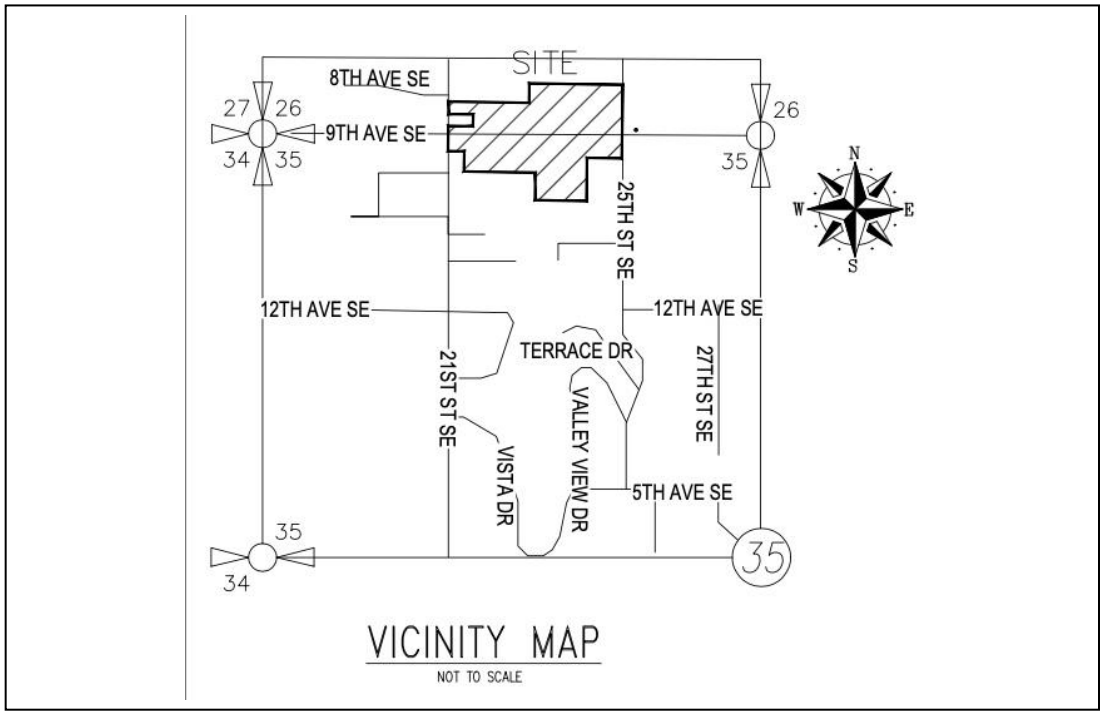
Routine, scheduled maintenance extends the time between major repairs or replacements. Most facilities have life expectancies of 25 to 50 years, with longer life spans achievable by conscientious maintenance.

## 2. Project Location and Access Description

This project is to construct a small building and parking lot. It is a stand-alone project and an addition to a completed facility.

| | |
|---|---|
| Addresses: | 811 21st ST SE, Puyallup, WA 98372 |
| Cross Street | 21st ST SE |
| Directions to Facilities | Use Internal Drive aisles |
| Parcel Number: | 0420352148 |
| Outfall: | Infiltration in detention pond, overflow to Deer Creek |

*Figure 1 Vicinity Map*




The project intends to add parking, paving work, landscaping, and series of temporary wet and dry portable outlying buildings to support elementary classrooms near the junior high and high school buildings on the existing school site located at 811 21st ST SE in the jurisdiction of Puyallup, Washington. This project will be on-site work only, retaining current accesses from the public road and served by existing public water, sewer, and power, with onsite service extensions. Stormwater will continue to be collected and on-site and additional on-site conveyance will be provided with drain connections for the annexed property to discharge to the existing stormwater infrastructure available on the school site.

The project area totals about 17.37 acres of a larger, combined developed campus. The balance of the campus that drains to distinct onsite basins will not be modified in the SW management design. No work within a ROW is proposed.

