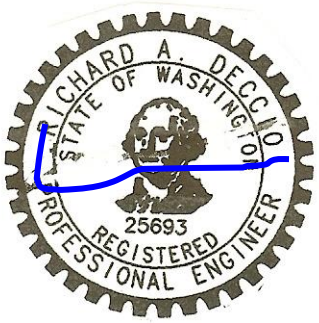
DECCIO Engineering Inc.

17217 7th Avenue W.
Bothell, WA. 98012
(206) 390-8374
Fax: (425) 741-8214

Lacey Gas Station and Retail
City of Lacey

Operation and Maintenance Manual

Property Location:
Campus Glen Drive NE
Lacey, WA



February 2, 2021

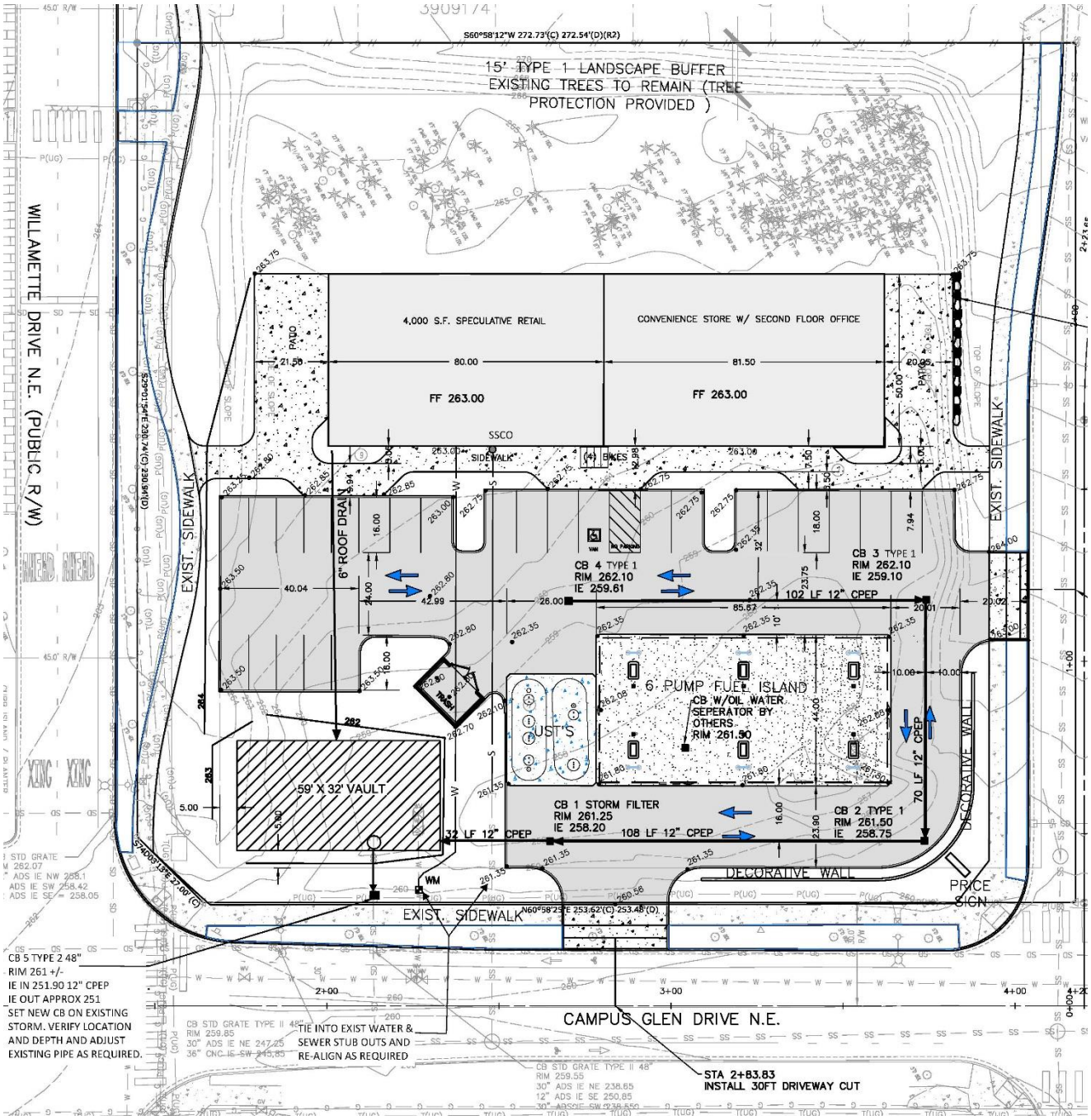
Prepared for:

