Appendix D – Design Checklists for the Main On-Site Stormwater Management BMPs

Checklist 7: Post-Construction Soil Quality and Depth BMP

Checklist 8: Sheet Flow Dispersion BMP

Checklist 9: Concentrated Flow Dispersion BMP

Checklist 10: Bioretention Cells, Swales, and Planter Boxes

Checklist 11: Permeable Pavement

Checklist 12: Rain Gardens

Checklist 13: Downspout Full Infiltration Systems

Checklist 14: Downspout Dispersion BMPs

Checklist 15: Perforated Stub-Out Connections

City of Edmonds

Public Works Department, Engineering Division

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Checklist 7:
Post-Construction Soil Quality and Depth BMP

Per ECDC 18.30, all Category 1 projects must comply with Minimum Requirements No. 1 through No. 5, and all Category 2 projects must comply with Minimum Requirements No. 1 through No. 9. Post-construction soil quality and depth is required to be established on all disturbed lawn and landscaped areas subject to Minimum Requirement No. 5. See also Addendum Checklists 1 through 3 for submittal requirements.

Post-construction soil quality and depth shall be established in accordance with the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Addendum. The City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements for this BMP. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30, the Addendum, or other City requirements that are not included in the SWMMWW) are also included in the checklist. Note also that much of the post-construction soil quality and depth design content in the SWMMWW refers to the Soils for Salmon, Building Soil guidebook (available at <www.soilsforsalmon.org/how>. To simplify the design and review process, the requirements from the Building Soil guidebook are also included in this checklist

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		MODELING AND SIZING (SWMMWW Volume V, Section 5.3.1, BMP T5.13)
1		Lawn and landscape areas that meet the requirements of this BMP are modeled as "pasture" rather than "lawn" surface over the underlying soil (till or outwash).
		SETBACKS (Addendum, Appendix A)
2*		Lawn and landscape area is not within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA).
		DESIGN CRITERIA (SWMMWW Volume V, Section 5.3.1, BMP T5.13; Building Soil Manual, 2018; City of Edmonds Standard Detail for Post-Construction Soil Quality and Depth)
		Compost Specifications
3*		Compost meets organic content requirements either by using "preapproved" amendment rates (see compost specifications in BMP T7.30 and Addendum Checklist 10) or calculated amendment rates (see below).
4*		If using "preapproved" amendment rates, the compost meets the compost specifications in BMP T7.30 and Addendum Checklist 10, with the following exceptions: • Compost may have up to 35 percent biosolids or manure. • Compost must have organic matter content of 40 percent to 65 percent. • Carbon to nitrogen ratio may be up to 35:1 for plantings entirely composed of plants native to the Puget Sound Lowlands region.
5*		If using calculated amendment rates, compost meets compost specifications for preapproved rates, or other organic materials amended to meet carbon to nitrogen requirements and contaminant standards for "composted materials" in WAC 173-350-220.
		Soil Retention
6*		Existing vegetation and soils are left undisturbed and are protected from compaction during construction.
7*		Soils to be retained are not stripped, logged, graded or driven on during construction (Building Soil Manual, 2018).
		Soil Amendment
8*		Soil organic matter is determined using the most current version of ASTM D2974 "Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils" and TMECC 05.07A "Loss-On-Ignition Organic Matter Method." Results of soil analysis are submitted to the City along with proposed soil mix to meet soil requirements.
9*		Topsoil pH is 6.0 to 8.0, or matches the pH of the original undisturbed soil.
10*		Subsoils are scarified to at least 8 inches depth (or to depth needed to achieve a total depth of 12 inches of uncompacted soil after calculated amount of amendment is added).
11*		Leave plant debris or its equivalent on the soil surface to replenish organic matter.

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		Turf Installations
12*		Topsoil layer in turf areas achieves a minimum organic matter content of 5 percent.
13*		If using the preapproved amendment rate, 1.75 inches of composted material is rototilled into 6.25 inches of soil for a total settled depth of 8 inches (Building Soil Manual, 2018).
14*		If using the calculated amendment rate, the calculated amount of composted material or approved organic material is rototilled into depth of soil needed to achieve 8 inches of settled soil at 5 percent organic content (Building Soil Manual, 2018).
15*		Soil is compacted to 85 percent of maximum dry density, modified proctor ASTM D1557 (Building Soil Manual, 2018).
16*		Surface is level and no woody debris or rocks over 1-inch diameter remain (Building Soil Manual, 2018).
		Planting Beds
17*		Topsoil layer in planting beds achieves a minimum organic matter content of 10 percent.
18*		If using the preapproved amendment rated, 3 inches of composted material is rototilled into 5 inches of soil for a total settled depth of 8 inches (Building Soil Manual, 2018).
19*		If using a calculated amendment rate, calculated amount of composted material or approved organic material rototilled into depth of soil needed to achieve 8 inches of settled soil at 10 percent organic content (Building Soil Manual, 2018).
20*		Surface is smooth and no rocks over 2 inches in diameter remain (Building Soil Manual, 2018).
21*		2 inches of organic mulch is provided.
		Stockpile Soil
22*		Areas requiring cuts have removed the upper native topsoil and stockpiled for replacement on site.
23*		The depth of upper native soils that is stockpiled is the entire depth of the native topsoil horizon, but no more than 3 feet.
24*		Stockpiled soils are amended as needed and applied as described in Soil Amendment above (Building Soil Manual, 2018).
25*		Stockpiled soils are reapplied in layers no greater than 1 foot.
		Importing Soil
26*		Topsoil pH is 6.0 to 8.0, or matches the pH of the original undisturbed soil.
27*		Subsoils are scarified to at least 6 inches below the topsoil layer.
		Turf Installations
28*		For turf installations, an imported topsoil mix that contains 5 percent organic matter (typically around 25 percent compost) is used (Building Soil Manual, 2018).
29*		Soil portion is sand or sandy loam per the USDA (Building Soil Manual, 2018).
30*		3 inches of imported topsoil mix is tilled into 2 inches of soil (Building Soil Manual, 2018).

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31*		3 more inches of topsoil mix are placed on surface (Building Soil Manual, 2018).
32*		Soil is compacted to 85 percent of maximum dry density, modified proctor ASTM D1557 (Building Soil Manual, 2018).
33*		Surface is level, and no woody debris or rocks over 1-inch diameter remain (Building Soil Manual, 2018).
		Planting Beds
34*		For planting beds, an imported mix that contains 10 percent organic matter (typically around 25 percent compost) is used (Building Soil Manual, 2018).
35*		Soil portion is sand or sandy loam per the USDA (Building Soil Manual, 2018).
36*		3 inches of imported topsoil mix is tilled into 2 inches of soil (Building Soil Manual, 2018).
37*		3 more inches of topsoil mix are placed on surface (Building Soil Manual, 2018).
38*		Surface is smooth and no rocks over 2 inches in diameter remain (Building Soil Manual, 2018).
39*		2 inches of organic mulch is provided.
		CONSTRUCTION CRITERIA INCLUDED IN THE SWPPP (Addendum, Section 6.1)
40*		Root zones where tree roots limit the depth of incorporation of amendments are exempted from soil preservation and amendment requirements. Root zones are fenced and protected from stripping of soil, grading, or compaction to the maximum extent practical.
41*		Materials are stockpiled in areas designated for clearing and grading (such as parking areas and future impervious roadways) and away from infiltration and other stormwater facilities.
42*		Small stockpiles are covered with weed barrier material that sheds moisture yet allows air transmission. Large stockpiles are seeded and/or mulched.
43*		Topsoil or other materials are not relocated to areas where they can cover critical root zones, suffocate vegetation, or erode into adjacent streams.
44*		The soil preservation area is clearly identified (e.g., using flagging or high visibility fencing) and protected prior to construction.
45*		A soil and vegetation management plan is provided showing areas to be protected and restoration methods for disturbed areas.
46*		Construction SWPPP sheets outline construction sequencing that will protect the soil preservation area during construction.
47		General (i.e., non-BMP-specific) construction SWPPP BMPs and protection techniques are implemented as applicable. The upslope of construction areas are stabilized and overland flow distances are minimized.
48*		Machinery is operated outside of the soil preservation area during construction.
49*		Placement of topsoils does not occur during wet or saturated conditions.
50*		Establish soil quality and depth toward the end of construction, and once established, protect from compaction and erosion.

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		INSPECTION CRITERIA
51		The soil preservation and amendment BMP meets applicable siting, design, and construction criteria (see * notations in applicable rows).

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Checklist 8:
Sheet Flow Dispersion BMP

Per ECDC 18.30, all Category 1 projects must comply with Minimum Requirements No. 1 through No. 5, and all Category 2 projects must comply with Minimum Requirements No. 1 through No. 9. Sheet flow dispersion may be used to help meet Minimum Requirement Nos. 5 and 7, provided that the following requirements are met. See also Addendum Checklists 1 through 3 for submittal requirements, and Addendum Appendix A for infeasibility criteria that apply to Minimum Requirement No. 5 specifically.

Sheet flow dispersion shall be designed in accordance with the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Addendum. The City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements for this BMP. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30, the Addendum, or other City requirements that are not included in the SWMMWW) are also included in the checklist.

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		MODELING AND SIZING (SWMMWW Volume V, Section 3, BMP T5.12)
1		Where sheet flow dispersion is used to disperse runoff into an undisturbed native landscape area or an area that meets the requirements of BMP T5.13: Post-Construction Soil Quality and Depth design criteria, the impervious area should be modeled as a lateral flow impervious area.
		SETBACKS (Addendum Appendix A)
2*		The sheet flow dispersion area is not within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA).
3*		The sheet flow dispersion is not within the buffer of the ESLHA (minimum buffer equal to the height of the steep slope or 50 feet, whichever is greater) unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system.
4*		For sites with on-site or adjacent septic systems, the discharge point is at least 30 feet upgradient, or 10 feet downgradient, of the drainfield primary and reserve areas (per WAC 246-272A-0210). This requirement can be modified by the City if site topography will clearly prohibit flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc.) indicate that this is unnecessary.
5*		The sheet flow dispersion area is not within the buffer of a Category 1 or Category 2 wetland.
6*		The sheet flow dispersion area is not within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
		DESIGN CRITERIA (SWMMWW Volume V, Section 3, BMP T5.12)
7		The dispersion of runoff does not create flooding or erosion impacts.
8*		Positive drainage for sheet flow runoff is achieved.
9*		Flow path is undisturbed native landscape, or well-established lawn, landscape, groundcover over soil.
10		Some natural resource protection areas and critical area buffers may count towards flow path lengths if they are permanently protected from modification through a covenant or easement, or a tract dedicated by the proposed project.
11*		The dispersion/buffer area is not within 50 feet of the top of slopes greater than 15 percent (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system).
12*		Contributing surfaces to dispersion areas are flat or moderately sloping (less than 15 percent slope) surfaces such as driveways, sport courts, patios, roofs without gutters, lawns, pastures, or any situation where concentration of flows can be avoided.
13*		The dispersion area is graded to avoid concentrating flows (if not, the project should use BMP T5.11: Concentrated Flow Dispersion BMP, see Addendum Checklist 9)
14		Sheet flow dispersion is designed as shown in City of Edmonds Standard Detail.