The proponent intends to provide stormwater facilities and conveyance systems above and below ground for the new and replaced areas and retain the use of the existing collection system in the areas remaining unchanged. The project projects no impacts to critical areas so includes no mitigation on or adjacent to the site.

Improvements, if proposed in the Right of Way, will be maintained by the City of Puyallup and therefore are not addressed here.

## 3. Facility Purpose and Performance Mechanisms

The following chart describes the stormwater BMPs and conveyance systems, and how these systems are designed to manage the volume, rate, and quality of stormwater runoff from the project.

**Table: BMPs and Conveyance Purposes**

| BMP or Conveyance | Volume Management | Rate Management | Quality Management |
|---|---|---|---|
| Soil Amendment **Mulch** | Absorbs more precipitation than compacted or organic poor soils. | Increases time to first runoff and Decreases overall runoff volume. | Increases Biological activity – Caution, also leaches excess nutrients. |
| **Dispersion, Partial or Full** | Promotes evaporation and transpiration by Spreading volume over large area. | Increases time to first runoff and Decreases overall runoff volume. | Increases Biological activity – Caution, also leaches excess nutrients. |
| **Catch Basins** | Collects excess surface water. | None. | Settles out sediment and traps floating debris so discharge is cleaner. |
| **Pipe** | Carries flows to suitable discharge structure. | Pipe size and slope selected to carry volumes. | None. |
| Detention Assembly (Pond, ~~Vault, Pipe Array~~**)** | Temporarily stores volume. | Controls release rate. | Only if wet pool is included or soils achieve quality. |
| ~~Treatment Assembly **(filters,** separators, dead storage, etc)~~ | ~~None.~~ | ~~None.~~ | ~~Traps sediment and floating debris, filters and absorbs some dissolved elements.~~ |
| ~~Pervious Pavements~~ | ~~Absorbs Precipitation.~~ | ~~Increases time to first runoff and Decreases overall runoff volume.~~ | ~~Depends mostly on underlying native soils. Some Filtration.~~ |
| ~~**Infiltration Trenches** Pond Drywell~~ | ~~Absorbs precipitation.~~ | ~~Increases time to first runoff and Decreases overall runoff volume.~~ | ~~Depends mostly on underlying native soils. Some Filtration.~~ |
| ~~Bioretention, Rain Gardens~~ | ~~Absorbs precipitation.~~ | ~~Increases time to first runoff~~ | ~~Promotes biological sorption and filtration.~~ |

## 4. Description of Facilities Requiring Maintenance

A list of all stormwater structures and BMPs requiring maintenance is provided below, and shown graphically on sheets C6 and C7 in the associated project's current civil drawings. All of the stormwater structures and BMPs requiring maintenance are the responsibility of the landowner.

**Table: Facilities Requiring Maintenance**

| BMP or Stormwater Structure | Purpose | Functions by | Maintenance Requirement |
|---|---|---|---|
| Soil Amendment Mulch | Reduce runoff quantity and improve quality. | Gravity, storage capacity, and biological activity. | Keep Porosity and organic content high. |
| Roof Gutters and Downspouts | Carries flows to suitable discharge structure. | Gravity and channelization. | Keep Clean and free flowing. |
| Catch Basins (CB) and Storm Drain Man Holes (SDMH) | Collects excess surface water, settles out sediment and traps floating debris. | Still water over sump capacity. | Keep Clean and free flowing. |
| Pipes | Carries flows to suitable discharge structure. | Gravity and channelization. | Keep Clean and free flowing. |
| Treatment | Improve water quality | Gravity, biologic action, filtration. | Keep Clean and free flowing. |
| ~~**Infiltration Trenches** And/or Permeable Paving~~ | ~~Reduce runoff quantity and/or improve quality~~ | ~~Gravity, storage capacity, and infiltration~~ | ~~Keep clean and retain porosity.~~ |
| Detention Assembly | Reduce runoff rate by storing water temporarily. | Gravity and storage capacity. | Keep clean and retain volume. |

Maintenance checklists for stormwater structures and BMPs requiring maintenance are attached as a list at the end of this text.

