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Document Title: Stormwater Outfall Management & BMP Facilities Agreement

Grantee: City of Puyallup

Grantor: Benaroya Capital Company, LLC

Abbreviated Legal Description: A portion of Lot 1 and Lot 3 of BLR 202203225003

Complete Legal Description: See Exhibit A

Assessor's Tax Parcel or Account Number(s): 0419034038, 0419034036

Reference Number of Related Document(s):

Stormwater Management & BMP Facilities Agreement

- A. Parties.** The parties to this agreement are Grantee City of Puyallup, a Washington State municipal corporation (City), and Grantor landowner Benaroya Capital Company, LLC, a Washington limited liability company (Landowner).
- B. Property.** Landowner is the owner of certain real property (Property), which is legally described in this document and is located at the following address: 1015 39th Ave SE Puyallup, WA 98374.
- C. Development Plan & Stormwater Facilities.** The site, subdivision or other development plan (Plan) for the Property, specifically known, entitled or described as South Hill Business & Technology Center Parking Lot Expansion provides for detention, retention, treatment or management of stormwater that is associated with the Property through the use of identified stormwater facilities or best management practices (collectively, Stormwater Facilities). Upon approval of the Plan by the City, the Plan shall be incorporated herein by this reference. In accordance with the Plan, Landowner shall adequately construct, operate, use, maintain and repair the Stormwater Facilities.

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D. Agreement. On the terms and conditions set forth herein, the City and Landowner agree as follows:

1. The Stormwater Facilities shall be constructed, operated, used, maintained and repaired by Landowner in accordance with the requirements of the Plan, and any other applicable law or regulation.
2. Landowner (which expressly includes its agents, successors and assigns, including any homeowners association) shall adequately and properly operate, use, maintain and repair the Stormwater Facilities as described in the maintenance and operations manual, which is on file with the City, and may be attached and recorded herewith as Exhibit B. This duty extends to all associated pipes and channels, as well as all structures, improvements, and vegetation that are provided to control the quantity and quality of the stormwater. Adequate maintenance shall mean maintenance that is sufficient to keep the Stormwater Facilities in good working order and operating so as to satisfy the design and performance standards of the Plan.
3. Landowner shall regularly inspect the Stormwater Facilities and shall submit an inspection report to the City at least once a year on a date prescribed by the City. The purpose of the inspection(s) is to ensure that the Stormwater Facilities are safe and functioning properly. The scope of the inspection shall include the entire Stormwater Facilities, including but not limited to, berms, outlet structures, pond areas, access roads, and so forth. Deficiencies and any performance or other related issues shall be noted by Landowner in the inspection report. The annual report shall be in a form and include content as prescribed from time to time by the City. An example copy of the report form may be attached hereto as Exhibit C.
4. Landowner hereby grants permission to the City to enter upon the Property to inspect the Stormwater Facilities. Except in case of emergency, the City shall provide Landowner with at least forty-eight (48) hours written notice prior to entering on to the Property. Landowner shall be entitled to have a representative accompany the City during such inspection. The City shall provide Landowner with copies of written inspection reports.
5. If Landowner fails to adequately and properly operate, use, maintain or repair the Stormwater Facilities, the City shall notify Landowner in writing and provide Landowner with a reasonable opportunity to cure. If Landowner fails to timely cure, then the City may enter upon the Property and remedy the issue(s) identified in the notice and those reasonably related thereto; Furthermore, if the City performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like while remedying the identified issues, the City may charge the cost of the remedy to Landowner, and Landowner shall promptly pay the costs to the City. Notwithstanding the foregoing, the City shall be under no obligation to inspect, maintain or repair the Stormwater Facilities.
6. Landowner shall defend, indemnify and hold the City, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits including attorney fees, arising out of or in connection with activities or operations, performed by Landowner, or on Landowner's behalf, that relate to the Stormwater Facilities and the subject matter of this agreement, except for injuries and damages caused by the negligence of the City.

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- E. Covenant.** The terms and provisions of this agreement constitute a covenant, which is subject to the following: This covenant is an equitable covenant. It touches and concerns the land that is described as the Property herein. The parties intend that this covenant shall bind the parties' successor and assigns. This covenant shall run with the land that is described as the Property herein, and shall bind whoever has possession of the land, in whole or in part, without regard to whether the possessor has title, or has succeeded to the same estate that granting parties have or had. Possessors shall include, but are not limited to, leasehold tenants, contract purchasers, subtenants, and adverse possessors. This covenant shall run with the land even in the absence of the transfer of some interest in land, other than the covenant itself, between Landowner and the City. This covenant shall not be governed by the mutuality rule. The burden of the covenant can run independently from the benefit of the covenant, and the benefit need not run. The benefit may be in gross or personal to Landowner or the City. Landowner waives its right to assert any defenses to the enforcement of this covenant, including, but not limited to, the change of neighborhood doctrine, laches, estoppel, balancing of hardships, and abandonment. If Landowner breaches any term of this covenant and agreement, then all remedies in equity and at law, including, but not limited to, injunctions, mandamus, declaratory judgments, and damages, shall be available to the City.
- F. Governing Law & Venue.** This agreement shall be governed by and construed in accordance with the laws of the State of Washington. The venue for any action that arises from or out of this instrument shall be the Pierce County Superior Court.