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		For Flat to Moderately Sloped Areas Only (less than 15 percent slope)
15*		The contributing area cross-slope is a minimum of 2 percent.
16*		A transition zone and vegetated buffer is provided.
17*		The transition zone is located at least 25 feet from the right-of-way if the contributing area slopes toward street.
18*		The transition zone is 2 feet wide and is between the edge of the contributing surface (or building eaves) and the downslope vegetation.
19*		The transition zone consists of subgrade material (crushed rock), modular pavement, drain rock, or other material approved by the City.
20*		A 10-foot-wide vegetated buffer for up to 20 feet of width of paved or impervious surface, and an additional 10 feet of vegetated buffer width for each additional 20 feet of contributing area width or fraction thereof is provided.
		For Variable Sloped Areas Only (less than 15 percent slope overall, but variable in longitudinal and/or cross slope)
21*		Berms and dispersion trenches are provided.
22*		Berms are diagonal to the direction of surface flow to intercept and convey runoff to dispersion trenches.
23*		Berms are 6 inches wide and 2 to 4 inches high.
24*		Berms are placed such that there is no more than 700 square feet of contributing area between berms.
25*		A minimum vegetated flow path of 25 feet is provided between berms.
26*		The dispersion trench is located at least 25 feet from the right-of-way if the contributing area slopes toward street.
		CONSTRUCTION CRITERIA INCLUDED IN THE SWPPP (Addendum, Section 6.1)
27*		The dispersion area is clearly identified (e.g., using flagging or high visibility fencing) and protected prior to construction.
28		A soil and vegetation management plan is provided showing areas to be protected and restoration methods for disturbed areas.
29*		Construction SWPPP sheets outline construction sequencing that will protect the dispersion area during construction.
30*		General (i.e., non-BMP-specific) construction SWPPP BMPs and protection techniques are implemented as applicable. The upslope of construction areas are stabilized and overland flow distances are minimized.
31*		Machinery is operated outside of dispersion area during construction.
32*		Construction site flow directed away from the dispersion area using applicable Construction SWPPP BMPs (e.g., temporary diversion swales).
33*		Soil was scarified along the dispersion flow path if disturbed during construction.

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34*		Dispersion area excavated to final grade only after all disturbed areas in the upgradient project drainage area have been permanently stabilized.
35*		If the flow path area is disturbed during construction, the area is restored to meet the BMP T5.13 Post- Construction Soil Quality and Depth (Addendum Checklist 7) requirements and a dense cover of lawn, landscape, or groundcover is established.
		INSPECTION CRITERIA
36		The dispersion system meets applicable siting, design, and construction criteria (see * notations in applicable rows).

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Checklist 9:
Concentrated Flow Dispersion BMP

Per ECDC 18.30, all Category 1 projects must comply with Minimum Requirements No. 1 through No. 5, and all Category 2 projects must comply with Minimum Requirements No. 1 through No. 9. Concentrated flow dispersion may be used to help meet Minimum Requirement Nos. 5 and 7, provided that the following requirements are met. See also Addendum Checklists 1 through 3 for submittal requirements, and Addendum Appendix A for infeasibility criteria that apply to Minimum Requirement No. 5 specifically.

Concentrated flow dispersion shall be designed in accordance with the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Addendum. The City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements for this BMP. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30, the Addendum, or other City requirements that are not included in the SWMMWW) are also included in the checklist.

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		MODELING AND SIZING (SWMMWW Volume V, Section 3, BMP T5.11)
1		Where concentrated flow dispersion is used to disperse runoff into an undisturbed native landscape area or an area that meets the requirements of BMP T5.13 Post-Construction Soil Quality and Depth (see Addendum Checklist 7), the impervious area should be modeled as a lateral flow impervious area. In situations where multiple instances of concentrated flow dispersion will occur, the following options are allowed: • When a pad of crushed rock or dispersion trenches are used and the length of the vegetated flow path is at least 50 feet, the impervious area may be modeled as a landscaped area (grass). • When dispersion trenches are used and the length of the vegetated flow path is 25 to 50 feet, the impervious area may be modeled as 50 percent impervious/50 percent landscape.
		SETBACKS (Addendum Appendix A)
2*		The concentrated flow dispersion area is not within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA).
3*		The concentrated flow dispersion area is not within the buffer of the ESLHA (minimum buffer equal to the height of the steep slope or 50 feet, whichever is greater) unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system.
4*		For sites with on-site or adjacent septic systems, the discharge point is at least 30 feet upgradient, or 10 feet downgradient, of the drainfield primary and reserve areas (per WAC 246-272A-0210). This requirement can be modified by the City if site topography will clearly prohibit flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc.) indicate that this is unnecessary.
5*		The concentrated flow dispersion area is not within the buffer of a Category 1 or Category 2 wetland.
6*		The concentrated flow dispersion area is not within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
		DESIGN CRITERIA (SWMMWW Volume V, Section 3, BMP T5.11)
7		The dispersion of runoff does not create flooding or erosion impacts.
8*		Flow path is undisturbed native landscape, or well-established lawn, landscape, or groundcover over soil.
9		Some natural resource protection areas and critical area buffers may count towards flow path lengths if they are permanently protected from modification through a covenant or easement, or a tract dedicated by the proposed project.
10*		Concentrated flow dispersion is designed as shown in City of Edmonds Standard Detail.

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11*		A slotted drain, diagonal berm, or similar measure is provided to direct flow from the impervious surface to the concentrated flow dispersion device (i.e., rock pad or dispersion trench).
12*		If used, slotted drains are located a minimum of 25 feet from the right-of-way if the contributing area slopes towards the street.
13*		If used, slotted drains must be perpendicular the direction of surface flow to intercept and convey runoff to concentrated flow dispersion devices.
14*		If used, berms are 6 inches wide and 2 to 4 inches high.
15*		Berms or drains are placed such that a maximum of 700 square feet of impervious area drains to each concentrated flow dispersion device.
16*		Berms are diagonal to the direction of surface flow to intercept and convey runoff to the concentrated flow dispersion device.
17*		A pad of drainage rock (2 feet wide by 3 feet long by 6 inches deep) or a dispersion trench (per BMP T5.10B: Downspout Dispersion and Addendum Checklist 14) is included at each discharge point as the dispersion device. Drainage rock conforms to WSDOT Spec. 9-03.12(5) Gravel Backfill for Dry Wells.
18*		Each concentrated flow dispersion device has a separate flow path.
19*		If either concentrated flow dispersion device is used, a minimum vegetated flow path of 50 feet between the discharge point and a slope greater than 15 percent is provided (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system).
20*		If a rock pad is used, a minimum vegetated flow path of 50 feet between the discharge point and the downstream property line or any structure, stream, lake, wetland, or other impervious surface is provided.
21*		If a dispersion trench is used, a minimum vegetated flow path of 25 feet between the discharge point and the downstream property line, structure, stream, lake, wetland, or other impervious surface is provided.
		CONSTRUCTION CRITERIA INCLUDED IN THE SWPPP (Addendum, Section 6.1)
22*		The dispersion area is clearly identified (e.g., using flagging or high visibility fencing) and protected prior to construction.
23		A soil and vegetation management plan is provided showing areas to be protected and restoration methods for disturbed areas.
24*		Construction SWPPP sheets outline construction sequencing that will protect the dispersion area during construction.
25*		General (i.e., non-BMP-specific) construction SWPPP BMPs and protection techniques are implemented as applicable. The upslope of construction areas are stabilized and overland flow distances are minimized.
26*		Machinery is operated outside of dispersion area during construction.
27*		Construction site flow is directed away from the dispersion area using applicable Construction SWPPP BMPs (e.g., temporary diversion swales).

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28*		The soil was scarified along the dispersion flow path if disturbed during construction.
29*		Dispersion area excavated to final grade only after all disturbed areas in the upgradient project drainage area have been permanently stabilized.
30*		If the flow path area is disturbed during construction, the area is restored to meet the BMP T5.13: Post- Construction Soil Quality and Depth (Addendum Checklist 7) requirements; and a dense cover of lawn, landscape, or groundcover is established.
		INSPECTION CRITERIA
31		The dispersion system meets applicable siting, design, and construction criteria (see * notations in applicable rows).

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Checklist 10:
Bioretention Cells, Swales, and Planter Boxes

Per ECDC 18.30, all Category 1 projects must comply with Minimum Requirements No. 1 through No. 5, and all Category 2 projects must comply with Minimum Requirements No. 1 through No. 9. Bioretention cells, swales, and planter boxes may be used to help meet Minimum Requirement Nos. 5, 6, and/or 7, provided that the following requirements are met. See also Addendum Checklists 1 through 3 for submittal requirements, and Addendum Appendix A for infeasibility criteria that apply to Minimum Requirement No. 5 specifically.

Bioretention areas shall be designed in accordance with the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Addendum. The City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements for this BMP. In addition, multiple City-specific requirements for bioretention systems (i.e., requirements presented in ECDC 18.30, the Addendum, or other City requirements that are not included in the SWMMWW) are also included in the checklist.