**Table: Stormwater Additions Schedule**

| Stormwater Additions Schedule | | | | | | | |
|---|---|---|---|---|---|---|---|
| Pipes – PVC SDR 35, Infiltration- Aluminized CMP ALTA2 -16 gauge, or A-2000 PVC | | | | | | | |
| **Designation** | **Dia.** | **Material** | **Discharge** | **From** | **To** | **Slope** | **Remarks** |
| Landscape Area Grassy Swale | Surface Grades and Landscaping | | | Sheet Flow | YD#1 Beehive Grate | 0.5% | |
| Portable Roof | 6” | PVC | Splash-block | Roof | Veg. Swale | 0.5% | |
| Perforated Stub-out Connection | 6” | PVC | Pipe Flow | YD#4 | YD#3 | 0.0% | |

## 5. Ownership and Responsible Parties

This section of the Maintenance and Source Control Manual identifies the party (or parties) the owner has made responsible for maintenance and operation of all stormwater structures and BMPs requiring maintenance. When the facility is in operation, keep the following up to date.

Stormwater Facility Manager:
Address:
Phone
Email:

Name of Maintenance Contractor:
Address:
Phone: Cell:
Email:
Contact Person:

Space for Update Name of Maintenance Contractor:
Address:
Phone: Cell:
Email:
Contact Person:

Space for Update Name of Maintenance Contractor:
Address:
Phone: Cell:
Email:
Contact Person:

The ultimate responsibility rests with the owner:
Cascade Christian Schools
811 21st ST Se
Puyallup, WA 98372
253-606-1854

## 6. Project History

This project is an addition to the existing school, comprising of new elementary school portables and improved parking areas. The new stormwater system will connect to the existing system, and overflows, if any, will discharge to Deer Creek. Please see the existing and new stormwater drainage system in the associated drainage report and attached site plans.

# 7. Maintenance and Inspection Plan and Instructions

This plan and instructions outline conditions for determining if maintenance actions are required, as identified through inspection. However, they are not intended to be measures of the facility's required condition at all times between inspections. Exceedance of these conditions at any time between inspections or maintenance activity does not automatically constitute a violation of these standards. However, based upon inspection observations, the inspection and maintenance presented in the checklists shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action.

The purpose of the items in the Stormwater Structures list is to collect runoff and excess subsurface drainage and, if necessary, move it to a treatment BMP so that the acceptable quality is attained before discharge. These structures all function by gravity flow, and do not require active processes to function. Maintenance is needed to keep them clean and free-draining. Stormwater Structures on this project will consist of:

- Gutters & Downspouts,
- Catch Basins,
- Conveyance Pipes,
- Detention

The purpose of items in the BMP list is to control outlet flow rates and/or to restore the water quality by removing natural sediment, deposited particles, liquid drips, and other substances from the runoff before it leaves the site. For this site, the BMPs are a mix of constructed and natural functions. They are passive and function by a combination of gravity, filtration, and microbial action. Maintenance is needed to prevent them from being overtaken by other uses. BMPs on this project will consist of:

- Existing Bioswale
- Mulch beds in soil areas

## A. Pollution Source Control Measures

Pollution source control is the application of pollution prevention practices on a developed site to reduce contamination of stormwater runoff at its source. BMPs and resource management systems are designed to reduce the amount of contaminants used, and potentially discharged to the environment, so that stormwater is of good quality.

**Potential Pollutant Generating Sources**

This section of the Maintenance and Source Control Manual contains pollution source controls that are specifically applicable to the proposed uses on site.

- S411 BMPs for Landscaping and Lawn/ Vegetation Management
- S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems
- S421 BMPs for Parking and Storage of Vehicles and Equipment
- S424 BMPs for Roof/ Building Drains at Manufacturing and Commercial Buildings

**S411 BMPs for Landscaping and Lawn/ Vegetation Management**

## Operational BMPS

• Install engineered soil/landscape systems to improve the infiltration and regulation of stormwater in landscaped areas.