<signature page to follow>

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Capital
Benaroya Capital Company, LLC

BY: *Larry R Benaroya*
Larry R. Benaroya
Manager

Dated: 10/17/2025

City of Puyallup

Dated: 10/20/2025

BY: *Kenneth Cook*
Accepted by:
Kenneth Cook
Development Engineering Manager

City of Puyallup

Dated: 10/14/2025

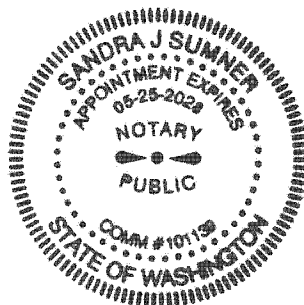
DocuSigned by:
BY: *Joseph N Beck*
Approved as to form:
Joseph N. Beck
City Attorney

STATE OF Washington)
)
COUNTY OF King)

-SS

On this 17th day of October, 2025, before me personally appeared Larry Benaroya, to me known to be the Manager of Benaroya Capital Company, LLC that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said limited liability company, for the uses and purposes therein mentioned, and on oath stated that he or she was authorized to execute said instrument and that the seal affixed is the corporate seal of said limited liability company.

In Witness Whereof I have hereunto set my hand and affixed my official seal the day and year first above written.



Sandra Joan Sumner
Printed Name: Sandra Joan Sumner
Notary Public in and for the State of Washington
Residing in: Mountlake Terrace, WA.
My appointment expires: May 25, 2028

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EXHIBIT A

LOT 1:

A PORTION OF CITY OF PUYALLUP BOUNDARY LINE REVISION No. P-18-0145, RECORDED UNDER PIERCE COUNTY AUDITOR'S FEE NUMBER 201905225002, LYING IN THE CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE STONE MONUMENT MARKING THE SOUTH QUARTER CORNER OF SECTION 3, TOWNSHIP 19 NORTH, RANGE 4 EAST, OF THE WILLAMETTE MERIDIAN, SAID STONE MONUMENT LIES NORTH 86°31'42" WEST, 2621.06 FEET FROM THE SOUTHEAST CORNER OF SAID SECTION 3; THENCE NORTH 00°00'24" EAST, ALONG THE WEST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 3, 43.08 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUING ALONG THE WEST LINE OF SAID SOUTHEAST QUARTER, NORTH 00°00'24" EAST, 2556.43 FEET TO THE NORTH LINE OF SAID BOUNDARY LINE REVISION;

THENCE SOUTH 87°44'17" EAST, ALONG SAID NORTH LINE, 496.53 FEET;

THENCE SOUTH 00°04'00" WEST, 132.96 FEET; THENCE SOUTH 16°29'57" EAST, 15.96 FEET;

THENCE SOUTH 00°00'36" EAST, 335.82 FEET; THENCE SOUTH 52°49'01" EAST, 132.81 FEET;

THENCE SOUTH 89°15'41" EAST, 28.82 FEET; THENCE SOUTH 82°14'13" EAST, 58.63 FEET;

THENCE SOUTH 53°48'38" EAST, 13.69 FEET; THENCE SOUTH 37°10'59" WEST, 232.64 FEET;

THENCE SOUTH 00°15'12" EAST, 225.75 FEET; THENCE SOUTH 89°59'00" WEST, 80.33 FEET;

THENCE SOUTH 00°00'36" WEST, 489.96 FEET; THENCE NORTH 89°59'00" EAST, 547.26 FEET;

THENCE NORTH 00°00'36" EAST, 860.97 FEET; THENCE SOUTH 89°41'48" EAST, 381.02 FEET;

THENCE SOUTH 83°08'36" EAST, 199.54 FEET TO THE EAST LINE OF SAID BOUNDARY LINE REVISION;

THENCE SOUTH 00°13'45" WEST, 1645.13 FEET TO THE SOUTHERLY LIMITS OF SAID BOUNDARY LINE REVISION;

THENCE ALONG THE SOUTHERLY LIMITS OF SAID BOUNDARY LINE REVISION FOR THE FOLLOWING 26 COURSES:

THENCE NORTH 86°31'42" WEST, 295.47 FEET; THENCE SOUTH 00°13'45" WEST, 332.49 FEET;

THENCE NORTH 87°01'38" WEST, 580.68 FEET; THENCE NORTH 00°52'42" EAST, 677.52 FEET;

THENCE NORTH 89°59'36" WEST, 125.03 FEET;

THENCE SOUTH 45°04'35" WEST, 283.07 FEET TO A NON-TANGENT CURVE, CONCAVE TO THE WEST, HAVING A RADIUS OF 205.00 FEET, THE RADIUS POINT OF WHICH BEARS NORTH 87°53'38" WEST;

THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 33°00'39", FOR 118.11 FEET; THENCE SOUTH 32°19'16" WEST, 41.17 FEET;

THENCE SOUTH 45°04'35" WEST, 113.76 FEET TO A CURVE TO THE LEFT, HAVING A RADIUS OF 254.00 FEET;

THENCE ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 18°36'33, FOR 82.50 FEET;

THENCE SOUTH 25°10'59" WEST, 11.39 FEET; THENCE SOUTH 19°13'48" WEST, 41.03 FEET;

THENCE SOUTH 13°32'58" WEST, 10.80 FEET TO A NON-TANGENT CURVE, CONCAVE TO THE EAST, HAVING A RADIUS OF 254.00 FEET, THE RADIUS POINT OF WHICH BEARS SOUTH 77°48'15" EAST;

THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 06°43'28" FOR 29.81 FEET;

THENCE SOUTH 87°01'38" EAST, 27.68 FEET; THENCE SOUTH 02°58'22" WEST, 33.74 FEET;

THENCE NORTH 87°01'38" WEST, 28.12 FEET; THENCE SOUTH 03°27'46" WEST, 10.16 FEET;

THENCE NORTH 87°01'38" WEST, 59.99 FEET; THENCE SOUTH 47°58'22" WEST, 29.08 FEET;

THENCE NORTH 86°31'42" WEST, 12.85 FEET; THENCE NORTH 00°00'24" EAST, 69.13 FEET;

THENCE NORTH 86°31'42" WEST, 58.60 FEET; THENCE SOUTH 45°04'35" WEST, 23.32 FEET;

THENCE SOUTH 00°00'24" WEST, 55.66 FEET; THENCE NORTH 86°31'42" WEST, 28.05 FEET TO THE POINT OF BEGINNING.