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		MODELING AND SIZING (SWMMWW Volume V, Section 5, BMP T7.30)
		Minimum Requirement No. 5 (List No. 1 or List No. 2)
1		For compliance with Minimum Requirement No. 5 (List No. 1 or No. 2), the bioretention area has a horizontally projected surface area below the overflow which is at least 5 percent of the total impervious surface area draining to it. If lawn/landscape area will also be draining to the bioretention area, the horizontally projected surface area below the overflow is increased by 2 percent of the lawn/landscape area.
		Minimum Requirement No. 5 (On-site Performance Standard), Minimum Requirement No. 6, and/or Minimum Requirement No. 7
2		For compliance with Minimum Requirement No. 5 (on-site performance standard component only), Minimum Requirement No. 6, and/or Minimum Requirement No. 7; the Western Washington Hydrology Model (WWHM), MGSFlood, or other approved continuous runoff model is used to size the bioretention area.
3		For compliance with Minimum Requirement No. 6, at least 91 percent of the influent runoff file produced using a continuous simulation model is treated.
4		The surface pool drawdown time (surface ponding volume) is not greater than 24 hours (drain time is calculated as a function of ponding depth and native soil design infiltration rate or bioretention soil media infiltration rate, whichever is less).
5		Infiltration rates of the native soil and bioretention soil media rate are used when sizing and modeling bioretention areas. If using imported bioretention soil, the infiltration rate is 12 inches per hour before applying the correction factor. Refer to the "Bioretention Soil Media Infiltration Rates" section below for applicable correction factors.
6		A computational time step of 15 minutes is used (SWMMWW Volume III, Section 2.2).
7		Surface flow and interflow from drainage area are routed to facility.
8		If the model does not apply precipitation and evaporation to facility, the facility area is included in the basin area.
9		The value entered in the model for bioretention soil depth is at least 18 inches.
10		If side slopes of the bioretention area are steeper than 3H:1V, no infiltration is applied across the wetted surface. Areas that are non-infiltrating are not included in sizing calculations or hydrologic modeling.
11		The overflow elevation is set at the maximum ponding elevation and the overflow is modeled as weir flow over riser edge or a riser notch.
12		When using underlying perforated drain pipes that discharge to the surface, the only volume modeled as storage is the void space within the aggregate bedding layer below the invert of the drain pipe.
		SETBACKS (Addendum, Appendix A) Note: setback distances are measured from the bottom edge of the bioretention footprint.
13*		The bioretention area is not within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA).

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14*		The bioretention area is not within the buffer of the ESLHA (minimum buffer equal to the height of the steep slope or 50 feet, whichever is greater) unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system.
15*		Bioretention area is not within 50 feet of the top of slopes greater than 15 percent (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system).
16*		Bioretention area is located on a slope of less than 8 percent.
17*		The bioretention area is not located: • Within 100 feet of an area known to have deep soil contamination. • Where groundwater modeling indicates infiltration will likely increase or change the direction of the migration of pollutants in the groundwater. • Where surface soils have been found to be contaminated unless those soils are removed within 10 horizontal feet from the infiltration area. • In any area where these facilities are prohibited by an approved cleanup plan under the state Model Toxics Control Act or Federal Superfund Law, or an environmental covenant under Chapter 64.70 RCW.
18*		For sites with on-site or adjacent septic systems, the discharge point is at least 30 feet upgradient, or 10 feet downgradient, of the drainfield primary and reserve areas (per WAC 246-272A-0210). This requirement can be modified by the City if site topography will clearly prohibit flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc.) indicate that this is unnecessary.
19*		The bioretention area is not within 10 feet of an underground storage tank and connecting underground pipes when the capacity of the tank and pipe system is 1,100 gallons or less.
20*		The bioretention area is not within 100 feet of an underground storage tank and connecting underground pipes when the capacity of the tank and pipe system is greater than 1,100 gallons.
21		All bioretention areas have at least 3 feet of vertical clearance from the lowest elevation of the bioretention soil to the seasonal high groundwater elevation or other impermeable layer if the area tributary to the facility meets or exceeds any of the following thresholds: • 5,000 square feet of pollution-generating impervious surface (PGIS) • 10,000 square feet of impervious area • 0.75 acres of lawn and landscape
22		For bioretention areas with a contributing area less than the above thresholds, a minimum of 1 foot of clearance from seasonal high groundwater or other impermeable layer is provided.
23*		If the contributing area is less than 5,000 square feet, the bioretention area is at least 5 feet from a structure without a basement and 10 feet from a structure with a basement.
24*		If the contributing area is greater than or equal to 5,000 square feet, the bioretention area is not within a 1H:1V slope line from the bottom edge of the facility to a structure.

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		(Minimum clearance 5 feet from a structure with a basement and 10 feet for a structure with a basement.)
25*		The bioretention area is at least 5 feet from any property lines and easements.
26*		The bioretention area is not within the buffer of a Category 1 or Category 2 wetland.
27*		The bioretention area is not within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
		DESIGN CRITERIA (SWMMWW Volume V, Section 5, BMP T7.30; City of Edmonds Standard Details for Bioretention Cells, Swales, and Planter Boxes)
		Applications and Limitations
28*		Bioretention soil media does not contain composted materials if the bioretention area drains to Hall Creek or Lake Ballinger and if the underlying native soil does not meet the soil suitability criteria for treatment.
29*		Bioretention areas with underdrains do not discharge to Hall Creek or Lake Ballinger.
		Flow Entrance/Presettling
30*		Flow velocities entering bioretention areas are less than 1 foot per second.
31*		One of the following four types of flow entrances is provided: 1. Dispersed, low velocity flow across a grass or landscaped area. 2. Dispersed sheet flow across pavement or gravel. 3. Drainage curb cuts for roadside, driveway, or parking lot areas. 4. Pipe flow entrance that includes rock or other erosion protection, via catch basins or trench drains.
32*		For curb cuts, engineered flow dissipation (e.g., rock pad or flow dispersion weir) is incorporated.
33*		Curb cut width is at least 12 inches. If bioretention cell is located in a high-use parking lot, curb cut width is at least 18 inches.
34*		Flow entrance drops 2 inches from curb line and provides an area for settling and periodic removal of sediment and coarse material.
35*		For pipe flow entrances, engineered flow dissipation (e.g., rock pad or flow dispersion weir) is incorporated.
36*		Woody plants are not located in the entrance flow path.
		Bottom Area and Side Slopes
37*		The planted side slope for cells deeper than 3 feet is not steeper than 3H:1V.
38*		The bottom width is at least 1 foot.
39*		Where flush curbs are used, at least 12 inches is provided between the road edge and beginning of the bioretention side slope.
40*		Shoulder is compacted to 90 percent (modified proctor, ASTM D1557).
		Ponding Area
41*		The ponding depth is not greater than 12 inches.

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42*		If berming is used, the slope of the berm is not steeper than 3H:1V, and the top width of design berm is at least 1 foot.
43*		If berming is used, soil used for berming is imported bioretention soil or amended native soil and compacted to a minimum of 90 percent dry density (modified proctor, ASTM D1557).
44*		For sloped bioretention areas, check dams are included.
		Surface Overflow
45		The overflow route is sized to convey the 100-year recurrence interval developed peak flow to the downstream conveyance system or other acceptable discharge point without posing a health or safety risk or causing property damage.
46*		Overflow is either: • Surface overflow via vertical stand pipes connected to underdrain systems, or via horizontal drainage pipes or armored overflow channels installed at the designed maximum ponding elevation connected to a downstream BMP or an approved discharge point. • A curb cut at the down-gradient end of the bioretention area to direct overflows back to the street.
47*		The freeboard (measured from the invert of the overflow pipe or earthen channel to facility overtopping elevation) is at least 6 inches.
		Bioretention Soil Media (BSM)
48*		The treatment soil is at least 18 inches deep.
		Compost Requirements ***Applies to Default and Custom Bioretention Soil Media.***
49*		Meets the definition of "composted material" in WAC 173-350-100 and complies with testing parameters and other standards in WAC 173-350-220.
50*		Produced at Cedar Grove Composting, Washington or other approved equal. See: <https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Waste-reduction-programs/Organic-materials/Managing-organics-compost>.
51*		Composed of yard debris, crop residues, or bulking agents originated with a minimum of 65 percent by volume.
52*		Composed of postconsumer food waste originated with a maximum of 35 percent by volume.
53*		Water content: no visible free water or dust is produced when handling the material.
54*		Tested in accordance with the U.S. Composting Council "Test Method for the Examination of Compost and Composting" (TMECC).

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55*		Meets the size gradations established in the U.S. Composting Council's Seal of Testing Assurance (STA) program as follows:

	Min.	Max.
Percent passing 2 inches	100	
Percent passing 1 inch	99	100
Percent passing 0.625 inch	90	100
Percent passing 0.25 inch	75	100

56*		pH is between 6.0 and 8.5 (TMECC 04.11-A).
57*		"Physical contaminants" (as defined in WAC 173-350-100) content is less than 1 percent by weight (TMECC 03.08-A) total, and does not exceed 0.25 percent film plastic by dry weight.
58*		Minimum organic matter content is 40 percent by dry weight basis (TMECC 05.07-A).
59*		Soluble salt contents are less than 4.0 dS/m (mmhos/cm) (TMECC 04.10-A).
60*		Maturity indicators from a cucumber bioassay shall be greater than 80 percent (TMECC 05.05-A) for both emergence and vigor.
61*		Stability is 7 mg CO2-C/g OM/day or less (TMECC 05.08-B).
62*		Carbon to nitrogen ratio is than 25:1 (TMECC 05.02A "Carbon to Nitrogen Ratio," which uses TMECC 04.01 and 04.02-D). A ratio of up to 35:1 may be allowed when only Puget Sound lowland native species are planted, and a ratio of up to 40:1 may be allowed for coarse compost to be used as a surface mulch.
		Default Bioretention Soil Media
63*		Compost meets compost requirements above.
64*		Bioretention soil consists of two parts fine compost (approximately 35 to 40 percent) by volume and three parts mineral aggregate (approximately 60 to 65 percent), by volume.
65*		The mixture is well blended to produce a homogeneous mix.
66*		Mineral aggregate fines are not greater than 5 percent according to ASTM D422.
67*		Mineral aggregate is free of wood, waste, coating, or any other deleterious material.
68*		The aggregate portion of the Bioretention Soil Media (BSM) is well-graded according to ASTM D2487-98: • Coefficient of Uniformity ($C_u = D_{60}/D_{10}$) is equal to or greater than 4, **and** • Coefficient of Curve ($C_c = (D_{30})2/D_{60} \times D_{10}$) is greater than or equal to 1 and less than or equal to 3.

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69*		The mineral aggregate is analyzed by an accredited lab using the following sieves and gradation: **US Sieve Number** / **Percent Passing** 0.375 inch / 100 4 / 95–100 10 / 75–90 40 / 24–40 100 / 4–10 200 / 2–5
70*		Organic matter content is 5 to 8 percent by weight.
71*		Cation Exchange Capacity (CEC) is greater than 5 milliequivalents/100 grams dry soil. Note: Soil mixes meeting the compost and mineral aggregate ratio and organic matter content specifications do not have to be tested for CEC.
		Custom Bioretention Soil Media
72*		Compost meets compost requirements above EXCEPT the gradation specification. An alternative gradation specification indicates the minimum percent passing for a range of similar particles.
73*		Cation Exchange Capacity (CEC) is at least 5 milliequivalents/100 grams of dry soil; USEPA 9081.
74*		pH is between 5.5 and 7.0.
75*		Organic matter content is 5 to 8 percent before and after the saturated hydraulic conductivity test (ASTM D2974).
76*		Mineral aggregate fines are between 2 to 5 percent passing the US No. 200 sieve (TMECC 04.11-A).
		Bioretention Soil Media Infiltration Rates
77*		If using the default bioretention soil media, the default infiltration rate is 12 inches per hour before a correction factor is applied. After the safety factor is applied, the infiltration rate is either 3 or 6 inches per hour, depending on contributing area (see row 79).
78*		If using a custom bioretention soil media, the measured (initial) infiltration rate is less than 12 inches per hour (ASTM D2434) at 85 percent compaction (modified proctor, ASTM D1557) before a correction factor is applied. The design (long-term) infiltration rate is greater than 1 inch per hour with the correction factor applied (see row 79).