• Do not dispose of collected vegetation into waterways or storm sewer systems.

• Conduct mulch-mowing whenever practicable.

• Dispose of grass clippings, leaves, sticks, or other collected vegetation, by composting, if feasible.

• Use mulch or other erosion control measures on soils exposed for more than one week during the dry season or two days during the rainy season.

• Store and maintain appropriate oil and chemical spill cleanup materials in readily accessible locations when using oil or other chemicals. Ensure that employees are familiar with proper spill cleanup procedures.

• Till fertilizers into the soil rather than dumping or broadcasting onto the surface. Determine the proper fertilizer application rate for the types of soil and vegetation encountered.

• Till a topsoil mix or composted organic material into the soil to create a well-mixed transition layer that encourages deeper root systems and drought-resistant plants.

• Use manual and/or mechanical methods of vegetation removal rather than applying herbicides, where practical.

• Post notices and delineate the spray area prior to the application, as required by the local jurisdiction or by Ecology.

• Conduct spray applications during weather conditions as specified in the label direction and applicable local and state regulations. Do not apply during rain or immediately before expected rain.

Recommended Additional Operational BMPs for the use of pesticides:

• Consider alternatives to the use of pesticides such as covering or harvesting weeds, substitute vegetative growth, and manual weed control/moss removal.

• Consider the use of soil amendments, such as compost, that are known to control some common diseases in plants, such as Pythium root rot, ashy stem blight, and parasitic

nematodes. The following are three possible mechanisms for disease control by compost addition (USEPA Publication 530-F-9-044):

1. Successful competition for nutrients by antibiotic production;
2. Successful predation against pathogens by beneficial microorganism; and
3. Activation of disease-resistant genes in plants by composts.

Installing an amended soil/landscape system can preserve both the plant system and the soil system more effectively. This type of approach provides a soil/landscape system with adequate depth, permeability, and organic matter to sustain itself and continue working as an effective stormwater infiltration system and a sustainable nutrient cycle.

• Once a pesticide is applied, evaluate its effectiveness for possible improvement. Records should be kept showing the effectiveness of the pesticides considered.

• Rinseate from equipment cleaning and/or triple-rinsing of pesticide containers should be used as product or recycled into product.

**S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems**

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

## Operational BMPS

Maintain stormwater treatment facilities per the operations and maintenance (O&M) procedures presented in Section 4.6 of Volume V in addition to the following BMPs:

• Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed, and determine necessary O&M improvements.

• 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 sewer capacities and prevent heavy sediment discharges to the sewer system.

• Regularly remove debris and sludge from BMPs used for peak-rate control, treatment, etc. and discharge to a sanitary sewer if approved by the sewer authority, or truck to an appropriate local or state government approved disposal site.

• Clean catch basins when the depth of deposits reaches 60 percent of the sump depth as measured from the bottom of basin to the invert of the lowest pipe into or out of the basin.

However, in no case should there be less than six inches clearance from the debris surface to the invert of the lowest pipe. Some catch basins (for example, WSDOT Type 1L basins) may

have as little as 12 inches sediment storage below the invert. These catch basins need frequent inspection and cleaning to prevent scouring. Where these catch basins are part of a stormwater collection and treatment system, the system owner/operator may choose to concentrate maintenance efforts on downstream control devices as part of a systems approach.

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

• Post warning signs; “Dump No Waste - Drains to Ground Water,” “Streams,” “Lakes,” or emboss on or adjacent to all storm drain inlets where possible.

• Disposal of sediments and liquids from the catch basins must comply with “Recommendations for Management of Street Wastes” described in Appendix IV-G of this volume.