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LOT 3:

A PORTION OF CITY OF PUYALLUP BOUNDARY LINE REVISION No. P-18-0145, RECORDED UNDER PIERCE COUNTY AUDITOR'S FEE NUMBER 201905225002, LYING IN THE CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

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EXHIBIT B

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Operations and Maintenance (O&M) Manual

South Hill Business & Technology Center Parking Expansion Project

Prepared For: The Benaroya Company
Prepared By: Parametrix, Inc.

Responsible Party for Operation & Maintenance:
Jeff Eby - South Hill Business & Technology Center Chief Engineer
Email: Jeffe@benaroya.com
Phone: (253)-200-4751 Office (206)-327-2515 Cell

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Site Overview

The South Hill Business & Technology Center Parking Expansion project proposes to expand their office park parking lot on roughly 10-acres undeveloped land in Puyallup, WA. The project site is generally located in southeast Puyallup, WA located off SE 39th Avenue east of Bradley Lake and west of Pierce College. The parking expansion will occur on the eastern portion of the existing office park currently a mixture of gravel maintenance yard area and wooded slopes.

The Project will employ the use of on-site detention and infiltration facilities to manage increased stormwater volumes and flowrates. The Project will treat water quality by providing basic treatment for removal of suspended solids by providing grassy swales, bioretention swales, and infiltration planters. Infiltration planters and underground NDS StormChamber chamber system will detain and infiltrate runoff generated as a result of the project completion.

The purpose of this manual is to define the operations and maintenance procedures that must be followed to keep this Project functioning as designed. This includes but is not limited to: maintenance intervals, methods, and materials. Please see Section 205.4, Operations and Maintenance Manual, of the Engineering and Construction Standards for the minimum requirements. See Appendix A for site plans and details.

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NDS StormChamber

The NDS StormChamber system is an unground detention facility that has an approximate 447'x 31' footprint installed beneath the proposed main drive aisle adjacent to the existing building in the business park. A series of chambers collectively provide storage space for stormwater to collect prior to discharging at controlled flowrates from an outlet structure. There are inlet connections throughout the site with a manhole or catch basin preceding the connection to the chamber system. Risers extend up from top of the chambers at locations for observation and sedimental removal via a vacuum truck.

Maintenance Plan

- It is recommended that a logbook be maintained showing the depth of water in the chamber at each observation in order to determine the rate at which the system dewateres after runoff producing storm events. Once the performance characteristics of the system have been verified, the monitoring schedule can be reduced to an annual basis, unless the performance data suggests that a more frequent schedule is required.
- The system is designed with a defined top portal that can be cut-out to accept a 10-inch diameter riser pipe. The riser is used as an observation well and for access of a vacuum truck tube that can be used to remove sediment.
- Remove sediment by inserting the vacuum truck tube into the 10-inch riser pipe when deposits approach within six inches of the invert heights of connecting pipes between rows.
- The use of inlet structures with a 2–4-foot sump may allow for additional capture of sediment that can easily be removed with a vacuum truck or other device before it gets into the StormChamber® system. A sumped inlet structure placed at both ends of the first row of StormChamber® system can also be used to facilitate sediment removal within the StormChamber® system. Under this alternative, one or more additional chamber(s) is added to the beginning and end of the first row, the end of each being inserted directly into the sumped inlet structures. This provides for physical access into the first row for maintenance.

General Maintenance Procedures

- Visually inspect the condition of the unit at cleanout locations and take note of any concerning defects/problems or significant sediment build-up.

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Infiltration Planters

A series of infiltration planters will be constructed in the upper tiers of the parking lot. The planters will have open bottoms to allow stormwater to slowly infiltrate into the ground. They contain a layer of gravel, soil, and vegetation. Stormwater runoff temporarily pools on top of the soil, and then slowly infiltrates through the planter into the ground.

Maintenance Plan

A visual inspection should occur after significant rainfall events. Subsequent cleaning to occur if necessary. Bioretention areas require annual plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant removal capabilities. In general, bioretention maintenance requirements are typical landscape care procedures and include:

- **Watering:** Plants should be selected to be drought tolerant and not require watering after establishment (2 to 3 years). Watering may be required during prolonged dry periods after plants are established.
- **Erosion control:** Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred. Properly designed facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems occur the following should be reassessed: (1) flow volumes from contributing areas and bioretention cell sizing; (2) flow velocities and gradients within the cell; and (3) flow dissipation and erosion protection strategies in the pretreatment area and flow entrance. If sediment is deposited in the bioretention area, immediately determine the source within the contributing area, stabilize, and remove excess surface deposits.
- **Sediment removal:** Follow the maintenance plan schedule for visual inspection and remove sediment if the volume of the ponding area has been compromised.
- **Plant material:** Depending on aesthetic requirements, occasional pruning and removing dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause, and replace with appropriate species. Periodic weeding is necessary until plants are established.
- **Weeding:** Invasive or nuisance plants should be removed regularly and not allowed to accumulate and exclude planted species. At a minimum, schedule weeding with inspections to coincide with important horticultural cycles (e.g., prior to major weed varieties dispersing seeds). Weeding should be done manually and without herbicide applications. The weeding schedule should become less frequent if the appropriate plant species and planting density are used and the selected plants grow to capture the site and exclude undesirable weeds.
- **Nutrient and pesticides:** The soil mix and plants are selected for optimum fertility, plant establishment, and growth. Nutrient and pesticide inputs should not be required and may