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79*		An appropriate bioretention soil media design infiltration rate correction factor is applied: • A correction factor of 4 is applied to the initial infiltration rate if contributing area meets the following thresholds: o 10,000 square feet of impervious area, or o 5,000 square feet of PGIS, or o 0.75 acres of lawn and landscape • A correction factor of 2 is applied if contributing area is less than the thresholds above or if the design includes a pretreatment device for solids removal.
		Filter Fabric
80*		Filter fabric is not used between the subgrade and the bioretention soils mix.
		Underdrain (if included)
81*		The underdrain is slotted, thick-walled plastic pipe that meets the following specifications: • Minimum 4 inches diameter • Slotted subsurface drain PVC per ASTM D1785 SCH 40 • Slots should be cut perpendicular to the long axis of the pipe and be 0.04 to 0.069 inches by 1 inch long and be spaced 0.25 inches apart (spaced longitudinally). Slots are arranged in four rows spaced on 45-degree centers and cover one-half of the circumference of the pipe.
82*		Underdrain pipe slope is at least 0.5 percent.
83*		Pipe is placed on aggregate bedding/filter layer with a minimum thickness of 6 inches and covered with aggregate bedding/filter with a minimum thickness of 1 foot around the top and sides of the pipe.
84*		Aggregate bedding/filter material meets the requirements of type 26 gravel backfill for drains (City of Seattle).
85*		Geotextile fabric is used between the soil layer and underdrain.
86*		If the bioretention area is used to meet the List No. 2 option of Minimum Requirement No. 5, the underdrain meets the following additional requirements: • The invert of the underdrain is elevated at least 6 inches above the bottom of the aggregate bedding/filter layer. • The distance from the bottom of the bioretention soil media to the crown of the elevated underdrain pipe is between 6 and 12 inches. • The aggregate bedding/filter layer runs the full length and the full width of the bottom of the bioretention area. • The facility is not underlain by a low permeability liner that prevents infiltration into the native soil.
87*		Orifice diameter is at least 0.5 inches.
		Check Dams and Weirs (if included)
88		Check dams and/or weirs are spaced at appropriate intervals to reduce flow velocity and erosion.

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		Hydraulic Restriction Layer
89*		A hydraulic restriction layer is provided across the facility if it is necessary to prevent infiltration to underlying soils (e.g., contaminated soils or steep slope areas), or to prevent or restrict lateral infiltration pathways (for bioretention adjacent to roads, foundations or other sensitive infrastructure).
90*		The hydraulic restriction layer is either: • A low permeability (e.g., concrete) container with a closed bottom and underdrain; or • A low permeability material (e.g., clay, geomembrane liner) and underdrain.
91*		If a geomembrane liner is used, the liner has a minimum thickness of 30 mils and is ultraviolet (UV) resistant.
		Plant Materials
92		The design plans specify that vegetation coverage of selected plants will achieve 90 percent coverage within 2 years or additional plantings will be provided until this coverage requirement is met.
93*		For facilities receiving runoff from 5,000 square feet or more impervious surface, plant spacing and plant size is designed to achieve specified coverage by a certified landscape architect.
94*		Plants are sited according to sun, soil, wind, and moisture requirements.
95*		Provisions are made for supplemental irrigation for at least the first two growing seasons following installation.
		Mulch Layer (if used)
96*		Compost is provided in the bottom of the bioretention area (wood chip mulch is not to be used in the bottom of the bioretention area).
97*		Wood chip mulch composed of shredded or chipped hardwood or softwood is provided on the bioretention cell slopes above the ponding elevation and rim area.
98*		Shredded construction wood debris or shredded wood with added preservatives are not used.
99*		The mulch layer is free of weed seeds, soil, roots, and other material that is not trunk or branch wood and bark.
100*		The mulch layer is 3 inches thick.
101*		If aggregate mulch is used, the area covered with aggregate mulch does not exceed 1/3 of the facility bottom area.
		CONSTRUCTION AND INSTALLATION (SWMMWW Volume V, Section 5, BMP T7.30; and Addendum, Section 6.1)
102*		The bioretention area is clearly identified (e.g., using flagging or high visibility fencing) and protected prior to construction.
103		A soil and vegetation management plan is provided showing areas to be protected and restoration methods for disturbed areas.

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104*		Construction SWPPP sheets outlines construction sequencing that will protect the bioretention area during construction.
105*		General (i.e., non-BMP-specific) construction SWPPP BMPs and protection techniques are implemented as applicable. The upslope areas of construction areas are stabilized and overland flow distances are minimized.
106*		Machinery is operated outside of the bioretention area during construction. If machinery is operated in the bioretention area for excavation, lightweight, low ground-contact pressure equipment is utilized and the base soil is scarified to a minimum of 12 inches at completion; and subgrade infiltration rates must be field tested and compared to design rates. If the results indicate that the facility does not meet design infiltration rates, the engineering design must be revised to achieve treatment and flow control benefits assumed in the Stormwater Site Plan.
107*		Bioretention area excavated to final grade only after all disturbed areas in the upgradient project drainage area have been permanently stabilized. If areas must be excavated before permanent site stabilization, initial excavation is conducted to no less than 6 inches of the final elevation of the facility floor.
108*		Excavation of bioretention areas does not occur during wet or saturated conditions.
109*		Placement or mixing of bioretention soil media does not occur during wet or saturated conditions.
110*		Prior to placement of the bioretention soil media, the finished subgrade is scarified to a minimum depth of 3 inches, any sediment deposited from construction is removed, and subgrade is inspected by the responsible engineer to verify required subgrade condition.
111*		Bioretention soil media is placed in layers less than 6 inches in depth and compacted to 85 percent of maximum dry density (modified proctor, ASTM D1557).
112*		Bioretention facilities are not used as sediment control facilities during construction, and all drainage is directed away from the facility after initial rough grading.
113*		If the design includes curb and cutter, the curb and gutters are blocked until bioretention soil media and mulch have been placed, planting is completed, and dispersion pads are in place.
114*		Clogging and over-compaction of the subgrade is prevented during construction.
115*		Area is inspected for compaction prior to planting. If compaction occurred during construction, the bioretention soil was aerated prior to planting.
		INSPECTION CRITERIA
116		The bioretention area meets applicable siting, design, and construction criteria (see * notations in applicable rows).

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		Verification of Performance by Project Engineer (SWMMWW Volume V, Section 5, BMP T7.30)
117*		For post-construction infiltration rate verification, a Pilot Infiltration Test (PIT) or falling-head percolation test is performed. If using the PIT method, only conduct the test at the finished bioretention soil media elevation.
118		The City is notified of the scheduled infiltration testing at least 2 working days in advance.
119*		If tests indicate poor function, the City is informed.

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments:

City of Edmonds

Public Works Department, Engineering Division

121 5th Ave N
Edmonds, WA 98020

Checklist 11:
Permeable Pavement Surfaces

Per ECDC 18.30, all Category 1 projects must comply with Minimum Requirements No. 1 through No. 5, and all Category 2 projects must comply with Minimum Requirements No. 1 through No. 9. Permeable pavement may be used to help meet Minimum Requirement Nos. 5, 6, and/or 7, if the following requirements are met. See also Addendum Checklists 1 through 3 for submittal requirements, and Addendum Appendix A for infeasibility criteria that apply to Minimum Requirement No. 5 specifically.

Permeable pavement surfaces shall be designed in accordance with the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Addendum. The City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements for this BMP. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30, the Addendum, or other City requirements that are not included in the SWMMWW) are also included in the checklist.

This checklist reflects most, but not necessarily all, of the items that shall be documented by the project proponent, for review by the Engineering Division. It is intended to be used as an aid for developers and plan reviewers by providing a foundation for clear and consistent BMP design in the City of Edmonds. However, all items may not be applicable to every project, and all items of concern to this office may not be covered on this checklist.

This checklist is for permeable pavement surfaces that only manage rainfall that falls on the surface. Runoff from other parts of the site shall not be routed to these surfaces.

Applicant:

Application #:

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		MODELING AND SIZING (SWMMWW Volume V, Section 5, BMP T5.15)
		Minimum Requirement No. 5 (List No. 1 or List No. 2)
1*		For compliance with Minimum Requirement No. 5 (List No. 1 or No. 2), "other hard surfaces" (i.e., not roofs) must be permeable pavement unless infeasible.
		Minimum Requirement No. 5 (On-site Performance Standard), Minimum Requirement No. 6, and/or Minimum Requirement No. 7
2		For compliance with Minimum Requirements No. 5 (on-site performance standard component only), No. 6, and/or No. 7; the Western Washington Hydrology Model (WWHM), MGSFlood, or other approved continuous runoff model is used to model the permeable pavement section.
3		Modeling of runoff from areas of permeable pavement conform to requirements of the 2019 Ecology Stormwater Management Manual for Western Washington, Volume V, Section 5.
4		Permeable pavement is represented in WWHM with the "porous pavement element."
		SETBACKS (Addendum, Appendix A)
5*		The permeable pavement area is not within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA).
6*		The permeable pavement area is not within the buffer of the ESLHA (minimum buffer equal to the height of the steep slope or 50 feet, whichever is greater) unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system.
7*		The permeable pavement area is not within 50 feet of the top of slopes greater than 15 percent (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system).
8*		For sites with on-site or adjacent septic systems, the discharge point is at least 30 feet upgradient, or 10 feet downgradient, of the drainfield primary and reserve areas (per WAC 246-272A-0210). This requirement can be modified by the City if site topography will clearly prohibit flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc.) indicate that this is unnecessary.
9*		The permeable pavement area is not within 10 feet of any underground storage tank and connecting underground pipes, regardless of tank size. As used in these criteria, an underground storage tank means any tank used to store petroleum products, chemicals, or liquid hazardous wastes of which 10 percent or more of the storage volume (including volume in the connecting piping system) is beneath the ground surface.
10		The permeable pavement area is not located where the seasonal high groundwater or an underlying impermeable/low permeable layer would create saturated conditions within 1 foot of the bottom of the lowest gravel base course (permeable ballast).
*		