Northwest Investors LLC

Stormwater Facility Maintenance Guide

Maintenance Standards

The following pages contain facility-specific maintenance standards, which are intended to be observable conditions for determining whether maintenance actions are required.



STORM FACILITIES LOCATION

Section 1: Project Description

The site is a gas station with conveyance store. The runoff from the proposed site improvements will be intercepted by catch basins and storm pipes, where the will pass through a StormFilter catch basin for water quality, then detained in a detention vault before being released to the roadway storm system.

Section 2 – Maintenance Importance and Intent

"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 goals of maintenance activities are to ensure the entire flow regime and treatment train designed for this site continue to fully function. For this site these include

- Maintain designed stormwater detention/retention volume
- Maintain ability of storm facility to attenuate flow rates
- Maintain ability to safely convey design stormwater flows
- Maintain ability to treat stormwater runoff quality
- Preserve soil and plant health, as well as stormwater flow contact with plant and soil systems
- 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 properties.

Section 3 – Responsible Parties

The site is small and contains a privately own stormwater system which is the responsibility of the property to maintain the systems and keep proper records including the Maintenance and Source Control Manual,

Section 4 – Facilities Requiring Maintenance

The inventory of all stormwater structures and BMPs requiring maintenance include:

- 12" CPEP storm pipe
- Catch Basins
- Stormwater Detention Vault
- StormFilter 360 Water Quality catch basin

- Oil/Water Separator

Section 5 – Maintenance Instructions

"The parties responsible for maintenance must review and apply the maintenance requirements contained herein. These maintenance 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. For facilities not owned and maintained by the city, a log of maintenance activity that indicates what actions were taken must be kept on site and be available for inspection by the city."

Refer to "Maintaining Stormwater Facilities" section of this report for the specific maintenance requirement for each system

Section 6 – Vegetation Maintenance

The site does not contain any stormwater related vegetation.

Section 7 – Pollution Source Control Measures

The possible pollution sources include oils and debris from the parking lot area which is treated by the "StormFilter 360" catch basin system. Possible oil leaks around the fuel pumps is separated from the stormwater system and discharge into the sanitary sewer system.

Section 8– Annual Cost of Maintenance

The following is the estimated cost of maintenance:

- Catch Basin Pumping: 3 catch basins total $150 per year
- Catch Basin & Storm Pipe replacement: N/A over 20-year life
- Stormwater Vault Pumping: $450 pumping ever 4-years
- Stormfilter cartridge replacement: $ 560 per year (replace twice a year)

Maintaining Stormwater Facilities

All stormwater facilities need to be maintained. Regular maintenance ensures proper functioning and keeps the facility aesthetically appealing. This Stormwater Facility Maintenance Guide is designed to help explain how stormwater facilities work and provide user-friendly guidance on how to maintain facilities to keep them functional and up to standards.

As a facility owner or homeowner's association, you are responsible for regularly maintaining your privately-owned drainage facilities such as ponds, infiltration systems, rain gardens, catch basins, and pipes. (The City of Lacey maintains stormwater facilities located in the public right-of-way.)

Most large development sites (typically projects larger than one single-family property) will have developed a detailed Maintenance and Source Control Manual as part of the site development (refer to Drainage Control Plan Maintenance and Source Control Manual requirements in Chapter 3, Section 3.3.3 of the City of Lacey Stormwater Design Manual). The city requires that the Maintenance and Source Control Manual is transferred with the property to the new owner(s) and responsible parties. The Maintenance and Source Control Manual will provide extensive information on the project, the stormwater facilities on the site, maintenance responsibilities, and maintenance activities that may include or reference the maintenance checklists found in this appendix. Be sure to locate the Maintenance and Source Control Manual for your project and follow the information presented therein. Where you believe a Maintenance and Source Control Manual exists for your propertybut is not available, please contact the city to request a copy.