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degrade the pollutant processing capability of the bioretention area, as well as contribute pollutant loads to receiving waters. By design, bioretention facilities are located in areas where phosphorous and nitrogen levels may be elevated and these should not be limiting nutrients. If in question, have soil analyzed for fertility.

- **Mulch:** Replace mulch annually in bioretention facilities where heavy metal deposition is high (e.g., contributing areas that include gas stations, ports, and roads with high traffic loads). In residential settings or other areas where metals or other pollutant loads are not anticipated to be high, replace or add mulch as needed (likely 3 to 5 years) to maintain a 2-to-3-inch depth.

Soil: Soil mixes for bioretention facilities are designed to maintain long-term fertility and pollutant processing capability. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental concern for at least 20 years in bioretention systems, but this will vary according to pollutant load. Replacing mulch media in bioretention facilities where heavy metal deposition is likely provides an additional level of protection for prolonged performance. If in question, have soil analyzed for fertility and pollutant

Maintenance Procedures

A visual inspection of curb inlets and splash pads must occur.

- All inlets free of debris and unclogged.
- Vegetation must cover at least 90% of the facility at maturity. Maintain grass height at 6"-9". Trim to allow sight lines and foot traffic, also to ensure inlets and outlets freely convey stormwater into/out of the facility.
- Remove sediment accumulation more than 4-inches deep.
- Replace mulch annually to a depth 2-3 – inches

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Bioretention Swale

Swales are gently sloping depressions planted with dense vegetation or grass that treat stormwater runoff from rooftops, streets, and parking lots. As the runoff flows along the length of the swale, the vegetation slows and filters it and allows it to infiltrate into the ground. A swale can look like a typical landscaped area.

Maintenance Plan

Bioretention areas require annual plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant removal capabilities. In general, bioretention maintenance requirements are typical landscape care procedures and include:

- **Watering:** Plants should be selected to be drought tolerant and not require watering after establishment (2 to 3 years). Watering may be required during prolonged dry periods after plants are established.
- **Erosion control:** Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred. Properly designed facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems occur the following should be reassessed: (1) flow volumes from contributing areas and bioretention cell sizing; (2) flow velocities and gradients within the cell; and (3) flow dissipation and erosion protection strategies in the pretreatment area and flow entrance. If sediment is deposited in the bioretention area, immediately determine the source within the contributing area, stabilize, and remove excess surface deposits.
- **Sediment removal:** Follow the maintenance plan schedule for visual inspection and remove sediment if the volume of the ponding area has been compromised.
- **Plant material:** Depending on aesthetic requirements, occasional pruning and removing dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause, and replace with appropriate species. Periodic weeding is necessary until plants are established.
- **Weeding:** Invasive or nuisance plants should be removed regularly and not allowed to accumulate and exclude planted species. At a minimum, schedule weeding with inspections to coincide with important horticultural cycles (e.g., prior to major weed varieties dispersing seeds). Weeding should be done manually and without herbicide applications. The weeding schedule should become less frequent if the appropriate plant species and planting density are used and the selected plants grow to capture the site and exclude undesirable weeds.
- **Nutrient and pesticides:** The soil mix and plants are selected for optimum fertility, plant establishment, and growth. Nutrient and pesticide inputs should not be required and may degrade the pollutant processing capability of the bioretention area, as well as contribute

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pollutant loads to receiving waters. By design, bioretention facilities are located in areas where phosphorous and nitrogen levels may be elevated and these should not be limiting nutrients. If in question, have soil analyzed for fertility.

- **Mulch:** Replace mulch annually in bioretention facilities where heavy metal deposition is high (e.g., contributing areas that include gas stations, ports, and roads with high traffic loads). In residential settings or other areas where metals or other pollutant loads are not anticipated to be high, replace or add mulch as needed (likely 3 to 5 years) to maintain a 2-to-3-inch depth.
- **Soil:** Soil mixes for bioretention facilities are designed to maintain long-term fertility and pollutant processing capability. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental concern for at least 20 years in bioretention systems, but this will vary according to pollutant load. Replacing mulch media in bioretention facilities where heavy metal deposition is likely provides an additional level of protection for prolonged performance. If in question, have soil analyzed for fertility and pollutant levels.

General Maintenance Procedures

Biannually, a visual inspection should occur. Subsequent maintenance to occur if necessary.

- Vegetation must cover at least 90% of the facility at maturity. Maintain grass height at 6"-9". Trim to allow sight lines and foot traffic, also to ensure inlets and outlets freely convey stormwater into/out of the facility.
- Remove sediment accumulation more than 4-inches deep.
- Replace mulch annually to a depth 2-3 – inches
- Maintain side slopes to prevent erosion
- All inlet pipes should be free of debris and unclogged.

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Catch Basins/Manholes

Maintenance Plan

Catch basins and manholes should be inspected monthly from October to April and after any major storm event (1" or more in 24 hours).