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11*		The permeable pavement area is not within the buffer of a Category 1 or Category 2 wetland.
12*		The permeable pavement area is not within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
		DESIGN CRITERIA (SWMMWW Volume V, Section 5, BMP T5.15; APWA GSP 2-06.3(3))
13*		The structural design of permeable pavement to support anticipated loads is the responsibility of the applicant and their engineer.
14		If placed adjacent to buildings all layers must be sloped 0.5 percent or greater away from the building or otherwise approved by a geotechnical engineer. Permeable pavement placed adjacent to buildings with basements (regardless of slope), shall be approved by a geotechnical engineer.
		Subgrade
15*		The subgrade is prepared and protected in accordance with APWA GSP 2-06.3(3). Key requirements include: Compaction of subgrade to 90 percent to 92 percent (standard Proctor, ASTM D698/AASHTO T99). Alternatively, a licensed geotechnical engineer performed field test and provided written report that subgrade is in a "firm and unyielding" condition and that the subgrade is in a condition where the design infiltration rate can be achieved.
		Separation/Bottom Filter Layer (optional)
16*		If included, separation layer is a layer of sand or crushed stone (0.5 inch or smaller), graded flat.
		Pavement Base Course
17* * * * *		Pavement base course shall meet the design minimums provided in the City of Edmonds Standard Details (SD) for Permeable Pavement. Key requirements are identified below. • Porous Asphalt (SD-621): 2-inch-minimum permeable asphalt treated base OR 3-inch-minimum crushed surfacing choker course over 6-inch-minimum permeable ballast. • Pervious Concrete (SD-622): 6-inch-minimum permeable ballast. • Permeable Unit Pavers (SD-623): 3-inch-minimum crushed surfacing choker course over 6-inch-minimum thickness of permeable ballast. • Permeable Grass Pavers (SD-624): 6-inch-minimum pavement permeable ballast base
		Impermeable Check Dams (where required)
18*		For permeable pavement applications with slopes of 3 percent or greater, the hydraulic calculations for thickness of the reservoir course consider the sloped subgrade and check dams are installed at regular intervals perpendicular to the subgrade slope as assumed in the calculations (See SD-627).
19*		The check dams do not impound water into the pavement matrix by extending above the top of the reservoir course or to finish grade.

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20*		Each check dam has an overflow or allows overtopping to the next downslope check dam section without causing flows to enter the pavement matrix, express from the pavement surface, or out the sides of the base materials that are above grade.
		Wearing Layer
21*		Minimum wearing course slope is 0.5 percent and pavement drains away from structures and to a safe discharge location.
22*		Recommended maximum wearing course slope for permeable paving surfaces is 6 percent after reasonable efforts to design grade.
23*		Minimum infiltration rates, determined by ASTM C1701, are as follows: • Porous asphalt: 100 inches per hour • Pervious concrete: 100 inches per hour • Permeable unit pavers: 20 inches per hour • Permeable grass pavers: 20 inches per hour
24*		Porous asphalt meets the requirements of APWA GSP 5-04 for Porous HMA or Porous WMA. Key requirements are identified below. • Asphalt binder is performance grade (PG) 70-22ER polymer modified or higher grade. • Binder content is between 6 and 7 percent by total weight of the mix. • Drain down is 0.3 percent or less (ASTM D6390). • Void ratio is between 16 and 25 percent (ASTM D3203, Ndesign = 75 gyrations). • Aggregates for porous asphalt conform to APWA GSP 5-04.2.
25*		Pervious Concrete meets requirements of APWA GSP 5-06SA for Pervious Concrete Pavement. Key requirements are identified below. • Portland cement is Type I, Type II, Type I-II, Type IP, or Type IS. • Mix incorporates hydration stabilizing admixture. • Water to cement ratio is 0.35 or less. • No more than 25 percent of portland cement in the mix, by weight, is replaced by fly ash, ground granulated blast furnace slag, or a combination of both. • Coarse aggregate conforms to WSDOT Spec. 9-03.1(4), AASHTO Grading No. 8.
26*		Permeable unit pavers meet design requirements provided in the LID Technical Guidance Manual for Puget Sound (2012) and procedures published by the Interlocking Concrete Pavement Institute.
27*		Permeable grass paver systems include moisture retaining additive in grid fill and/or pavement base as specified by the manufacturer.
		Drainage Conveyance
28*		No runon from adjacent pervious or impervious surfaces. If minor incidental runoff comes from adjacent pervious areas, those areas are fully stabilized. Finish grade of adjacent pervious areas is 1 inch below the finish grade of the pervious pavement to prevent migration of landscaping materials onto the pervious pavement.

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29*		Impervious areas are sloped away from the permeable pavement to the maximum extent practicable.
30*		Roads are designed with adequate drainage conveyance facilities as if the road surface was impermeable.
*		
31*		Roads with base courses that extend below the surrounding grade have a designed flow path to safely move water away from the road prism and into the roadside drainage facilities.
		Pavement Edge Treatments
32*		Permeable pavement edge treatments are provided at dissimilar pavement interfaces and pavement to landscape transitions.
33*		Edge treatments conform with City of Edmonds Standard Details Edge Treatments at Landscape Interface (SD-625), and Edge Treatments for Pavers (SD-626).
		Runoff Treatment Layer
34*		For compliance with Minimum Requirement No. 6 (when applicable), designs must provide the following: • Native underlying soil meeting soil suitability criteria for treatment below, **or** • 6-inch media or sand filter layer meeting soil suitability criteria below or the sand filter BMP specification
35		Soil suitability criteria: • SSC No. 4: Measured (initial) saturated hydraulic conductivity of 12 inches per hour or less. Design (long-term) saturated hydraulic conductivity of up to 3 inches per hour with correction factor. • SSC No. 6: o Cation exchange capacity (CEC): ≥ 5 milliequivalents/100 grams of dry soil. o Depth of treatment soil: Depth of soil below permeable pavements serving as pollution-generating hard surfaces are at least 1 foot if the permeable pavement does not accept runon from other surfaces. o Organic matter content: 1 percent minimum (ASTM D2974).
		CONSTRUCTION AND INSTALLATION (SWMMWW Volume V, Section 5, BMP T5.15, and Addendum, Section 6.1)
35*		Contractor meets minimum contractor qualifications: • Pervious Concrete: NRMCA contractor's certification per APWA GSP 5-06.SA • Permeable Unit Pavers: ICPI contractor's certification (Certified Concrete Paver Installer).

	Within each blank cell, enter comment codes as follows: C = Complete R = Revise (i.e., make corrections) N/A = Not Applicable M = Missing (i.e., please include) IC = Incomplete	
36*		The permeable pavement area is clearly identified (e.g., using flagging or high-visibility fencing) and protected prior to and throughout construction, including opening pavement to traffic.
37*		Use physical construction SWPPP BMPs and/or grade the site to keep sediment laden runoff from contaminating permeable pavement subgrade, base, or wearing layer. The upslope areas of construction areas are stabilized and overland flow distances are minimized.
38*		Construction SWPPP sheets outline construction sequencing that will protect the permeable pavement area during construction.
39*		Appropriate quality control measures are in place to ensure aggregates, cementitious material, admixtures, and other pavement materials (as applicable) are free from contamination from deleterious material or other stockpiles/storage containers and protected from damage by equipment, vehicles, or weather.
40*		Machinery is operated outside of the permeable pavement area during construction. If machinery is operated in the permeable pavement area for excavation, lightweight, low ground-contact pressure equipment is utilized; and the base soil is scarified to a minimum of 12 inches at completion.
41*		Permeable pavement area excavated to final grade only after all disturbed areas in the upgradient project drainage area have been permanently stabilized. If areas must be excavated before permanent site stabilization, initial excavation is conducted to no less than 6 inches of the final elevation of the facility floor.
42*		Excavation of permeable pavement areas does not occur during wet or saturated conditions.
43*		Subgrade is graded with lightweight, low ground-contact pressure (rubber tired) equipment when within 12 inches of final subgrade elevation.
44*		Subgrade that is overcompacted is scarified (a minimum of 8 inches) and restored such that design permeability is achieved to the satisfaction of the design engineer.
45*		The bottom of the permeable pavement excavation is raked or scarified to a minimum depth of 3 inches after final excavation to restore infiltration rates.
56*		Subgrade and pavement base are prepared such that no machinery is operated on the final subgrade.
47*		To prevent compaction of subgrade when installing the aggregate base, the following steps (excavation and back-dumping) are followed: • Excavation begins at furthest point of site and proceeds out to point of access, with machinery operating outside of prepared subgrade. • The aggregate base is dumped onto the subgrade from the edge of the installation, and the aggregate is then pushed out onto the subgrade. • Trucks then dump subsequent loads from on top of the aggregate base as the installation progresses.
48*		Shaping and compaction of pavement base is in accordance with APWA GSP 4-04.3(5).

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49*		Sediment-laden construction equipment is not driven on the base material or pavement. Sediment-laden runoff is not allowed to run on to permeable pavements or base materials.
50*		Installation of pavement wearing layer is in accordance with the following requirements: • Porous asphalt: APWA GSP 5-04 • Pervious concrete: APWA GSP 5-06.SA • Permeable unit pavers: ICPI and manufacturer recommendations • Permeable grass pavers: manufacturer recommendations
51*		The various aggregate base materials are prevented from intermixing with fines and sediment. All contaminated material is removed and replaced.
52*		Once the pavement is finished and set, pavement is covered with plastic and geotextile to protect from other construction activities. Pavement area is closed and protected until the site is permanently stabilized.
53*		Protective surfaces (e.g., waterproof tarps and steel plates) are placed over any permeable pavement areas used for construction staging.
54*		If using permeable pavement area for access during construction, demonstrate that alternate construction access (i.e., temporary roads) is not feasible.
55*		Measures are incorporated to protect the road subgrade from over compaction and sedimentation if permeable pavement roads are used for construction access. • The aggregate base or pavement surface is covered with protective geotextile fabric and protect fabric with steel plates or gravel. Gravel is only used to protect the fabric placed over pavement base (not directly on prepared subgrade). • Once construction is complete and the site is permanently stabilized, the protective geotextile is removed, and the pavement installation is cleaned and completed.
		INSPECTION CRITERIA
56		The permeable pavement system meets applicable siting, design, and construction criteria (see * notations in applicable rows).
		Acceptance Test (SWMMWW Volume V, Section 5, BMP T5.15)
57*		Infiltration Rate Testing: • Permeable pavement driveway infiltration rates are tested with the bucket test. If anything other than a scant amount of puddles runs off the surface, additional testing is conducted (see testing requirements for roads). • Permeable pavement roadway infiltration rates are tested per ASTM C1701 or C1781, depending on pavement surface type.
58		The City is notified of the scheduled infiltration testing at least 2 working days in advance of the ASTM C1701 or C1781 tests.
59*		If the ASTM C1701 or C1781 tests indicated poor function (initial infiltration rate of less than 20 inches per hour), the City is informed; and testing will proceed as specified in

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		APWA GSP 5-04.3 for porous asphalt installations and APWA GSP 5.06.SA for pervious concrete installations.
60*		Unless otherwise approved by the City, acceptance of pervious concrete pavement (as defined in APWA GSP 5-06.SA) is per APWA GSP 5-06.SA (includes approved test panel requirement). Key criteria are outlined below: • Grade: pavement shall not deviate from grade more than 0.7 inch in 10 feet. • Conformance to job mix formula (JMF). • Compacted thickness and average hardened density: three cores per lot. No single core less than 0.75 inch of design depth; average of all cores within 0.375 inch of design depth (ASTM C1542). Hardened density within +/-5 percent of average density of JMF (ASTM C1754). • Fresh Density: within +/-5 pounds per cubic foot of fresh density of JMF (ASTM C1688). • Appearance: consistent surface texture, not raveled, free of ridges or other imperfections, joints at specified locations, and free of cracks.
61*		Unless otherwise approved by the City, acceptance of porous HMA pavement (as defined in APWA 5-04.3(8)A4 is per WSDOT Standard Spec. 5-04.3(8)A with APWA GSP 5-04.3(8) amendments.