**S421 BMPs for Parking and Storage of Vehicles and Equipment**

Of the Potential Pollutant Generating Sources listed for S421 Parking and Storage of Vehicles and Equipment, the following pollutant sources are not expected at this site:

- Not a Defined “High-Use” site
    - < 100 ADT/1,000 SF for gross building area
    - < 25 diesel vehicles over 10 tones gross weight.

## Operational BMPS

Clean parking lot by sweeping. Do not hose down into stormwater system.

## Storage of Solid Wastes

Improper storage of recycling, yard waste, and trash can lead not only to water pollution problems, but problems with neighborhood pets and vermin as well. Following the BMPs listed below can help keep the property a clean and healthy place.

All recycling and waste containers kept outside should have lids. If the lid is damaged, repair or replace it as soon as possible. If the container is supplied by your hauler, please call to have the lid repaired or replaced

- Leaking containers should be replaced. If your container is supplied by your hauler, contact the hauler to have damaged containers replaced.
- Store containers under cover if possible, or on grassy areas.
- Inspect the storage area regularly to pick up loose scraps of material and dispose of them properly.

- Reduce waste where possible.

**S424 BMPs for Roof/ Building Drains at Manufacturing and Commercial Buildings**

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

**Operational BMPS**

- 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.

**Structural Source Control BMPs:**

- Paint/coat the galvanized surfaces as described in Ecology Publication # 08-10-025.

## O & M Appendix A: Maintenance Checklists

Maintenance instructions are intended to explain to future property owners the purpose of each flow control element (BMP) and how it must be maintained and operated. A set of minimum maintenance instructions is provided for each flow control BMP selected. Maintenance checklists are from Volume V of Department of Ecology *Stormwater Management Manual for Western Washington,* issued December 2014*,* unless otherwise noted.

Maintenance timelines vary according to the severity of the impact.

**Emergency Action:**
Where maintenance and repair is necessary to correct health or safety problems, to prevent harmful materials from entering the stormwater system, or to remove harmful materials that have entered the stormwater system, such work shall be completed by the owner or operator of the stormwater system or stormwater facility within 24 hours of discovery of the need for maintenance or repair.

See section 5 for the emergency contact phone number.

**Triggered Maintenance:**
When maintenance and repair is found necessary to prevent water quality degradation, such work shall be completed within 14 calendar days of discovery of the need for maintenance or repair.

**Routine Maintenance:**
For other related problems, maintenance or repairs shall be completed within 30 calendar days of discovery or repair.

**Maintenance and Inspection Record Keeping:**
Maintenance performed shall be logged either on this document and its copies, or in an electronic format that may be printed or transmitted to another party.

**Detention Ponds Checklist**

## No. 1 – Detention Ponds

| Maintenance Component | Defect | Conditions When Maintenance Is Needed | Results Expected When Maintenance Is Performed |
|---|---|---|---|
| | Beaver Dams | Dam results in change or function of the facility. | Facility is returned to design function.<br>(Coordinate trapping of beavers and removal of dams with appropriate permitting agencies) |
| | Insects | When insects such as wasps and hornets interfere with maintenance activities. | Insects destroyed or removed from site.<br>Apply insecticides in compliance with adopted IPM policies |
| | Tree Growth and Hazard Trees | Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering with access or maintenance, do not remove<br>If dead, diseased, or dying trees are identified<br>(Use a certified Arborist to determine health of tree or removal requirements) | Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood).<br>Remove hazard Trees |
| Side Slopes of Pond | Erosion | Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.<br>Any erosion observed on a compacted berm embankment. | Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.<br>If erosion is occurring on compacted berms a licensed civil engineer should be consulted to resolve source of erosion. |
| Storage Area | Sediment | Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility. | Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion. |
| | Liner (If Applicable) | Liner is visible and has more than three 1/4-inch holes in it. | Liner repaired or replaced. Liner is fully covered. |
| Pond Berms (Dikes) | Settlements | Any part of berm which has settled 4 inches lower than the design elevation.<br>If settlement is apparent, measure berm to determine amount of settlement.<br>Settling can be an indication of more severe problems with the berm or outlet works. A licensed civil engineer should be consulted to determine the source of the settlement. | Dike is built back to the design elevation. |
| | Piping | Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.<br>(Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition. | Piping eliminated. Erosion potential resolved. |