A maintenance activity log must be completed during each inspection (See Appendix C).

Maintenance Procedures

A visual inspection must take place to ensure the structures are functioning as designed. The following list mentions some of items to look for when performing an inspection however a complete checklist can be found on the maintenance log in Appendix B.

- Trash and debris in the structure or blocking the grate opening
- "Dump no pollutants" stamp not visible
- Dead animals or vegetation present
- Sediment that exceeds 60% of the sump depth
- Damage to the structure frame and/or top slab
- Cracks in the structure walls or bottom
- Settlement
- Any evidence of oil, gasoline, contaminants, or other pollutants
- Locking mechanism not working
- Cover difficult to remove
- Ladder rungs unsafe
- Grate opening unsafe
- Insects present

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Basic Biofiltration Swale

Basic Biofiltration Swale			
Drainage System	Potential Defect	Conditions When Needed	Minimum Performance Standard
Feature		Note: table spans multiple pages.	
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.	Grass treatment area of the swale is free of accumulated sediment deposits. Swale bottom is level from side to side and drains freely toward outlet. There should be no areas of standing water once inflow has ceased.
	Standing Water	When water stands in the swale between storms and does not drain freely.	Water drains from swale per design standards after a storm. (Any of the following may apply: remove sediment or trash blockages, improve

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Basic Biofiltration Swale			
Drainage System	Potential Defect	Conditions When Needed	Minimum Performance Standard
Feature		Note: table spans multiple pages.	
			grade from head to foot of swale, remove clogged check dams, add underdrains, or convert to a wet biofiltration swale.)
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale width	Spreader is level and clean so that flows are spread evenly over entire filter width.
	Constant Baseflow	When small quantities of water continually flow through the swale, even when it has been dry for weeks, and an eroded, muddy channel has formed in the swale bottom.	A low-flow pea-gravel drain the length of the swale has been added or a by-pass created for the baseflow around the swale.
	Poor Vegetation Coverage	When grass is sparse or bare or eroded patches occur in more than 10% of the swale bottom.	Grass coverage has been restored to good condition and facility meets design function.
	Vegetation	When the grass becomes excessively tall (greater than 10 inches); when nuisance weeds and other vegetation starts to take over.	Vegetation is mowed to less 3"-4" height. Nuisance vegetation has been removed such that flow is not impeded. Grass clippings removed from swale.
	Excessive Shading	Grass growth is poor because sunlight does not reach swale.	Overhanging limbs and brushy vegetation on adjacent slopes has been trimmed back to (extent based on acceptable aesthetics and maintained plant health) to allow adequate sunlight to reach grass in swale.
	Inlet/Outlet	Inlet/outlet areas clogged with sediment and/or debris.	Material has been removed and there is no clogging or blockage in the inlet and outlet area.
	Trash and Debris Accumulation	Trash and debris accumulated in the bio-swale.	Remove trash and debris from bioswale.
	Erosion/Scouring	Eroded or scoured swale bottom due to flow channelization, or higher flows.	Eroded/scoured areas have been repaired and facility filters stormwater per design function. (Ruts or bare areas less than 12 inches wide may be repaired filling damaged portion with crushed gravel; grass will creep in over the rock in time. For large bare areas [generally >12" wide], the swale should be re-graded and re-seeded. For smaller bare areas, over-seed when bare spots are evident, or take plugs of grass from the upper slope and plant in the swale bottom at 8-inch intervals.)

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Bioretention System

Bioretention System			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Note: table spans multiple pages.			
General	Pests	Signs of pest infestations (IPM protocol threshold(s) are exceeded), including rodent holes or mounds that disturb dispersion flow paths.	Pests are not present or engaged in activities that present a significant public health risk or compromise to the intended design function of the facility. Pests that have exceeded acceptable thresholds have been addressed using appropriate IPM measures. Standing water that may allow mosquito breeding has been removed and cause of standing water has been addressed (see "Ponded Water").
Facility Area	Trash and Debris	Trash and debris present in facility area.	Pest-damaged vegetation has been removed. Facility area is free of trash and debris.
	Pet Waste	Large volumes of feces from domestic pets are present.	Pet waste removed. Pet waste station or additional signage installed, if appropriate.
	Mulch	Mulch depth is less than 2 inches or the facility has bare spots without mulch cover.	Mulch has been restored to a depth of 2 to 3 inches and is appropriate to the location within the facility (e.g. compost mulch in the bottom and wood chips on side slopes).
Facility Bottom Area	Sediment	Sediment accumulated to extent that infiltration rate is reduced, water can be seen to be ponding, or surface storage capacity is significantly impacted.	Source of sediment has been identified and controlled. Excess sediment has been removed, and damaged vegetation and mulch has been replaced.
	Leaves	After fall leaf drop, leaves have accumulated in the facility in a manner to pose a risk of impeding water flow or clogging the outlet.	Leaves have been removed.
	Ponded Water	Water overflows during storms smaller than the design event, or ponded water remains in the basin more than 48 hours after the end of a storm.	Cause of excessive ponding has been identified by investigating: 1) potential that debris build-up is impeding infiltration; 2) condition of underdrain (if present); 3) potential that other water inputs are present (e.g. groundwater, illicit connections); 4) facility size is appropriate to contributing area; and 5) condition of bioretention soil media.

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Bioretention System			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Note: table spans multiple pages.			
			Cause of excessive ponding has been corrected. Engineer has been consulted where necessary.
Earthen Side Slopes and Berms	Erosion at Inlets/ Outlets	Erosion (gullies/ rills) greater than 2 inches deep around inlets, outlet, and alongside slopes.	For channels or cuts over 3 inches deep, temporary erosion control measures have been put into place until permanent repairs are made. Source of erosion has been addressed/ eliminated and eroded areas repaired per design specifications, with additional stabilizing material (cobbles, vegetation, etc.) added as necessary.
	Erosion of Side Slopes	Erosion of sides causes slope to become a hazard.	Source of erosion has been addressed and side slopes repaired to design specifications. Slopes have stabilizing material where necessary.
	Settlement	Settlement greater than 3 inches (relative to undisturbed sections of berm).	Slopes and berm have been restored to design elevations/ heights.
	Berm Leaking	Downstream face of berm wet; seeps or leaks evident.	Any seeps or leaks have been plugged and berm material and compaction are per design specifications. Engineer has been consulted where necessary.
	Rodents in Berm	Any evidence of rodent holes or water piping in berm.	Rodents have been eradicated (see "Pests in Facility"). Holes have been filled and berm compacted (see "Berm Leaking").
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.
Low Permeability Check Dams and Weirs	Sediment or Other Debris Blocking	Sediment, vegetation, or debris accumulated at or blocking (or having the potential to block) check dam, flow control weir or orifice.	No blockage present of check dam, flow control weir, or orifice. Any likely immediate sources of additional debris or sediment (e.g. additional dead plant material, erosion issue, etc. upstream) addressed or removed.
	Erosion or Undercutting	Erosion and/or undercutting present.	Eroded and/or undercut areas have been repaired and sources of issue addressed to prevent further erosion/undercutting at weir.
	Grade Board Not Level	Grade board or top of weir damaged or not level.	Grade board is undamaged (repaired or replaced) and level.

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Bioretention System			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Note: table spans multiple pages.			
Inlet	Erosion at Inlet	Concentrated flows are causing erosion at inlet.	A cover of rock or cobbles or other erosion protection measure (e.g., matting) is in place to protect the ground where concentrated water enters the facility (e.g., a pipe, curb cut or swale).
Splash Block Inlet	Water Misdirected from Inlet	Water is not being directed properly to the facility and away from the inlet structure.	Splash block(s) reconfigured/ repaired to direct water to facility and away from structure.
Curb Inlet/Outlet	Leaf Accumulation at Curb Cut	Accumulated leaves or other debris at curb cuts (inlets and outlets) can block water flow and proper function of the facility. Maintenance is particularly important in the fall.	Curb cuts and adjacent gutters are free of leaves and debris, and water can flow freely into (and out of) the facility.
Pipe Inlet/Outlet	Pipe is Damaged	Pipe is damaged.	Pipe repaired or replaced to design specifications.
	Pipe is Clogged	Pipe is clogged, completely or partially. Problem material may include leaves, debris, trash, roots, sediment, or other material.	Pipe is unclogged and free of any obstructions. Pipe functioning at design capacity.
	Access is Blocked	Vegetation is blocking access for inspection.	Area within 1 foot of inlets/outlets is clear of vegetation, and access pathways are clear and maintained where necessary.
Trash Rack	Trash and Debris	Trash or other debris is present on trash rack. Capacity may be reduced by buildup of trash or debris.	Trash rack is free of trash, leaves, debris, or other foreign material.
	Bar Screen Damage	Bar screen on trash rack is damaged or missing.	Bar screen has been repaired/ replaced to design specifications.
Overflow	Overflow Blocked	Overflow capacity is reduced by sediment or debris.	Overflow area is free of sediment and debris and capacity functions per design standards.
Underdrain Pipe	Reduced Capacity	Plant roots, sediment, or debris may reduce the capacity of the underdrain. Symptoms may include ponded water in facility bottom area.	Underdrain pipe is free of plant roots, sediment, and debris. Infiltration and pipe capacity functioning per design function.
Vegetation (continues on next page)	Plant Health	Plants not thriving across at least 80% of the entire design vegetated area within the BMP; overly dense vegetation requiring pruning.	Healthy water tolerant plants in bioretention area, plants thriving across at least 80% of the entire design vegetated area within the facility.

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Bioretention System

Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Note: table spans multiple pages.			
	Diseased Plant Material	Diseased plants or plant material is present in the facility.	Diseased plants and plant parts have been removed and disposed of in an approved location (off-site). Potential sources of and conditions exacerbating disease have been addressed (see Pacific Northwest Plant Disease Management Handbook). Vegetated areas replanted as necessary to maintain vegetative coverage per design.
	Vegetation Needs Pruning	Trees and shrubs need regular maintenance and/or corrective pruning.	Trees and shrubs pruned per routine maintenance schedule, appropriate to individual species and age of plants. All pruning of mature trees done under direct supervision of ISA certified arborist.
	Large Trees and Shrubs Interfering	Large trees and shrubs interfere with operation of the facility or access for maintenance.	Trees and shrubs have been pruned using most current ANSI A300 standards and ISA BMPs. Trees and shrubs removed if necessary for operation of facility per design function.
	Dead Vegetation	Standing dead vegetation is present (particularly in fall and spring).	Standing dead vegetation has been removed from site; gaps in vegetation have been replaced with new plantings where necessary, or appropriate erosion control measures put in place until vegetation replacement is feasible.
	Maintenance Needed Around Mature Trees	If conditions warrant maintenance work or planting of new vegetation around mature trees (within the dripline), appropriate care must be taken to avoid adverse impacts to the mature tree(s).	The most current ANSI A300 standards and ISA BMPs have been followed to the extent practicable (e.g., take care to minimize any damage to tree roots and avoid compaction of soil) when working around and under mature trees. New plantings under mature trees include mainly plants that come as bulbs, bare root or in 4-inch pots; new plants in no larger than 1-gallon containers.
	Stakes or Guys Present	Stakes or guys present in plantings installed for over 1 year.	Stakes or guys have been removed from new vegetation after 1 year since installation. Holes have been backfilled where necessary.
	Vehicular Sight Lines Impaired by Vegetation	Vegetation causes some visibility (line of sight) or driver safety issues.	Vegetation has been pruned to appropriate height and spread to maintain sight clearances. If continued (regular) pruning of a given plant have been necessary, plant(s) have been relocated to a more appropriate location and replaced with plant(s) of appropriate mature size.
	Emergent Vegetation Compromises Conveyance	Emergent vegetation compromises conveyance (may become too dense).	Emergent vegetation has been thinned and does not impede conveyance.