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments:

City of Edmonds

Public Works Department, Engineering Division

121 5th Ave N
Edmonds, WA 98020

Checklist 12:
Rain Gardens

Per ECDC 18.30, all Category 1 projects must comply with Minimum Requirements No. 1 through No. 5, and all Category 2 projects must comply with Minimum Requirements No. 1 through No. 9. Rain gardens may be used to help meet Minimum Requirement No. 5, provided that the following requirements are met. See also Addendum Checklists 1 through 3 for submittal requirements, and Addendum Appendix A for infeasibility criteria that apply to Minimum Requirement No. 5 specifically.

Rain gardens shall be designed in accordance with the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Addendum. The City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements for this BMP. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30, the Addendum, or other City requirements that are not included in the SWMMWW) are also included in the checklist. Note also that much of the rain garden design content in the SWMMWW refers to the Rain Garden Handbook for Western Washington (Rain Garden Handbook). To simplify the design and review process, the requirements from the Rain Garden Handbook are also included in this checklist.

This checklist reflects most, but not necessarily all, of the items that shall be documented by the project proponent, for review by the Engineering Division. It is intended to be used as an aid for developers and plan reviewers by providing a foundation for clear and consistent BMP design in the City of Edmonds. However, all items may not be applicable to every project, and all items of concern to this office may not be covered on this checklist.

Applicant:

Application #:

	Within each blank cell, enter comment codes as follows: C = Complete R = Revise (i.e., make corrections) N/A = Not Applicable M = Missing (i.e., please include) IC = Incomplete	
		MODELING AND SIZING (SWMMWW Volume V, Section 5, BMP T5.14A)
		Minimum Requirement #5 (List #1)
1		For compliance with Minimum Requirement #5 (List #1), the rain garden area has a horizontally projected surface area below the overflow, which is at least 5 percent of the total impervious surface area draining to it. If lawn/landscape area will also be draining to the rain garden area, the horizontally projected surface area below the overflow is increased by 2 percent of the lawn/landscape area.
		SETBACKS (Addendum, Appendix A) Note: setback distances are measured from the bottom edge of the rain garden footprint.
2*		The rain garden is not within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA).
3*		The rain garden is not within the buffer of the ESLHA (minimum buffer equal to the height of the steep slope or 50 feet, whichever is greater) unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system.
4*		The rain garden is not within 50 feet of the top of slopes greater than 15 percent (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system).
5*		The rain garden is located on a slope of less than 8 percent.
6*		The rain garden is not located: • Within 100 feet of an area known to have deep soil contamination; • Where groundwater modeling indicates infiltration will likely increase or change the direction of the migration of pollutants in the groundwater; • Where surface soils have been found to be contaminated unless those soils are removed within 10 horizontal feet from the infiltration area; • In any area where these facilities are prohibited by an approved cleanup plan under the state Model Toxics Control Act or Federal Superfund Law, or an environmental covenant under Chapter 64.70 RCW.
7*		For sites with on-site or adjacent septic systems, the discharge point is at least 30 feet upgradient, or 10 feet downgradient, of the drainfield primary and reserve areas (per WAC 246-272A-0210). This requirement can be modified by the City if site topography will clearly prohibit flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc.) indicate that this is unnecessary.
8*		The rain garden is not within 10 feet of an underground storage tank and connecting underground pipes when the capacity of the tank and pipe system is 1,100 gallons or less.
9*		The rain garden is not within 100 feet of an underground storage tank and connecting underground pipes when the capacity of the tank and pipe system is greater than 1,100 gallons.

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10		A minimum of 1 foot of clearance from seasonal high groundwater or other impermeable layer is provided.
11*		The rain garden is at least 5 feet from a structure without a basement and 10 feet from a structure with a basement.
12*		The rain garden is at least 5 feet from any property lines and easements.
13*		The rain garden is not within the buffer of a Category 1 or Category 2 wetland.
14*		The rain garden is not within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
		DESIGN CRITERIA (SWMMWW Volume V, Section 5 (BMP T5.14A), and the Rain Garden Handbook, 2013; City of Edmonds Standard Details for Rain Gardens)
		Applications and Limitations
15*		Rain garden soil mix does not contain composted materials if the rain garden area drains to Hall Creek or Lake Ballinger, and if the underlying native soil does not meet the soil suitability criteria for treatment.
		Flow Entrance
16*		Flow entrance is sized to capture flow from the catchment area and designed to reduce the potential for clogging at the inlet and prevent inflow from causing erosion in the rain garden.
17*		Runoff is delivered to rain garden across a landscaped area, through an open swale with plants and decorative rock, or through a pipe (Rain Garden Handbook, 2013).
18*		If water is directed through a swale with slope greater than 2 percent, small rock check dams are included every 5 to 10 feet (Rain Garden Handbook, 2013).
19*		A pad of rock is provided where water enters the rain garden from a swale or pipe to slow the water and guard against erosion (Rain Garden Handbook, 2013).
		Ponding Area
20*		The ponding depth is 6 inches.
21*		The freeboard (measured from the invert of the overflow pipe or earthen channel to facility overtopping elevation) is at least 4 inches (Rain Garden Handbook, 2013).
22*		If berming is used, the slope on berm is not steeper than 3H:1V, and the width if the berm is at least 1 foot.
23*		Soil used for berming is imported rain garden soil or amended native soil.
		Bottom Area and Side Slopes
24*		The planted side slope is not steeper than 2.5H:1V.
25*		The bottom width is at least 1 foot.

Within each blank cell, enter comment codes as follows:

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		Overflow
26*		An overflow route is identified for stormwater flows that overtop the rain garden area. The overflow route flows to the downstream conveyance system or other acceptable discharge point (e.g., open space, roadside swale, or storm drain) without posing a health or safety risk or causing property damage. Overflow is not directed towards adjacent properties or structures.
27*		A rock-lined overflow is provided (Rain Garden Handbook, 2013).
28*		The overflow cuts through the berm in a depression that slopes out from the ponding area (Rain Garden Handbook, 2013).
29		The overflow rock extends about 4 feet outside the rain garden to slow water as it exits (Rain Garden Handbook, 2013).
		Rain Garden Soil
30*		The treatment soil is 12 to 24 inches deep (Rain Garden Handbook, 2013).
		Compost Requirements
31*		Compost does not include biosolids or manure.
32*		Meets the definition of "composted material" in WAC 173-350-100 and complies with testing parameters and other standards in WAC 173-350-220.
33*		Produced at Cedar Grove Composting, Washington or other approved equal. See: <https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Waste-reduction-programs/Organic-materials/Managing-organics-compost>.
34*		Composed of yard debris, crop residues, or bulking agents originated with a minimum of 65 percent by volume.
35*		Composed of postconsumer food waste originated with a maximum of 35 percent by volume.
36*		Water content: no visible free water or dust is produced when handling the material.
37*		Tested in accordance with the U.S. Composting Council "Test Method for the Examination of Compost and Composting" (TMECC).
38*		Meets the size gradations established in the U.S. Composting Council's Seal of Testing Assurance (STA) program:

	Min.	Max.
Percent passing 2 inches	100	
Percent passing 1 inch	99	100
Percent passing 0.625 inch	90	100
Percent passing 0.25 inch	75	100

39*		pH is between 6.0 and 8.5 (TMECC 04.11-A).
40*		"Physical contaminants" (as defined in WAC 173-350-100) content is less than 1 percent by weight (TMECC 03.08-A) total, and does not exceed 0.25 percent film plastic by dry weight.
41*		Minimum organic matter content is 40 percent by dry weight basis (TMECC 05.07-A).

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42*		Soluble salt contents are less than 4.0 dS/m (mmhos/cm) (TMECC 04.10-A).
43*		Maturity indicators from a cucumber bioassay shall be greater than 80 percent (TMECC 05.05-A) for both emergence and vigor.
44*		Stability is 7 mg CO2-C/g OM/day or less (TMECC 05.08-B).
45*		Carbon to nitrogen ratio is than 25:1 (TMECC 05.02A "Carbon to Nitrogen Ratio," which uses TMECC 04.01 and 04.02-D). A ratio of up to 35:1 may be allowed when only Puget Sound lowland native species are planted, and a ratio of up to 40:1 may be allowed for coarse compost to be used as a surface mulch.
		Rain Garden Soil Mix
46*		Compost meets compost requirements above.
47*		OPTION No. 1. Excavate and Replace Soil: Excavate the soil and completely replace with imported rain garden soil mix; **or** OPTION No. 2. Excavate and Amend Soil for Reuse: Excavate the soil, amend it by mixing in compost, then put it back into the rain garden; **or** OPTION No. 3. Amend Soil in Place: Amend your existing soil in place by mixing in compost after you've excavated to the proper depth. (Rain Garden Handbook, 2013)
48*		If the applicant chooses Option No. 1 above, rain garden soil is 60 percent screened sand and 40 percent compost by volume, or meets the bioretention soil mix specification (Rain Garden Handbook, 2013).
49*		If the applicant chooses Option No. 2 above, amended soil is approximately 65 percent excavated soil and 35 percent compost by volume. Before adding amended soil, the excavated area is scarified (Rain Garden Handbook, 2013).
50*		If the applicant chooses Option No. 3 above, 3 inches of compost and till are spread over the excavation to a depth of 4 to 5 inches (Rain Garden Handbook, 2013).
		Planting
51		The design plans specify that vegetation coverage of selected plants will achieve 90 percent coverage within 2 years, or additional plantings will be provided until this coverage requirement is met.
52		Plant spacing and plant size is designed to achieve specified coverage.
53*		Plants are sited according to sun, soil, wind, and moisture requirements.
54*		Provisions are made for supplemental irrigation for at least the first two growing seasons following installation.
55*		Plants are chosen in accordance with the Rain Garden Handbook, 2013.
		Mulch Layer
56*		The mulch layer is a maximum of 3 inches thick (Rain Garden Handbook, 2013).
57*		Compost is provided in the bottom of the rain garden area, and wood chip mulch is used on the rain garden cell slopes above the ponding elevation and rim area.
58*		Wood chip mulch is composed of shredded or chipped hardwood or softwood (Rain Garden Handbook, 2013).
59*		Mulch is not composed of grass clippings, pure bark, beauty bark, or rock mulch (Rain Garden Handbook, 2013).