## No. 1 – Detention Ponds

| Maintenance Component | Defect | Conditions When Maintenance Is Needed | Results Expected When Maintenance Is Performed |
|---|---|---|---|
| Emergency Overflow/ Spillway and Berms over 4 feet in height. | Tree Growth | Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping.<br>Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm. | Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed civil engineer should be consulted for proper berm/spillway restoration. |
| | Piping | Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.<br>(Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition. | Piping eliminated. Erosion potential resolved. |
| Emergency Overflow/ Spillway | Emergency Overflow/ Spillway | Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway.<br>(Rip-rap on inside slopes need not be replaced.) | Rocks and pad depth are restored to design standards. |
| | Erosion | See “Side Slopes of Pond” | |

**Flow Restrictor checklist**

## No. 4 – Control Structure/Flow Restrictor

| Maintenance Component | Defect | Condition When Maintenance is Needed | Results Expected When Maintenance is Performed |
|---|---|---|---|
| General | Trash and Debris (Includes Sediment) | Material exceeds 25% of sump depth or 1 foot below orifice plate. | Control structure orifice is not blocked. All trash and debris removed. |
| | Structural Damage | Structure is not securely attached to manhole wall. | Structure 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 and show signs of rust. | 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. |
| Cleanout Gate | Damaged or Missing | Cleanout gate is not watertight or is missing. | 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. |
| | | Gate is rusted over 50% of its surface area. | Gate is repaired or replaced to meet design standards. |
| Orifice Plate | Damaged or Missing | Control device is not working properly due to missing, out of place, or bent orifice plate. | Plate is in place and works as designed. |
| | Obstructions | Any trash, debris, sediment, or vegetation blocking the plate. | Plate is free of all obstructions and works as designed. |
| Overflow Pipe | Obstructions | Any trash or debris blocking (or having the potential of blocking) the overflow pipe. | Pipe is free of all obstructions and works as designed. |
| Manhole | See “Closed Detention Systems” (No. 3). | See “Closed Detention Systems” (No. 3). | See “Closed Detention Systems” (No. 3). |
| Catch Basin | See “Catch Basins” (No. 5). | See “Catch Basins” (No. 5). | See “Catch Basins” (No. 5). |

## No. 5 – Catch Basins

| Maintenance Component | Defect | Conditions When Maintenance is Needed | Results Expected When Maintenance is performed |
|---|---|---|---|
| General | Trash & Debris | Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. | 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<br>(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 Basin Walls/ Bottom | Maintenance person judges that structure is unsound. | Basin replaced or repaired to design standards. |
| | | 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 | If failure of basin has created a safety, function, or design problem. | Basin replaced or repaired to design standards. |
| | Vegetation | Vegetation growing across and blocking more than 10% of the basin opening. | 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. |
| | Contamination and Pollution | See "Detention Ponds" (No. 1). | No pollution present. |

## No. 5 – Catch Basins

| Maintenance Component | Defect | Conditions When Maintenance is Needed | Results Expected When Maintenance is performed |
|---|---|---|---|
| Catch Basin Cover | Cover Not in Place | Cover is missing or only partially in place. Any open catch basin requires maintenance. | Catch basin cover is closed |
| | Locking Mechanism Not Working | Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread. | Mechanism opens with proper tools. |
| | Cover Difficult to Remove | One maintenance person cannot remove lid after applying normal lifting pressure.<br>(Intent is keep cover from sealing off access to maintenance.) | Cover can be removed by one maintenance person. |
| Ladder | Ladder Rungs Unsafe | Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges. | Ladder meets design standards and allows maintenance person safe access. |
| Metal Grates (If Applicable) | Grate opening Unsafe | Grate with opening wider than 7/8 inch. | Grate opening meets design standards. |
| | Trash and Debris | Trash and debris that is blocking more than 20% of grate surface inletting capacity. | Grate 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. |

**Catch Basin Insert Checklist**

## No. 18 – Catchbasin Inserts

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

**Conveyance Checklist**

In the absence of DOE checklist for conveyance, the following checklist from Pierce County SWDM is provided.

**#22 – Maintenance Checklist for Conveyance Systems (Pipes and Ditches):**

| Drainage System Feature | Defect or Problem | Condition When Maintenance Is Needed | Results Expected When Maintenance Is Performed |
|---|---|---|---|
| Pipes | Sediment & Debris | Accumulated sediment that exceeds 20 percent of the diameter of the pipe. | Pipe cleaned of all sediment and debris. |
| Pipes | Vegetation | Vegetation that reduces free movement of water though pipes. | Vegetation does not impeded free movement of water through pipes. *Prohibit use of sand and sealant application and protect from construction runoff.* |
| Pipes | Damaged (Rusted, Bent or Crushed) | Protective coating is damaged: rust is causing more than 50 percent deterioration to any part of pipe. | Pipe repaired or replaced. |
| Pipes | Damaged (Rusted, Bent or Crushed) | Any dent that significantly impedes flow (i.e. decreases the cross section area of pipe by more than 20 percent). | Pipe repaired or replaced. |
| Pipes | Damaged (Rusted, Bent or Crushed) | Pipe has major cracks or tears allowing groundwater leakage. | Pipe repaired or replaced. |
| Open Ditches | Trash & Debris | Dumping of yard wastes such as grass clippings and branches. Unsightly accumulation of non-degradable materials such as glass, plastic, metal, foam, and coated paper. | No trash or debris present. Trash and debris removed and disposed of as prescribed by the County. |
| Open Ditches | Sediment Buildup | Accumulated sediment that exceeds 20 percent of the design depth. | Ditch cleaned of all sediment and debris so that it matches design. |
| Open Ditches | Vegetation | Vegetation (e.g. weedy shrubs or saplings) that reduces free movements of water through ditches. | Water flows freely though ditches. Grassy vegetation should be left alone. |
| Open Ditches | Erosion Damage to Slopes | Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. | No erosion damage present. Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. |
| Open Ditches | Erosion Damage to Slopes | Any erosion observed on a compacted berm embankment. | *If erosion is occurring on compacted berms a professional engineer should be consulted to resolve source of erosion.* |
| Open Ditches | Rock Lining Out of Place or Missing (If Applicable) | Native soil is exposed beneath the rock lining. | Rocks replaced to design standards. |

If you are unsure whether a problem exists, contact a professional engineer.

**Stormwater Maintenance Inspection Form**

Sample - Please adapt to electronic format and/or copy as useful.

| **Name**<br>**INSPECTION ITEMS** | **Working Adequately? Y/N** | **Actions taken, follow up needed, and notes** | **Date** |
|---|---|---|---|
| Stormwater Pond | | Sample comment “Inlet & Overflow clear” or “Schedule for cleaning” | |
| Catch Basins<br>Per schedule, above | | Sample comment “Cleaned grate & sump” | |
| Conveyance<br>Per schedule, above | | Sample comment “visual inspection” | |
| Bioswale | | Sample note “Cleaned” | |
| Paving | | Sample note “Pavement swept” | |
| Stub-out Perforated Pipe Trench | | Sample note “Empty between rainfall” | |
| Amended/Mulch Soils | | Sample note “removed weeds” | |

Blank Inspection Form

| **Name** | **Working Adequately? Y/N** | **Actions taken, follow up needed, and notes** | **Date** |
|---|---|---|---|
| **INSPECTION ITEMS** | | | |
| Stormwater Tank | | | |
| Catch Basins | | | |
| Conveyance | | | |
| Bioswale | | | |
| Paving | | | |
| Stub-out Perforated Pipe Trench | | | |
| Amended/Mulch Soils | | | |

End of document.

*Page inserted for duplex print spacing.*