For sites that do not have a Maintenance and Source Control Manual (typically smaller, single-family sites), the following instructions and helpful tips for successful facility inspections and maintenance are provided.

Maintenance Checklists

The checklists in this guide are for you to use when inspecting and maintaining the stormwater facilities that you are responsible for. If you are missing a particular checklist, or if you have additional facilities not identified or addressed in this guide, please contact your site developer, design engineer, or the city.

The checklists are in table format for ease of use and brevity. Each checklist tells you what part of the feature to check, how often to check, what to check for, and the desired outcome after maintenance is performed. Log sheets are included to help you keep track of when you last surveyed the stormwater drainage system.

Although it is not intended for the inspection to involve anything too difficult or strenuous, there are a few tools that will make the job easier and safer. These tools include:

- Gloves
- A flashlight (to look into catch basins, manholes or pipes)
- A long pole or broom handle (see below)

- Some kind of pry bar or lifting tool for pulling manhole and grate covers
- Standard yard tools, such as a rake and a shovel
- Measuring tool

A listing of resources is also included within this packet (see next page). Here you will find the phone numbers of the agencies referred-to in the tables.

Safety Warning:

For your safety and per OSHA regulations, you should never stick your head or any part of your body into a manhole or other type of confined space. When looking into a manhole or catch basin, stand above it and use the flashlight to help you see. Use a pole or broom handle that is long enough when you are checking sediment depths in confined spaces. Always properly replace grates and lids.

NO PART OF YOUR BODY SHOULD BREAK THE PLANE OF THE OPEN HOLE.

Checklist Instructions

The following pages contain maintenance checklists covering most of the needs for the components of your drainage system, as well as for some components that you may not have (you can ignore those checklists that don't apply to your system). Let city staff know if there are any components of your drainage system that you do not recognize or are missing from these pages.

Refer to the City of Lacey Stormwater Code, LMC 14.25 for additional stormwater maintenance requirements, including required maintenance frequency.

Using photocopies of these checklists and the log sheet, check off the problems that you look for each time you do an inspection. Add comments regarding problems found and actions taken on the log sheet. Keep the completed forms in your files for future reference.

You may call the City of Lacey at (360) 491-5600 for technical guidance. Please do not hesitate to call, especially if you are unsure whether a situation you have discovered may be a problem.

Resource Listing

If you are unsure whether a problem exists, please contact the city at the number below and ask for technical assistance with your situation. Other resources are listed for your convenience and as references associated with the checklists.

Lacey Public Works Department
(360) 491-5600 <http://www.ci.lacey.wa.us/city-government/city-departments/public-works/water-resources/storm-and-surface-water-programs/private-facilities>.

City of Lacey Spill Response Team
(360) 491-5644 <www.ci.lacey.wa.us/report-a-spill>.

Thurston County Environmental Health
Hazardous Waste Disposal (oil, paint, pesticides, etc.)
(360) 754-4111 <http://www.co.thurston.wa.us/HEALTH/ehhw/index.html>.

Solid Waste Disposal (yard waste, construction waste, contaminated soils, etc.)
(360) 786-5136 <http://www.co.thurston.wa.us/HEALTH/ehsw/index.html>.

WSU Thurston Co. Extension (Water Resource Ed. Programs, Envir. Stewardship info.)
(360) 786-5445 <http://thurston.wsu.edu/water/>.

Log Sheet

Use copies of this log sheet to keep track of when maintenance inspections 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 others can easily access them.