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60*		Mulch layer is free of weed seeds, soil, roots, and other material that is not trunk or branch wood and bark (Rain Garden Handbook, 2013).
		CONSTRUCTION CRITERIA INCLUDED IN THE SWPPP (Addendum, Section 6.1)
61*		The rain garden area is clearly identified (e.g., using flagging or high-visibility fencing) and protected prior to construction.
62		A soil and vegetation management plan is provided showing areas to be protected and restoration methods for disturbed areas.
63*		General (i.e., non-BMP-specific) construction SWPPP BMPs and protection techniques are implemented as applicable. The upslope areas of construction areas are stabilized, and overland flow distances are minimized.
64*		Machinery is operated outside of rain garden area during construction. If machinery is operated in the rain garden area for excavation, lightweight, low ground-contact pressure equipment is utilized; and the base soil is scarified to a minimum of 12 inches at completion.
65*		Rain garden area excavated to final grade only after all disturbed areas in the upgradient project drainage area have been permanently stabilized. If rain garden areas must be excavated before permanent site stabilization, initial excavation is conducted to no less than 6 inches of the final elevation of the facility floor.
66		Excavation of rain garden areas does not occur during wet or saturated conditions.
67*		Placement or mixing of native soil, rain garden soil, or amended soil does not occur during wet or saturated conditions.
68*		The bottom of the rain garden excavation is raked or scarified to a minimum depth of 3 inches after final excavation to restore infiltration rates.
69*		Rain garden areas are not used as sediment control facilities during construction, and all drainage is directed away from the facility after initial rough grading.
70*		Clogging and over-compaction of the subgrade, native soil, rain garden soils, or amended soils is prevented during construction.
71*		Area is inspected for compaction prior to planting. If compaction occurred during construction, the native soil, rain garden soil, or amended soil was aerated prior to planting.
		INSPECTION CRITERIA
72		The rain garden BMP meets applicable siting, design, and construction criteria (see * notations in applicable rows).

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments:

City of Edmonds

Public Works Department, Engineering Division

121 5th Ave N
Edmonds, WA 98020

Checklist 13:
Downspout Full Infiltration Systems

Per ECDC 18.30, all Category 1 projects must comply with Minimum Requirements No. 1 through No. 5, and all Category 2 projects must comply with Minimum Requirements No. 1 through No. 9. Downspout full infiltration may be used to help meet Minimum Requirement Nos. 5 and 7, provided that the following requirements are met. See also Addendum Checklists 1 through 3 for submittal requirements, and Addendum Appendix A for infeasibility criteria that apply to Minimum Requirement No. 5 specifically.

Downspout full infiltration shall be designed in accordance with the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Addendum. The City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements for this BMP. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30, the Addendum, or other City requirements that are not included in the SWMMWW) are also included in the checklist.

This checklist reflects most, but not necessarily all, of the items that shall be documented by the project proponent, for review by the Engineering Division. It is intended to be used as an aid for developers and plan reviewers by providing a foundation for clear and consistent BMP design in the City of Edmonds. However, all items may not be applicable to every project, and all items of concern to this office may not be covered on this checklist.

Applicant:

Application #:

	Within each blank cell, enter comment codes as follows: C = Complete R = Revise (i.e., make corrections) N/A = Not Applicable M = Missing (i.e., please include) IC = Incomplete	
		MODELING AND SIZING (SWMMWW Volume V, Section 4, BMP T5.10A)
1		If roof runoff is infiltrated according to the requirements of this BMP, the roof area is discounted from the project area used for sizing stormwater facilities.
2*		Infiltration trench length is sized based on underlying soil type as follows: • Coarse sand and cobbles: 20 linear feet of trench per 1,000 square feet contributing roof area • Medium sand: 30 linear feet of trench per 1,000 square feet of contributing roof area • Fine or loamy sand: 75 linear feet of trench per 1,000 square feet of contributing roof area • Sandy loam: 125 linear feet of trench per 1,000 square feet of contributing roof area • Loam: 190 linear feet of trench per 1,000 square feet of contributing roof area • Fill: 60 linear feet of trench per 1,000 square feet of contributing roof area
3*		Infiltration drywell is sized based on underlying soil type as follows: • Coarse sand and cobble: 60 cubic feet of gravel per 1,000 square feet of contributing impervious surface • Medium sand: 90 cubic feet of gravel per 1,000 square feet of contributing impervious surface
		SETBACKS (Addendum, Appendix A)
4*		The downspout infiltration system is not within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA).
5*		The downspout infiltration system is not within the buffer of the ESLHA (minimum buffer equal to the height of the steep slope or 50 feet, whichever is greater) unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system.
6*		The downspout infiltration system is not within 50 feet of the top of slopes greater than 15 percent (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system).
7		There is at least 3 feet or more of permeable soil from the proposed final grade (i.e., ground elevation at the facility location) to the seasonal high groundwater table or other impermeable layer, AND there is at least 1 foot or more of permeable soil from the proposed bottom of the infiltration system to the seasonal high groundwater table or other impermeable layer.
8*		The downspout infiltration system is not within 5 feet from any property lines and easements.
9*		If the contributing area is less than 5,000 square feet, the downspout infiltration system is not within 5 feet from a structure without a basement and 10 feet for a structure with a basement.

	Within each blank cell, enter comment codes as follows: C = Complete R = Revise (i.e., make corrections) N/A = Not Applicable M = Missing (i.e., please include) IC = Incomplete	
10*		If the contributing area is greater than or equal to 5,000 square feet, the downspout infiltration system is not within a 1H:1V slope line from the bottom edge of the facility to a structure. (Minimum clearance 5 feet from a structure with a basement and 10 feet for a structure with a basement.)
11*		For sites with on-site or adjacent septic systems, the discharge point is at least 30 feet upgradient, or 10 feet downgradient, of the drainfield primary and reserve areas (per WAC 246-272A-0210). This requirement can be modified by the City if site topography will clearly prohibit flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc.) indicate that this is unnecessary.
12*		If placed under pavement, overflow (small yard drain or catch basin with grate cover) is greater than 1 foot below the pavement.
13*		The downspout infiltration system is not within the buffer of a Category 1 or Category 2 wetland.
14*		The downspout infiltration system is not within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
		DESIGN CRITERIA (SWMMWW Volume V, Section 4, BMP T5.10A)
15*		The lot or site has outwash or loam soils.
16*		If placed in fill material, the measured infiltration rate is at least 8 inches per hour.
		Infiltration Trench
17*		Trench is no greater than 100 feet in length.
18*		Spacing between trench centerlines is at least 6 feet.
19*		Aggregate material consists of washed drain rock conforming to WSDOT Spec. 9-03.12(5) Gravel Backfill for Dry Wells.
20*		Filter fabric is installed around the tops and sides of trench drain rock prior to backfilling.
21*		A structure with sump is located upstream of the trench.
22*		Trench is sized according to the sizing requirements above in Modeling and Sizing.
23*		Downspout full infiltration trench is designed as shown in City of Edmonds Standard Detail.
		Infiltration Drywell
24*		Drywell is at least 48 inches in diameter.
25*		Drywell is deep enough to contain gravel amounts specified above in Modeling and Sizing.
26*		Filter fabric is installed around the tops and sides of trench drain rock prior to backfilling.
27*		Aggregate material consists of washed drain rock conforming to WSDOT Spec. 9-03.12(5) Gravel Backfill for Dry Wells.
28*		Spacing between drywells is a minimum of 10 feet (minimum 4 feet between edges of drywells).
29*		Drywell is sized according to the sizing requirements above in Modeling and Sizing.
30*		Downspout full-infiltration drywell is designed as shown in City of Edmonds Standard Detail.

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		CONSTRUCTION CRITERIA INCLUDED IN THE SWPPP (Addendum, Section 6.1)
31*		The infiltration area is clearly identified (e.g., using flagging or high-visibility fencing) and protected prior to construction.
32		A soil and vegetation management plan is provided showing areas to be protected and restoration methods for disturbed areas.
33*		Construction SWPPP sheets outline construction sequencing that will protect the infiltration area during construction.
34*		General (i.e., non-BMP-specific) construction SWPPP BMPs and protection techniques are implemented as applicable. The upslope of construction areas is stabilized, and overland flow distances are minimized.
35*		Machinery is operated outside of the infiltration areas during construction.
36*		Infiltration area is excavated to final grade only after all disturbed areas in the upgradient project drainage area have been permanently stabilized. If infiltration areas must be excavated before permanent site stabilization, initial excavation is conducted to no less than 6 inches of the final elevation of the facility floor.
37*		Excavation of infiltration areas does not occur during wet or saturated conditions.
38*		The bottom of the infiltration facility excavation is raked or scarified to a minimum depth of 3 inches after final excavation to restore infiltration rates.
39*		Downspout infiltration facilities are not used as sediment control facilities during construction, and all drainage is directed away from the facility after initial rough grading.
40*		Clogging and over-compaction of the subgrade, native soil, rain garden soils, or amended soils is prevented during construction.
41*		If placed in fill material, fill is compacted under supervision of professional civil engineer with geotechnical expertise.
		INSPECTION CRITERIA
42		The infiltration system meets applicable siting, design, and construction criteria (see * notations in applicable rows).