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Bioretention System			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Note: table spans multiple pages.			
	Noxious Weeds Present	Noxious weeds are present among the site vegetation. Remove, bag, and dispose of Class A & B noxious weeds immediately per WA law. Make reasonable attempts to remove and dispose of Class C noxious weeds. See http://www.nwcb.wa.gov/ . Follow Integrated Pest Management (IPM) protocols.	Noxious weeds are not present on site above thresholds established by WA law.

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Catch Basin

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.

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	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 regouted 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.

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Conveyance Pipe

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.

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Control Structure/Flow Restrictor

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.
FROP-T Section	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.
	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.
Shear Gate	Damaged or missing	Any holes—other than designed holes—in the structure.	Structure has no holes other than designed holes.
		Shear gate is missing.	Replace shear gate.
		Shear gate is not watertight.	Gate is watertight and works as designed.

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		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 lip or damaged lip	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 1/2-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 1/4-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.

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Grounds

Grounds (Landscaping)			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Site	Trash or litter	Any trash and debris which exceed 1 cubic foot per 1,000 square feet (this is about equal to the amount of trash it would take to fill up one standard size office garbage can). In general, there should be no visual evidence of dumping.	Trash and debris cleared from site.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	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.
	Grass/groundcover	Grass or groundcover exceeds 18 inches in height.	Grass or groundcover mowed to a height no greater than 6 inches.
Trees and Shrubs	Hazard	Any tree or limb of a tree identified as having a potential to fall and cause property damage or threaten human life. A hazard tree identified by a qualified arborist must be removed as soon as possible.	No hazard trees in facility.
	Damaged	Limbs or parts of trees or shrubs that are split or broken which affect more than 25% of the total foliage of the tree or shrub.	Trees and shrubs with less than 5% of total foliage with split or broken limbs.
		Trees or shrubs that have been blown down or knocked over.	No blown down vegetation or knocked over vegetation. Trees or shrubs free of injury.
		Trees or shrubs which are not adequately supported or are leaning over, causing exposure of the roots.	Tree or shrub in place and adequately supported; dead or diseased trees removed.

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Manhole			
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 opening or is blocking inletting capacity of the basin by more than 10%.	No trash or debris located immediately in front of manhole 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 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 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 manhole.)	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 manhole through cracks.	Pipe is regouted and secure at basin wall.

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Manhole			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
	Settlement/ Misalignment	Manhole has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Manhole replaced or repaired to design standards.
	Vegetation Inhibiting System	Vegetation growing across and blocking more than 10% of the opening.	No vegetation blocking opening to manhole.
		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.
Manhole Cover	Cover Not in Place	Cover is missing or only partially in place. Any open manhole is a safety hazard and requires immediate maintenance.	Manhole 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.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to manhole 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.

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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.

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Modular Wetland Systems

Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
General	Missing or damaged internal component or cartridges	Missing or damaged internal component or cartridges	Internal components and cartridges installed properly and free from damage.
	Obstructed inlet or outlet	Accumulated of sediment and/or debris at inlet and/or outlet preventing the flow of stormwater.	Inlet and outlet free of sediment and debris.
	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 outlet clear, without thick visible sheen.
	Damage – Includes Cracks in Walls and/or Bottom, Damage to Frame and/or Top Slab	Maintenance/inspection personnel determine that the unit is not structurally sound.	Unit replaced or repairs made such that unit meets design specifications and is structurally sound.
		Cracks wider than 1/2 inch at the joint of any inlet/outlet pipe or drain down pipe or evidence of soil particles entering through the cracks.	Unit repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe or drain down pipe.
	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 unit.)	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.
	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.
Pre-Treatment Chamber	Floatables	Accumulation of floatables in which the length and width of the chamber is fully impacted more than 18 inches.	Pre-treatment chamber free of floatables.
	Debris and Sediment	Accumulated sediment depth exceeds 6 inches in the pre-treatment chamber.	Storage area free of sediment and debris.
		Accumulation of sediment on the media housed within the pre-filter cartridges, when media is more than 85% clogged.	Media in pre-filter cartridges is free of sediment.

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Modular Wetland Systems			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Discharge Chamber	Poor water level discharging	Water level in discharge chamber during full operating capacity (pre-treatment chamber water level at max height) is 20% lower or more than the highest discharge rate the system achieves.	Media in pre-filter cartridges is free of sediment.
Biofiltration Chamber	Vegetation	Vegetation dies or becomes unhealthy. Vegetation is overgrown or sparse.	Vegetation coverage restored and healthy.
		Nuisance plant species becomes abundant.	Nuisance plant species have been removed and desirable species should be planted in their place.
	Sediment and Debris in Wetland Media	Accumulation of sediment and debris in the wetland media.	Wetland media is free of sediment and debris.
Access Covers	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.

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Appendix A

Site Plan and Details

To view the stormwater site plan pages, go to the City of Puyallup City View permit portal using the web address shown below:

<https://cityview.puyallupwa.gov/Workspace/CityViewDMS/Document?id=86601>

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Appendix B

NDS Inspection and Maintenance Guide for StormChamber System

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Maintenance of StormChamber® Systems

StormChambers provide great flexibility in facilitating maintenance tasks through different arrangements of StormChamber system components. These can be used individually, or in combination, to best accommodate local requirements, hydrologic parameters, and engineering design constraints. Each is discussed individually below:

1) Pre-treatment devices.

Under normal circumstances, a pre-treatment device is not necessary. However, under certain conditions, or local requirements, pre-treatment devices can be useful. Filtering, swirl concentrators, or other types of pre-treatment devices can be installed up-stream of the StormChamber system for removal of sediment, floatables, oil and grease, etc. Their use is particularly helpful for stormwater “hot spot” areas, such as automobile repair shops, where abnormally high concentrations of pollutants such as oil and grease can be expected.

2) Vacuum truck tube through 10 inch clean-out riser.

The StormChambers are designed with a defined top portal area at the “down-flow” end of the chamber that can be cut out to accept up to a 10 inch diameter riser pipe (see drawings in this section). The 10 inch riser can be used as an observation well and for access of a vacuum truck tube that can be used to remove sediment. The “down-flow” ends of the StormChambers have end walls that are closed on the bottom (see enclosed drawings). The closed bottom functions similar to a coffer dam, with most of the sediment depositing prior to flowing into the next chamber, facilitating its removal through the riser pipe, which is positioned directly above this area. It is recommended, at a minimum, that clean-out risers be placed at the last chamber of each row of StormChambers which receive the flow from the stormwater inlet(s).

3) Sacrificial StormChamber row (in accommodation of the commonly utilized management practice of benign neglect).

An additional row of StormChamber can be added for accumulation of sediment with minimal effect on the stormwater storage requirements of the system. This would be utilized as the “first row” of chambers – the row that accepts the stormwater flow from the inlet structures. Because the flow from the first row of chambers will have to make 90 degree turns through connecting pipes into the adjacent row, velocity of flow will decrease and most of the transported sediment load deposits within the first row of StormChambers.

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Maintenance of StormChamber® Systems

4) Grated inlet structures.

The use of fully grated inlet structures will keep the vast majority of debris out of the StormChamber system. (It is suggested that these be placed near the entrance to the establishment being constructed as an incentive for owner maintenance).

5) Inlet structures with sumps.

The use of inlet structures with a 2-4 foot sump is recommended. This will allow for additional capture of sediment that can easily be removed with a vacuum truck or other device before it gets into the StormChamber system. A sumped inlet structure placed at both ends of the first row of StormChambers can also be used to facilitate sediment removal within the StormChamber system. Under this alternative, one or more additional chamber(s) is added to the beginning and end of the first row, the end of each being inserted directly into the sumped inlet structures. This provides for physical access into the first row for maintenance (see “Example Configurations” section).

6) Protected stormwater inlets during construction.

It is highly recommended that, under any of the above alternatives, the StormChamber system not be opened to receive stormwater flows until construction of the site has been completed. Even then, all stormwater inlets must be protected from sediment loading until the site is completely stabilized. Complete stabilization implies that the construction site has been cleared of construction-related debris and has incurred at least two storm events sufficient to wash most soil and other particulate matter off impervious surfaces.

Inspection and Maintenance Schedule

Inspect through the risers quarterly and after each large storm event. It is recommended that a log book be maintained showing the depth of water in the StormChamber at each observation in order to determine the rate at which the StormChamber system dewateres after runoff producing storm events. Once the performance characteristics of the StormChamber have been verified, the monitoring schedule can be reduced to an annual basis, unless the performance data suggests that a more frequent schedule is required. Sediment should be removed when deposits approach within six inches of the invert heights of connecting pipes between StormChamber rows, or in sumped inlet structures.

*Contact HydroLogic Solutions for technical assistance at 1.877.426.9128
or email us at info@stormchambers.com*

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Exhibit C

Maintenance Activity Log

Annual Inspection Report
City of Puyallup - Stormwater BMP Facilities Inspection and Maintenance Log

Facility Name _____
Address _____
Begin Date _____ End Date _____

Date	BMP ID#	BMP Facility Description	Inspected by:	Cause for Inspection	Exceptions Noted	Comments and Actions Taken

Instructions:

Record all inspections and maintenance for all treatment BMPs on this form. Use additional log sheets and/or attach extended comments or documentation as necessary. Submit a copy of the completed log with the Annual Independent Inspectors' Report to the City, and start a new log at that time.

BMP ID# — Always use ID# from the Operation and Maintenance Manual.
Inspected by — Note all inspections and maintenance on this form, including the required independent annual inspection.
Cause for inspection — Note if the inspection is routine, pre-rainy-season, post-storm, annual, or in response to a noted problem or complaint.
Exceptions noted — Note any condition that requires correction or indicates a need for maintenance.
Comments and actions taken — Describe any maintenance done and need for follow-up.

Return Form to: Stormwater Engineer/City of Puyallup
333 South Meridian
Puyallup, WA 98371

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Annual Inspection Report

City of Puyallup - Stormwater BMP Facilities Inspection and Maintenance Log

Facility Name

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