Location:		**Date Checked:**
Checked By:		
Name:		
Address:		**Phone:**
City:	**Zip:**	

Facility	Component Checked	Observations

Stormwater Facility Inspection and Maintenance Procedure

Stormwater facilities play an important role in managing the 4 feet of rainfall we receive in Lacey in an average year. The term "stormwater facility" refers to any landscaped or structural feature that collects, conveys, cleans or infiltrates runoff water. There are many types of stormwater facilities, ranging from simple swales and ponds to more complicated filter systems and flow control devices. Your on-site stormwater facilities work together to control runoff water, reduce flooding, and prevent pollution.

Owners of commercial property, multifamily residential property, or single-family residential properties with privately-owned drainage and stormwater facilities are required by City of Lacey Codes to maintain their facilities to established standards for full functionality (City of Lacey Stormwater Code, LMC 14.25). Facility owners are responsible for performing inspections of stormwater facilities, and for performing any maintenance identified by the inspections.

Basic maintenance work may be performed by the owner or property manager, although some tasks are best left to an experienced contractor. The inspection of stormwater facilities and any required maintenance work must be completed and reported annually to the City of Lacey Public Works Department by the date specified on the *Stormwater Facilities Inspection and Maintenance Annual Reporting Form* obtainable on the city's web site at <http://www.ci.lacey.wa.us/city-government/city-departments/public-works/water-resources/storm-and-surface-water-programs/private-facilities>).

Again, note that most large development sites will also have a Maintenance and Source Control Manual that was prepared as part of the site development, and should have been provided to the property owners. Look to your site's Maintenance and Source Control Manual for information on the project, the facilities on the site, maintenance responsibilities, and maintenance activities. Where a Maintenance and Source Control Manual is not available, the following steps are provided as general guidance:

Step 1. Identify

The first step is facility identification, so you know what types of stormwater facilities you have. Look on the site plan of your property, and note the main facility types indicated (such as rain gardens and infiltration trenches), along with related drainage components (such as catch basins, pipes, and debris barriers). Locate the various facilities on the ground.

Note that most drainage systems consist of components for four main purposes: stormwater collection (e.g., catch basins), conveyance (e.g., pipes and swales), water quality treatment (e.g., wet ponds) and flow control (via infiltration and/or surface discharge).

To assist you in identifying components, refer to the definitions and illustrations on the pages that follow.

Step 2. Inspect

For all facility components that you have identified, conduct an inspection. You may conduct the inspection yourself and/or with co-owners, or you may use a property manager or vendor to perform the inspection. Refer to the following Stormwater Facility Maintenance Checklists, which describe the maintenance standards for each component, and also identify and describe defects and their remedies.

For each facility, note on the Inspection and Maintenance Checklist the condition of the facility (good, fair or poor), and any problems or other observations.

Step 3. Maintain

For all facility components, if the inspection indicates maintenance is needed, have the work performed by competent personnel. Basic maintenance tasks may be performed by the property owner(s) or property manager, but difficult or potentially dangerous tasks should be performed by a qualified vendor. Be safe! Use caution when inspecting and working on or near facilities, and stay out of confined spaces such as catch basins and manholes.

Note the action taken and the date, and record this information on the Log Sheet. Mark the check boxes on the Inspection and Maintenance Checklist corresponding to the maintenance accomplished on each facility.

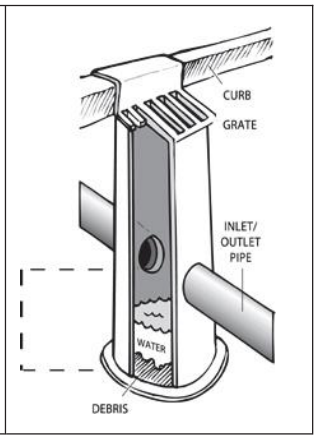
Step 4. Submit

Submit the completed *Stormwater Facilities Inspection and Maintenance Annual Reporting Form* by August 15 each year to: Lacey Water Resources, 420 College Street SE, Lacey, WA 98503. The completed checklist may be mailed, e-mailed (if available) or delivered in person to Lacey City Hall.

Common Stormwater Facilities: Identification and Actions

Catch Basin:

An underground concrete box structure with a slotted metal grate on top that collects runoff water from the ground surface. Typically located within pavement in parking lots and in the street gutter, usually next to a curb. Grate on top lets water in and keeps larger debris out. Sediment settles in the sump in the bottom (below the pipe openings) and must be removed periodically. Catch basins have an outlet pipe between the grate and the sump, to let the cleaner water flow out to a storm pond or other location. Some catch basins have both inflow and outflow pipes, to convey collected runoff water through.



Actions to keep catch basins functioning:

- Remove litter, leaves, debris, and obstructions from catch basin grates.
- Hire a professional to remove sediment buildup from sump (if road is privately owned; catch basins in the public right-of-way are maintained by the city).

Debris Barriers and Trash Racks:

A structural device with metal bars, to prevent debris from entering a pipe, spillway, or hydraulic structure.

Actions to keep debris barriers and trash racks functioning:

- Remove trash, debris, vegetation, and dirt from around the structure.
- Check inflow and outflow, and remove any flow obstructions.
- Remove plants such as alder and willow that tend to grow near the pipe ends.
- Check for structural integrity; hire a professional to fix broken bars or racks.

Group 1 – Flow Control and Treatment Facilities

1c. Detention Tanks and Vaults

These types of storage structures are usually underground and accessed via a manhole. DO NOT ENTER ANY TANK OR VAULT without proper training, certification and equipment.

Detention Tanks and Vaults					
Drainage System Feature	**Problem or Defect**	**Conditions To Check For**	**√ Check**	**What To Do for Desired Condition**	**√ Done**
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. Remove blockage or replace air vent if damaged.	
	Debris and Sediment	Accumulated sediment depth exceeds 10 percent of the diameter of the storage area for 50 percent of the length of storage vault or any point depth exceeds 15 percent of diameter. (Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than 50 percent of the length of tank.)		No debris or sediment present. All sediment and debris removed from storage area.	
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability).		All joint between tank/pipe sections are sealed.	
	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10 percent of its design shape. (Review required by engineer to determine structural stability).		Tank/pipe repaired or replaced to design.	
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 0.5 inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound.		Vault replaced or repaired to design specifications and is structurally sound.	

Detention Tanks and Vaults					
Drainage System Feature	**Problem or Defect**	**Conditions To Check For**	**√ Check**	**What To Do for Desired Condition**	**√ Done**
Storage Area (continued)	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 0.5 inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.		No cracks more than 0.25-inch wide at the joint of the inlet/outlet pipe.	
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.		Manhole access cover/lid is in place and secure.	
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 0.5 inch of thread (may not apply to self-locking lids)		Mechanism opens with proper tools.	
	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 and reinstalled by one maintenance person.	
	Ladder Rungs Unsafe	Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks. Ladder must be fixed or secured immediately.		Ladder meets design standards and allows maintenance persons safe access.	
Catch Basins	See "Catch Basins"	See "Catch Basins."		See "Catch Basins."	

1l. Media Filter Drains

A filter treatment device that is typically sited along highway side slopes (conventional design) and medians (dual media filter drains), borrow ditches, or other linear depressions. Media filter drains have basic components: a gravel no-vegetation zone, a grass strip, the MFD mix bed, and a conveyance system for flows leaving the media filter drain mix.

Media Filter Drains					
Drainage System Feature	**Problem or Defect**	**Conditions To Check For**	**√ Check**	**What To Do for Desired Condition**	**√ Done**
No Vegetation Zone Adjacent to Pavement	Erosion, Scour, or Vehicular Damage	No vegetation zone uneven or clogged so that flows are not uniformly distributed.		Area leveled and cleaned so that flows are spread evenly.	
	Sediment Accumulation on Edge of Pavement	Flows no longer sheet flowing off of roadway. Sediment accumulation on pavement edge exceeds top of pavement elevation.		No sediment accumulation on pavement edge that impedes sheet flow. Sediment deposits removed such that flows can sheet flow off of roadway.	
Vegetated Filter	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.		Sediment deposits removed, slope is re-leveled so that flows pass evenly through media filter drain.	
	Excessive Vegetation or Undesirable Species	When the grass becomes excessively tall (greater than 10 inches); when nuisance weeds and other vegetation starts to take over or shades out desirable vegetation growth characteristics. See also the Thurston County Noxious Weeds List.		Grass mowed and nuisance vegetation controlled such that flow not impeded. *Grass should be mowed to a height that encourages dense even herbaceous growth.*	
	Erosion, Scour, or Vehicular Damage	Eroded or scoured areas due to flow channelization, high flows or vehicular damage.		No eroded or scoured areas. *For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with suitable topsoil. The grass will creep in over the rock in time. If bare areas are large, generally greater than 12 inches wide, the filter strip should be re-graded and re-seeded. For smaller bare areas, overseed when bare spots are evident.*	

Media Filter Drains					
Drainage System Feature	**Problem or Defect**	**Conditions To Check For**	**√ Check**	**What To Do for Desired Condition**	**√ Done**
Media Bed	Erosion, Scour, or Vehicular Damage	Eroded or scoured areas due to flow channelization, high flows or vehicular damage.		No eroded or scoured areas. *For ruts or areas less than 12 inches wide, repair the damaged area by filling with suitable media. If bare areas are large, generally greater than 12 inches wide, the media bed should be re-graded.*	
	Sediment Accumulation on Media Bed	Sediment depth inhibits free infiltration of water.		Sediment accumulation does not impeded infiltration. Sediment deposits removed and slope is re-leveled so that flows pass freely through Media Bed.	
Underdrains	Sediment	Depth of sediment within perforated pipe exceeds 0.5 inch.		Depth of sediment within perforated pipe does not exceed 0.5 inch. Flush underdrains through access ports and collect flushed sediment.	
General	Trash and Debris Accumulation	Accumulated trash and debris. If there is less than the threshold, remove all trash and debris as part of the next scheduled maintenance.		No trash or debris present. Remove trash and debris from media filter.	
	Flows are Bypassing Media Filter Drain	Evidence of significant flows downslope (rills, sediment, vegetation damage, etc.) of media filter drain.		Facility functions as designed. Sediment deposits removed and slope is re-leveled so that flows pass evenly through media filter drain. If media filter drain is completely clogged, it may require a more extensive repair or replacement.	
	Media Filter Drain Mix Replacement	Water is seen on surface of the media filter drain mix from storms that are less than the 91st percentile 24-hour rain event (approximately 1.25 inches in 24 hours). Maintenance also needed on a 10-year cycle and during a preservation project.		No water ponded on surface after design storm. *Excavate and replace all of the media filter drain mix contained within the media filter drain.*	

1u. Fencing/Shrubbery Screen/Other Landscaping

Fencing, shrubbery screening, and landscaping provide flow control via interception, transpiration, and increased infiltration as well as slope protection. Most routine maintenance procedures are typical landscape care activities.

Fencing/Shrubbery Screen/Other Landscaping					
Drainage System Feature	**Problem or Defect**	**Conditions To Check For**	**√ Check**	**What To Do for Desired Condition**	**√ Done**
General	Missing or Broken Parts/Dead Shrubbery	Any defect in the fence or screen that permits easy entry to a facility.		Fence is mended or shrubs replaced to form a solid barrier to entry.	
	Erosion	Erosion has resulted in an opening under a fence that allows entry by people or pets.		Soil under fence replaced so that no opening exceeds 4 inches in height.	
	Unruly Vegetation	Shrubbery is growing out of control or is infested with weeds. See also Thurston County Noxious Weeds List.		Shrubbery is trimmed and weeded to provide appealing aesthetics. Do not use chemicals to control weeds.	
Fences	Damaged Parts	Posts out of plumb more than 6 inches.		Posts plumb to within 1.5 inches of plumb.	
		Top rails bent more than 6 inches.		Top rail free of bends greater than 1 inch.	
		Any part of fence (including posts, 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.	
		Missing or loose barbed wire that is sagging more than 2.5 inches between posts.		Barbed wire in place with less than 0.75-inch sag between posts.	
		Extension arm missing, broken, or bent out of shape more than 1.5 inches.		Extension arm in place with no bends larger than 0.75 inch.	
	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.		No openings in fabric.	