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments:

City of Edmonds

Public Works Department, Engineering Division

121 5th Ave N
Edmonds, WA 98020

Checklist 14:
Downspout Dispersion BMPs

Per ECDC 18.30, all Category 1 projects must comply with Minimum Requirements No. 1 through No. 5, and all Category 2 projects must comply with Minimum Requirements No. 1 through No. 9. Downspout dispersion may be used to help meet Minimum Requirement Nos. 5 and 7, provided that the following requirements are met. See also Addendum Checklists 1 through 3 for submittal requirements, and Addendum Appendix A for infeasibility criteria that apply to Minimum Requirement No. 5 specifically.

Downspout dispersion shall be designed in accordance with the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Addendum. The City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements for this BMP. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30, the Addendum, or other City requirements that are not included in the SWMMWW) are also included in the checklist.

This checklist reflects most, but not necessarily all, of the items that shall be documented by the project proponent, for review by the Engineering Division. It is intended to be used as an aid for developers and plan reviewers by providing a foundation for clear and consistent BMP design in the City of Edmonds. However, all items may not be applicable to every project, and all items of concern to this office may not be covered on this checklist.

Applicant:

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		MODELING AND SIZING (SWMMWW Volume V, Section 4, BMP T5.10B)
1		When splashblocks or dispersion trenches are used, and the length of the vegetated flow path is at least 50 feet, the connected roof area should be modeled as a lateral flow impervious area. In situations where multiple downspout dispersions will occur, modeling the roof area as a landscaped area (grass) is allowed. When dispersion trenches are used, and the length of the vegetated flow path is 25 to 50 feet, model the connected roof area as a lateral flow impervious area. In situations where multiple downspout dispersions will occur, modeling the roof area as 50 percent impervious/50 percent landscape is allowed.
		SETBACKS (Addendum Appendix A)
2*		The downspout dispersion area is not within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA).
3*		The downspout dispersion area is not within the buffer of the ESLHA (minimum buffer equal to the height of the steep slope or 50 feet, whichever is greater) unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system.
4*		The downspout dispersion area is at least 5 feet from any property lines and easements.
5*		For sites with on-site or adjacent septic systems, the discharge point is at least 30 feet upgradient, or 10 feet downgradient, of the drainfield primary and reserve areas (per WAC 246-272A-0210). This requirement can be modified by the City if site topography will clearly prohibit flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc.) indicate that this is unnecessary.
6*		The downspout dispersion area is not within the buffer of a Category 1 or Category 2 wetland.
7*		The downspout dispersion area is not within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
		DESIGN CRITERIA (SWMMWW Volume V, Section 5, BMP T5.10B)
8		The dispersion of runoff does not create flooding or erosion impacts.
9*		Flow path is undisturbed native landscape, or well-established lawn, landscape, or groundcover over soil.
10		Some natural resource protection areas and critical area buffers may be counted towards flow path lengths if they are permanently protected from modification through a covenant or easement, or a tract dedicated by the proposed project.
11*		Dispersion flow paths are sufficiently spaced to prevent overlap of flows in the flow path areas.

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12*		Dispersion flow paths are at least 50 feet in length between the outlet of the trench and any slope greater than 15 percent (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system).
		Dispersion Trench Design Criteria
13*		Dispersion trench meets the general design criteria above.
14*		Dispersion trench is designed as shown in City of Edmonds Standard Details.
15*		Each downspout dispersion trench has a separate flow path.
16*		Flow path is at least 25 feet in length between the outlet of the trench and the downstream property line or any structure, stream, wetland, or impervious surface.
17*		If the trench serves ≤ 700 square feet of roof area, the trench is 10 foot by 2 foot wide and gravel.
18*		If the trench serves > 700 square feet of roof area, a notched grade headboard is included.
19*		If the trench serves > 700 square feet of roof area, the trench is at least 10 feet in length per each 700 square feet of roof area (up to a maximum of 50 feet in length).
20*		Trench is at least 1.5 feet in depth.
21*		If the trench serves > 700 square feet of roof area, a type 1 catch basin or equivalent structure is provided upstream of the trench.
22*		Trench aggregate material consists of washed drain rock conforming to WSDOT Spec. 9-03.12(5) Gravel Backfill for Dry Wells.
23*		A 4-inch diameter perforated underdrain pipe is 6 inches below the surface of the trench.
		Splashblock Design Criteria
24*		Splashblock meets the general design criteria above.
25*		Splashblocks are designed as shown in City of Edmonds Standard Detail.
26*		Flow path is at least 50 feet in length from the downspout to the downstream property line or any structure, stream, wetland, or other impervious surface.
27*		Less than or equal to 700 square feet of roof area drains to each splashblock.
28*		Splashblock or pad of drain rock (2 feet wide by 3 feet long by 6 inches deep) is placed at each downspout discharge point. Drain rock conforms to WSDOT Spec. 9-03.12(5) Gravel Backfill for Dry Wells.
		CONSTRUCTION CRITERIA INCLUDED IN THE SWPPP (Addendum, Section 6.1)
29*		The dispersion area is clearly identified (e.g., using flagging or high visibility fencing) and protected prior to construction.
30		A soil and vegetation management plan is provided showing areas to be protected and restoration methods for disturbed areas.
31*		Construction SWPPP sheets outline construction sequencing that will protect the dispersion area during construction.

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32*		General (i.e., non-BMP-specific) construction SWPPP BMPs and protection techniques are implemented as applicable. The upslope of construction areas are stabilized and overland flow distances are minimized.
33*		Machinery is operated outside of dispersion area during construction.
34*		Construction site flow directed away from the dispersion area using applicable Construction SWPPP BMPs (e.g., temporary diversion swales).
35*		The soil is scarified along the dispersion flow path if disturbed during construction.
36*		Dispersion area excavated to final grade only after all disturbed areas in the upgradient project drainage area have been permanently stabilized.
37*		If the flow path area is disturbed during construction, the area is restored to meet the BMP T5.13: Post-Construction Soil Quality and Depth (Addendum Checklist 7) requirements and a dense cover of lawn, landscape, or groundcover is established.
		INSPECTION CRITERIA
38		The dispersion system meets applicable siting, design, and construction criteria (see * notations in applicable rows).

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments:

City of Edmonds

Public Works Department, Engineering Division

121 5th Ave N
Edmonds, WA 98020

Checklist 15:
Perforated Stub-Out Connections

Per ECDC 18.30, all Category 1 projects must comply with Minimum Requirements No. 1 through No. 5, and all Category 2 projects must comply with Minimum Requirements No. 1 through No. 9. Perforated stub-out connections may be used to help meet Minimum Requirement Nos. 5, provided that the following requirements are met. See also Addendum Checklists 1 through 3 for submittal requirements, and Addendum Appendix A for infeasibility criteria that apply to Minimum Requirement No. 5 specifically.

Perforated stub-out connections shall be designed in accordance with the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Addendum. The City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements for this BMP. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30, the Addendum, or other City requirements that are not included in the SWMMWW) are also included in the checklist.

This checklist reflects most, but not necessarily all, of the items that shall be documented by the project proponent, for review by the Engineering Division. It is intended to be used as an aid for developers and plan reviewers by providing a foundation for clear and consistent BMP design in the City of Edmonds. However, all items may not be applicable to every project, and all items of concern to this office may not be covered on this checklist.

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		MODELING AND SIZING (SWMMWW Volume V, Section 4, BMP T5.10C)
1		Any flow reduction is variable and unpredictable. No computer modeling credits are used.
		SETBACKS (Addendum Appendix A)
2*		Perforated stub-out system is not located within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA).
3*		Perforated stub-out system is not located within the buffer of the ESLHA (minimum buffer equal to the height of the steep slope or 50 feet, whichever is greater) unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system.
4*		Perforated stub-out system is not located within 50 feet of the top of slopes greater than 15 percent (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system).
5*		The perforated pipe portion of the system is not located under impervious or heavily compacted soils (e.g., driveways and parking areas).
6*		Perforated stub-out system is not within the buffer of a Category 1 or Category 2 wetland.
7*		Perforated stub-out system is not within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
8		There is at least 1 foot of permeable soil from the proposed bottom (final grade) of the perforated stub-out connection trench to the highest estimated groundwater table or other impermeable layer.
9*		For sites with on-site or adjacent septic systems, the discharge point is at least 30 feet upgradient, or 10 feet downgradient, of the drainfield primary and reserve areas (per WAC 246-272A-0210). This requirement can be modified by the City if site topography will clearly prohibit flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc.) indicate that this is unnecessary.
		DESIGN CRITERIA (SWMMWW Volume V, Section 4, , BMP T5.10C, City of Edmonds Standard Detail for Perforated Stub-Out Connections)
10*		The location of the connection allows the maximum amount of runoff to infiltrate into the ground (ideally a dry, relatively well-drained location).
11*		At least 10 feet of perforated pipe per 5,000 square feet of roof area is provided.
12*		Trench is at least 2 feet wide and 18 inches deep.
13*		Trench is backfilled with a minimum of 12 inches of washed drain rock conforming to WSDOT Spec. 9-03.12(5) Gravel Backfill for Dry Wells.
14*		Perforated pipe is 4 inches in diameter and level.
15*		At least 8 inches of washed drain rock is provided below the pipe invert. Drain rock conforms to WSDOT Spec. 9-03.12(5) Gravel Backfill for Dry Wells.
16*		Filter fabric is installed around the tops and sides of trench drain rock prior to backfilling.
17*		The drain rock is backfilled with 6 inches of random fill material.

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		CONSTRUCTION CRITERIA INCLUDED IN THE SWPPP (Addendum, Section 6.1)
18*		The infiltration area is clearly identified (e.g., using flagging or high-visibility fencing) and protected prior to construction.
19		A soil and vegetation management plan is provided showing areas to be protected and restoration methods for disturbed areas.
20*		Construction SWPPP sheets outline construction sequencing that will protect the infiltration area during construction.
21*		General (i.e., non-BMP-specific) construction SWPPP BMPs and protection techniques are implemented as applicable. The upslope areas of construction areas are stabilized, and overland flow distances are minimized.
22*		Machinery is operated outside of infiltration area during construction.
23*		Construction site flow directed away from the dispersion area using applicable Construction SWPPP BMPs (e.g., temporary diversion swales).
24*		Excavation of infiltration areas does not occur during wet or saturated conditions.
25*		The bottom of the infiltration area is raked or scarified to a minimum depth of 3 inches after final excavation to restore infiltration rates.
26*		Infiltration area excavated to final grade only after all disturbed areas in the upgradient project drainage area have been permanently stabilized. If infiltration areas must be excavated before permanent site stabilization, initial excavation is conducted to no less than 6 inches of the final elevation of the facility floor.
		INSPECTION CRITERIA
27		The perforated stub-out system meets applicable siting, design, and construction criteria (see * notations in applicable rows).

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments: