

Appendix C – Checklists for Various Project Submittal, Review, and Field Procedure Elements

Checklist 1: Category 1 Stormwater Site Plans

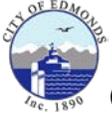
Checklist 2: Category 2 Stormwater Site Plans

Checklist 3: Construction SWPPP Drawings and Report

Checklist 4: Methods for Determining Infiltration Rates

Checklist 5: Field and Design Procedures for Bioretention, Permeable Pavement, Rain Gardens, and Downspout Infiltration Systems

Checklist 6: Procedures for Infiltration Trenches and Basins



Public Works Department, Engineering Division

121 5th Ave N
Edmonds, WA 98020

Checklist 1: Category 1 Stormwater Site Plans

Per ECDC 18.30, Category 1 projects must comply with Minimum Requirements No. 1 through No. 5 and include projects that:

- i. Result in 2,000 square feet, or greater, of new plus replaced hard surface area, or
- ii. Have land disturbing activity of 7,000 square feet or greater.

Stormwater Site Plans shall be prepared in accordance with Chapter 3 of Volume I of the Department of Ecology’s Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Edmonds Stormwater Addendum (Addendum). Because the SWMMWW does not include clear itemization of project submittal requirements, the City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30 and the Addendum that are not included in the SWMMWW) are also included in the checklist. For clarity, the checklist headings and subheadings are generally organized according to the SWMMWW structure, though some requirements specific to ECDC 18.30 and the Addendum are included under the SWMMWW headings.

This checklist reflects most, but not necessarily all of the items that will be reviewed 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 review of development work 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. Last, the structure and organization of project submittals can vary depending on the project. The headings outlined below represent the City’s preferred organization of submittal information, though variations are acceptable as long as all of the required information is provided in a clear submittal package.

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	
DRAWING REQUIREMENTS (SWMMWW Volume I, Chapter 3)	
General	
1	Lines are drawn with a straight edge (with the exception of curved lines).
2	Drawings are sufficiently clear to see footprints of structures and other features described above, and are on 11 x 17-inch paper or plan-size sheets (24 x 36-inch).
3	All drawings to scale, preferably at 1 inch = 20 feet, minimum font size 8 point.
4	All sheets have a north arrow, scale, a benchmark reference, datum, the section, township, and range. North arrow points to the top or to the left of the sheet.
5	Each set of drawings has a legend to define map symbols and line types.
Site Development Drawings (SWMMWW Volume I, Section 3.1.1 [survey requirements], 3.1.5 and 3.1.7) (all of the following should be included where applicable)	
6	Property lines, parcel numbers, and ownership.
7	Property dimensions and area.
8	Contour lines from the best available source (datum used is specified).
9	Adjoining street names.
10	Outlines of all drainage basins and basin areas.
11	Existing and proposed structures and other hard surfaces such as driveways, patios, etc.
12	Existing and proposed easements.
13	Established buffers, significant trees, and natural vegetation easements.
14	Natural drainage channels, wetlands, canyons, gullies, water bodies, etc.
15	Location of known wells, and underground storage tanks, and septic tanks.
16	Location and type of on-site stormwater management BMPs, discharge location and pathway, and areas served.
17	Location of stormwater conveyance systems for runoff from structures.
18	Notes, specifications, and details related to selected BMPs.
19	Locations of soil surveys, soil test pits, and soil borings conducted as part of the required soils report (see Soils Report Requirements below).
20	If a geotechnical evaluation is required, any recommendations contained in the report are incorporated into the site development drawings.
21	Existing public and private development, including utility infrastructure on and adjacent to the site, if publicly available.
22	Minor hydrologic features, including seeps, springs, closed depression areas, and drainage.
23	Major hydrologic features including streams, wetlands, and water bodies, as well as wetland and buffer boundaries and classifications.
24	Flood hazard areas on or adjacent to the site.

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53	The covenant includes an 8.5-inch x 11-inch plan view showing the location of on-site stormwater management BMPs relative to structures and property lines, and maintenance requirements and inspection frequencies for each on-site stormwater management BMP.
54	A map showing the location of newly planted and retained trees claimed as flow reduction credits is attached.

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments:



Checklist 2: Category 2 Stormwater Site Plans

Per ECDC 18.30, Category 2 projects must comply with Minimum Requirements No. 1 through No. 9 and include projects that:

- i. Result in 5,000 square feet, or greater, of new plus replaced hard surface area, or
- ii. Convert 0.75 acres, or more, of vegetation to lawn or landscaped areas, or
- iii. Convert 2.5 acres, or more, of native vegetation to pasture.

Stormwater Site Plans shall be prepared in accordance with Chapter 3 of Volume I of the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Edmonds Stormwater Addendum (Addendum). Because the SWMMWW does not include clear itemization of project submittal requirements, the City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30 and the Addendum that are not included in the SWMMWW) are also included in the checklist. For clarity, the checklist headings and subheadings are generally organized according to the SWMMWW structure, though some requirements specific to ECDC 18.30 and the Addendum are included under the SWMMWW headings.

This checklist reflects most, but not necessarily all of the items that will be reviewed 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 review of development work 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. Last, the structure and organization of project submittals can vary depending on the project. The headings outlined below represent the City's preferred organization of submittal information, though variations are acceptable as long as all of the required information is provided in a clear submittal package.

Applicant:

Application #:

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IC = Incomplete	
DRAWING REQUIREMENTS (SWMMWW Volume I, Section 3.1.1 [survey requirements], 3.1.5, and 3.1.7)	
General	
1	Sheet size is 24 inches x 36 inches.
2	All drawings to scale, preferably at 1 inch = 20 feet, minimum font size 8 point.
3	All sheets have a north arrow, scale, a benchmark reference, datum, the section, township, and range. North arrow points to the top or to the left of the sheet.
4	Each set of drawings has a legend to define map symbols and line types.
5	All drawings are stamped, signed, and dated by a licensed professional engineer prior to review by the City.
6	Lot dimensions, areas, property lines, parcel numbers, ownership, easements, and tracts.
7	Existing features are ghosted or shaded.
8	Identifies all topographic features within project limits (and sufficient area beyond) to resolve questions of setback, slope, drainage, access onto abutting property, and road continuations.
9	Identifies all pertinent existing roads and adjoining developments.
10	Existing and proposed ditch flow lines, drainage structures with invert elevations, utility locations (e.g., water, sewer, gas, telephone, etc.), fences, structures, hard surfaces, curbing and approaches, pertinent trees and shrubbery, and other appurtenances which would affect the construction of the project are identified.
11	Identifies existing and proposed underground wells and underground storage tanks (including septic tanks) – on-site and on adjacent properties (of record and not of record) within specified setbacks.
12	Indicates direction of flow, size, and kind of each drainage channel (including natural drainage systems), pipe, structure, and on-site or off-site drainage courses.
13	Identifies locations of all stormwater facilities and include the following information: <ul style="list-style-type: none"> • Overall dimensions and measurements • Placement on site • Location of inflow, bypass, and discharge systems • Dispersion flow paths • Drainage area
14	Includes property lines, parcel numbers, and ownership.
15	Hydrologic features, including but not limited to seeps, springs, closed depression areas, streams, wetlands, and water bodies, wetland and buffer boundaries and classifications, etc., are identified.
16	Identifies flood hazard areas on or adjacent to the site.
17	Identifies geologic hazard areas and associated buffer requirements on or adjacent to the site.

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Construction SWPPP Drawings (SWMMWW Volume I, Section 3.1.6 and Volume II, Chapter 3)	
33	Refer to Addendum Checklist 3: Construction SWPPP Drawings and Report.
STORMWATER SITE PLAN REPORT (SWMMWW Volume I, Section 3.1.5 and 3.1.7)	
Cover Sheet	
34	Project name.
35	Applicant's name, address, telephone number, and e-mail address.
36	Project engineer's name, address, telephone number, and e-mail address.
37	Date of submittal.
38	Contact's name, address telephone number, and e-mail address.
39	Contractor's name, address telephone number, and e-mail address, if known.
Project Engineer's Certification	
40	All plans and specifications, calculations, certifications, as-built drawings, and all other submittals which will become part of the permanent record of the project are dated and bear the project engineer's official seal and signature. Project engineer is a professional engineer licensed in the State of Washington in civil engineering.
Table of Contents	
41	Page numbers for each section of the report.
42	Page numbers of appendices.
43	All pages of the Stormwater Site Plan Report are numbered.
Project Site Map(s) (SWMMWW Volume I, Section 3.1.5 and 3.1.7)	
44	Topographic map at an appropriate scale.
45	Includes project boundaries, subbasin boundaries, and off-site areas tributary to the project are shown.
46	Identifies drainage features (such as channels, detention facilities, and floodways) and flow paths to receiving waters are shown.
47	Identifies areas contributing to flow control and/or runoff treatment facilities.
48	Identifies threshold discharge areas (TDAs) where applicable.

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49	Shows the following on the map (or on a schedule) for unit areas: <ul style="list-style-type: none"> • Total project area • Total hard surfaces • Pollution generating hard/impervious surface • Pollution generating pervious surface • Existing unmanaged hard surfaces • Total disturbed area • Average slope • Estimated ultimate infiltration rate • NRCS (formerly SCS) Soil Group
50	Includes conveyance data, identifier (for reference to model output), length, slope, inverts up and down.
51	Locations of soil pits and infiltration tests.
Project Overview (SWMMWW Volume I, Section 3.1.7)	
52	General description of the project, predeveloped, and developed site conditions.
53	Site area and size of improvements.
54	Indicates whether there are existing unmanaged hard surfaces that will remain after project completion.
55	Pre- and post- developed stormwater runoff conditions described, including downstream receiving system (see Addendum Chapter 4).
56	Summarizes site parameters, natural drainage systems, drainage to and from adjacent properties, and bypass flows.
57	Provides information regarding pollution source controls that are specifically applicable to the site.
Existing Conditions Summary (SWMMWW Volume I, Section 3.1.1 and Section 3.1.7)	
58	Summarizes existing site topography (see Survey Requirements).
59	Summarizes existing site soils (see Soil Report requirements).
Existing Site Hydrology (SWMMWW Volume I, Section 3.1.5)	
60	Describes the existing ground cover, including pervious (trees, shrubs, lawn, etc.), hard surface, and pollution generating areas.
61	Describes the off-site drainage tributary to the project.
62	Describes drains, channels, swales, and other stormwater management facilities within the project site and immediately adjacent.
63	Describes points of exit for existing drainage from the property.
64	Includes summary of existing soil type, groundwater levels, and soil hydraulic conductivity (details to be included in Soils Report section).

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<p>Minimum Requirement No. 4, Off-Site Analysis (Addendum Sections 5.4 and 6.2)</p>	
65	Off-site analysis and documentation in accordance with Addendum Section 6.2.
66	Describes where and how stormwater runoff will leave the site, including the drainage system between the site and the receiving surface waters. Provides information on pipe sizes, channel characteristics, and drainage structures. Describes emergency services located along the flow path (e.g., fire/police stations, hospitals). Describes environmentally sensitive areas, such as wetlands, etc.
67	Includes analysis of potential off-site impacts of stormwater discharges downstream from the site to the receiving water (or one-quarter mile, whichever is less).
68	Describes upstream drainage tributary to the project, to a point beyond any backwater effects caused by the project.
69	Documents field-inspection of all existing stormwater drainage systems downstream; describes any known historical drainage problems such as flooding, erosion, etc.; and includes determination of whether the capacity of the drainage system(s) is adequate to handle the existing flows, flows generated by the proposed project, and any overflow.
70	Existing and potential impacts analysis includes but is not limited to: <ul style="list-style-type: none"> • Conveyance system capacity issues • Flooding or bank overtopping • Upland erosion impacts, including slope stability and landslide hazards • Stream channel erosion (at the outfall location and to the downstream limit of analysis) • Violations of surface water quality standards as identified in a Basin Plan or a TMDL/Water Cleanup Plan (e.g., for Lake Ballinger)
71	For each existing or potential problem, documents: the magnitude of damage caused by the problem, the general frequency and duration, current mitigation of the problem (if any), the likely or possible cause of the problem, and whether the project is likely to aggravate the problem or create a new one.
72	Identifies whether the project is within any other critical areas or their buffers as defined in ECDC, and whether any additional requirements apply.
73	All areas pertinent to the analyses such as site boundaries, study area boundaries, streets and prominent features, downstream flow path, potential/existing problems, etc. are keyed to features shown on the project map/drawings.
74	Quantitative analysis provided (if required by the City). May include calculations and/or modeling analyses of on-site and off-site water quality, erosion, slope stability, and other impacts that may be caused or aggravated by a proposed project. Measures for preventing impacts and for not aggravating existing impacts are also identified.

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Developed Site Hydrology (SWMMWW Volume I, Section 3.1.5)	
Summary Section	
75	Provides a brief description of the development project (type, size, location), treatment, conveyance, and disposal/discharge (types, sizes, and locations).
76	Describes the permit for which the applicant is applying, address and legal description of property, parcel number, property zoning, etc.
77	Describes other permits required (HPA, USACE Section 404 Permit, wetlands, etc.) and presents status.
78	Includes tabulation of the following by threshold discharge area: <ul style="list-style-type: none"> • Current and proposed hard surfaces • New and replaced pollution generating pervious, impervious, and hard surfaces • Effective impervious surfaces • Existing unmanaged hard surfaces that will remain after project completion • Disturbed pervious (such as landscaped areas) • Converted vegetation areas • Undisturbed areas • Additions of hard surfaces
79	Describes environmentally sensitive areas, such as wetlands.
80	Describes proximity to structures, property lines, on-site structures, sewers, basements, bulkheads, and underground storage tanks.
81	Identifies which of the minimum requirements apply to the project, and how they are being addressed.
82	Includes justification for those minimum requirements that do not apply.
83	Developed threshold discharge areas and flow routing shown on the Site Map are cross-referenced to computer input screens and printouts or calculation sheets.
Performance Standards and Goals	
84	If treatment facilities are proposed, provides a listing of the water quality menus used. (Note that phosphorus treatment is required for projects that drain to Hall Creek or Lake Ballinger.)
85	If flow control facilities are proposed, provides confirmation of the flow control standard being achieved.
86	If on-site stormwater management BMPs are proposed, indicates whether the project used the mandatory list option, or the LID performance standard option, and completes documentation demonstrating compliance with either approach.
87	For projects that collect runoff from five or more parking spaces (but are not zoned SFR), indicates that floatable controls are installed in catch basins.
88	Describes the stormwater BMPs and conveyance systems.
89	Describes the detention system, outlet works, and spillways.

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90	Discusses vegetation establishment and management plan for conveyance and detention systems.
91	Includes complete engineering calculations for all facilities, including hydrologic modeling analyses and documentation (preferably in an appendix).
	Low Impact Development Features
92	For Minimum Requirement No. 5, includes project narrative describing how the project will fulfill the requirement for on-site management of stormwater to the extent feasible.
93	For Minimum Requirement No. 5, includes total area of vegetation retained.
94	For projects using the list option for Minimum Requirement No. 5, includes an explanation and documentation (including citation of site conditions is identified in a Soils Report) for any determination that an on-site stormwater management BMP was considered infeasible for the site. Information obtained and documented is used to substantiate any BMP infeasibility determinations. (See Addendum Appendix A: Infeasibility Criteria.)
95	For Minimum Requirement No. 5, includes areas of disturbed soils to be amended. (Note: All lawn and landscaped areas are to meet requirements of soil preservation and amendment [see Addendum Checklist 7: Post-Construction Soil Quality and Depth]. Use of compost is one way to meet the requirement).
96	For Minimum Requirement No. 5, describes retained trees and newly planted trees for which impervious reduction credits are claimed.
97	Documents that at least 25 percent of any existing hard surfaces that do not drain to an approved stormwater management facility and that will remain after the project use on-site stormwater management BMPs to manage those existing hard surfaces. (If the 25 percent minimum is met, projects are not required to evaluate BMPs in priority order or document infeasibility for these existing surfaces.)
98	Provides description/tabulation of managed and unmanaged surfaces. (Note that per Addendum Section 5.5, if a project cannot manage 100 percent of a given surface with the first feasible BMP, a second BMP may be required to manage the remaining unmanaged area. For example, where a roof surface drains to multiple downspouts around the perimeter of the structure, it is generally insufficient to only manage runoff that drains to a single downspout and to leave the remaining downspouts unmanaged.)
	Flow Control, Water Quality Systems, and Conveyance
99	Provides calculations for the project's stormwater storage, treatment, and conveyance system components. All relevant work/calculations meet requirements.
100	If hydrologic modeling is required, the project engineer uses an approved continuous simulation runoff model and documents modeling methods, assumptions, parameters, data sources (e.g., required Puget East long-term precipitation time series), and all other relevant information to the analysis. If model parameters are used that are outside the standards of practice, or if parameters are different than those standards, justification is provided for the parameters.

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101	If distributed bioretention areas and/or infiltration below pollution-generating hard surfaces are used to help meet treatment requirements, details to confirm accurate representation in the runoff model are provided.
102	Projects taking an impervious surface reduction credit for newly planted or retained trees provide those calculations.
103	Projects using full dispersion or downspout infiltration BMPs provide information to confirm conformance with design requirements that allow removal of the associated drainage areas from computer model input.
104	For Minimum Requirement No. 6, documents that the summation of volumes and the volume treated through a centralized, conventional treatment system must meet or exceed 91 percent of the total stormwater runoff file. This sum of volumes must include: Stormwater that has infiltrated through a bioretention area, and stormwater that has infiltrated below pollution-generating hard surfaces (e.g., permeable pavement) through adequate soils. Stormwater that passes through a properly sized treatment facility. Note that stormwater that is re-collected below a bioretention area and routed to a centralized treatment facility should not be counted twice. Subtraction of any stormwater that does not receive treatment due to bypass of, or overflow from a treatment facility or a bioretention area (if the overflow is not subsequently routed to a treatment facility).
105	Includes copies of all calculations for existing and proposed capacity of channels, culverts, drains, gutters, etc.
106	Describes capacities, design flows, and velocities in each pipe/reach.
107	Describes required materials or specifications for the design (e.g., rock lining for channels when velocity is exceeded, high density polyethylene pipe needed for steep slope).
	Special Reports and Studies (SWMMWW Volume I, Section 3.1.7)
108	Includes any special reports and studies conducted to prepare the Stormwater Site Plan (e.g., Soils Report).
	Soils Report (SWMMWW Volume I, Sections 3.1.1 and 3.3.5)
109	For all sites utilizing infiltration for stormwater management, a soils report is prepared that is stamped by a professional soil scientist certified by the Soil Science Society of America (or equivalent program), professional engineer licensed in the State of Washington in civil engineering, geologist, hydrogeologist, or licensed engineering geologist registered in the State of Washington.
110	Meets the specific infiltration rate (Ksat) testing and documentation requirements AND demonstrates compliance with applicable design requirements for all site-specific BMPs, e.g., testing for hydraulic restriction layers (see Addendum Checklist 4: Methods for Determining Infiltration Rates; Addendum Checklist 5: Field and Design Procedures for Bioretention, Permeable Pavement, Rain Gardens, and Downspout Infiltration Systems; and Addendum Checklist 6: Field and Design Procedures for Infiltration Trenches and Basins).

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111	<p>Soils Report includes the following:</p> <ul style="list-style-type: none"> • Topography within 500 feet of the proposed facility • Depth to hydraulic restriction layer • Detailed soil logs (see below) • Visual grain size analysis • Grain-size distribution (required if using the grain size analysis method to estimate infiltration rates) • Textural class • Percent clay content (include type of clay, if known) • Cation exchange capacity • Color/ mottling • Variations and nature of stratification
112	<p>Detailed logs for each test pit or hole were prepared, along with a map showing the locations of the test pits or holes. Logs include:</p> <ul style="list-style-type: none"> • Depth of log • Soil description • Depth to groundwater • Evidence of seasonal high groundwater elevation • Existing ground surface elevation • Proposed basin bottom elevation • Presence of stratification that may impact the infiltration design
113	Includes a description of local site geology, including soil or rock units likely to be encountered at soil sampling depths.
114	Includes a detailed documentation of the design infiltration rate determination.
115	States whether location is suitable for infiltration and recommends a design infiltration rate.
116	If infiltration for treatment is proposed, includes the results of the soil suitability criteria (SSC) testing per the SWMMWW Volume III, Section 3.3.7 (summarized in Addendum Checklist 6: Procedures for Infiltration Basins and Trenches).
117	If on-site infiltration may result in shallow lateral flow (interflow), the conveyance and possible locations where that interflow may re-emerge were assessed by a professional engineer, geologist, hydrogeologist, or engineering geologist registered in the State of Washington.
<p>CONSTRUCTION SWPPP REPORT (SWMMWW Volume I, Section 3.1.6 and Volume II, Chapter 3)</p>	
118	Refer to Addendum Checklist 3: Construction SWPPP Drawings and Report.

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OPERATION AND MAINTENANCE MANUAL (SWMMWW Volume I, Section 3.1.7)	
119	Prepared for each flow control and treatment facility, including any distributed bioretention facilities that are used to help meet flow control and/or treatment requirements.
120	A map of the project area is included in the manual.
121	Map provides the names of roads that the project connects to.
122	Brief description of the development project, including project type (plat, short plat, commercial center, industrial, etc.) and size (acres, number of lots, linear feet of road, square feet of building, etc.).
123	Describes the stormwater facility and conveyance systems, and how these systems are designed to manage the volume, rate, and quality of stormwater runoff from the project.
124	Identifies the party (or parties) responsible for maintenance and operation of all stormwater structures and BMPs requiring maintenance.
125	Includes detailed list of all stormwater structures and facilities requiring maintenance. For situations where there are split maintenance responsibilities (e.g., private/public), provide a breakdown of the entity responsible for each structure and facility.
126	Narrative description provided of the purpose, function, and maintenance requirements for all stormwater structures and BMPs requiring maintenance.
127	Detailed maintenance checklists for all stormwater structures and BMPs requiring maintenance. Include only those checklist items that are pertinent to the structures and BMPs proposed for the project.
128	Includes listing and location of plant species and their requirements for maintenance, newly planted and retained trees claimed as flow reduction credits.
129	Maintenance requirements address issues including, but not limited to, pest and disease management practices, pruning requirements, irrigation requirements, fertilization requirements, etc.
ESTABLISHMENT OF MAINTENANCE COVENANT (SWMMWW Volume I, Section 3.1.5 and 3.1.7)	
130	Covenant is included for each site/lot that contains stormwater management BMPs (flow control, runoff treatment, and on-site stormwater management BMPs) that will be maintained by a private entity.
131	For on-site stormwater management BMPs, design details, figures, and maintenance instructions for each BMP are attached.
132	A map showing the location of newly planted and retained trees claimed as flow reduction credits is attached.
133	The maintenance covenant is created on a City-approved form and all attachments meet the recording requirements of the Snohomish County Auditor.
134	The covenant is recorded at the Snohomish County Auditor's office and is tied to the parcel numbers that the project is built on.

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135	The covenant includes an 8.5-inch x 11-inch plan view showing the location of on-site stormwater management BMPs relative to structures and property lines, and maintenance instructions for each on-site stormwater management BMP.
136	Covenants are recorded prior to final construction approval for the proposed project.
137	Includes a legal description of the property.
138	Assessor parcel numbers.
139	Project name.
140	Project application/permit number.
141	Identifies parties responsible (including contact information) for maintenance and implementation of pollution source control measures.
142	Includes language stating that the covenant shall run with the land and be binding on all successors and assigns.
143	Requires that the responsible parties maintain the stormwater facilities in accordance with the project Operation and Maintenance Manual.
144	Requires that the responsible parties implement pollution source control measures in the Operation and Maintenance Manual.
145	Requires that the responsible parties keep and maintain a log of maintenance activity that indicates what actions were taken, and that the log be made available for inspection by the City.
146	Prohibits unauthorized modifications, unless approved by the City.
147	Provides for a City approval process and allows modification to the covenant, or to the Operation and Maintenance Manual.
148	Provides for a City process (remedies) for situations where the responsible party fails to perform the required maintenance or fails to implement the pollution source control measures.
149	Provides access authority to the City for purposes of inspection, maintenance, and repair.
150	Provides for reimbursement to the City by the responsible party in the event that the City incurs costs related to maintenance or repair.
151	Includes the location of the approved Stormwater Site Plan.
152	Includes the Operation and Maintenance Manual as an attachment.

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments:



Checklist 3: Construction SWPPP Drawings and Report

Per ECDC 18.30, all Category 1 and 2 projects must comply with Minimum Requirements No. 1 Stormwater Site Plans, which includes preparation of a Construction Stormwater Pollution Prevention Plan (Construction SWPPP) to comply with Minimum Requirement No. 2, Construction Stormwater Pollution Prevention.

Construction SWPPPs shall be prepared in accordance with Chapter 3 of Volume I of the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Edmonds Stormwater Addendum (Addendum). Because the SWMMWW does not include clear itemization of project submittal requirements, the City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30 and the Addendum that are not included in the SWMMWW) are also included in the checklist. For clarity, the checklist headings and subheadings are generally organized according to the SWMMWW structure, though some requirements specific to ECDC 18.30 and the Addendum are included under the SWMMWW headings.

This checklist reflects most, but not necessarily all of the items that will be reviewed 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 review of development work 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. Last, the structure and organization of project submittals can vary depending on the project. The headings outlined below represent the City's preferred organization of submittal information, though variations are acceptable as long as all of the required information is provided in a clear submittal package.

Applicant:

Application #:

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C = Complete	R = Revise (i.e., make corrections)
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IC = Incomplete	
CONSTRUCTION SWPPP NARRATIVE REPORT (SWMMWW Volume II, Section 3.2.1)	
Cover Sheet	
1	Project name.
2	Applicant's name, address, telephone number, and e-mail address.
3	Project engineer's name (if applicable), address telephone number, and e-mail address.
4	Date of submittal.
5	Contact's name, address telephone number, and e-mail address.
6	Contractor's name, address telephone number, and e-mail address, if known.
Project Engineer's Certification	
7	For Category 2 Stormwater Site Plans and Category 1 Stormwater Site Plans with engineered elements, the Construction SWPPP is stamped by a professional engineer licensed in the State of Washington in civil engineering.
8	If required, the SWPPP Report contains a page with the project engineer's seal with the following statement: <i>"I hereby state that this Construction Stormwater Pollution Prevention Plan for _____ (name of project) has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that Pierce County does not and will not assume liability for the sufficiency, suitability, or performance of Construction SWPPP BMPs prepared by me."</i>
Table of Contents	
9	Shows the page number for each section of the report and the appendices.
Certified Erosion and Sediment Control Lead	
10	For project sites that will disturb 1 acre or more and that discharge stormwater to surface waters of the State, a Certified Erosion and Sediment Control Lead (CESCL) is identified in the Construction SWPPP and shall be on site or on-call at all times.
General Information on the Existing Site and Project	
11	Nature and purpose of the construction project.
12	Total size of the area; any increase in existing impervious area; the total area expected to be disturbed by clearing, grading, excavation or other construction activities, including off-site borrow and fill areas; and the volumes of grading cut-and-fill that are proposed.
13	Existing topography, vegetation, and drainage.
14	Any structures or development on the parcel including the area of existing impervious surfaces.
15	Adjacent areas, including streams, lakes, wetlands, residential areas, and roads that might be affected by the construction project.
16	Describes how upstream drainage areas may affect the site.
17	Describes downstream drainage leading from the site to the receiving body of water.

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18	Areas on or adjacent to the site that are classified as critical areas.
19	Critical areas that receive runoff from the site up to one-quarter mile away.
20	Special requirements and provisions for working near or within these areas.
21	Soil on the site, giving such information as soil names, mapping unit, erodibility, ability to settle, permeability, depth, texture, and soil structure.
22	Areas on the site that have potential erosion problems.
Thirteen Elements	
23	Describes how the Construction SWPPP addresses each of the 13 required elements.
24	Type and location of BMPs used to satisfy the required element.
25	If an element is not applicable to a project, a written justification for why it is not necessary.
26	Includes description of construction-phase BMP protection techniques specific to categories of LID BMPs (e.g., infiltration and dispersion) as well as <i>specific</i> LID BMPs (permeable pavement, bioretention areas/rain gardens, and vegetated roofs per Addendum Section 6.1 [related to Element No. 13]).
Construction Phasing	
27	Provides intended sequence and timing of construction activities and any proposed construction phasing (including construction restraints for environmentally sensitive areas). See also the sequencing requirements in Addendum Section 6.1.
28	Includes construction schedule, including the activities that will continue during the wet season and how the transport of sediment from the construction site to receiving waters will be prevented.
Financial/Ownership Responsibilities	
29	Description of ownership and obligations for the project, including financial responsibility for environmental liabilities associated with construction.
Engineering Calculations	
30	All calculations made for the design of such items as sediment ponds, diversions, and waterways, as well as calculations for runoff and stormwater detention design are attached (if applicable).
CONSTRUCTION SWPPP DRAWINGS (SWMMWW Volume II, Section 3.2.2)	
31	Refer to the general Drawing Requirements in SWMMWW Volume I, Chapter 3; Addendum Checklist 1: Category 1 Stormwater Site Plans, and Addendum Checklist 2: Category 2 Stormwater Site Plans.
Vicinity Map	
32	Provides a map with enough detail to identify the location of the construction site, adjacent roads, and receiving waters.
Site Map	
33	Legal description of the property boundaries or an illustration of property lines (including distances) on the drawings.

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34	North arrow.
35	Existing structures and roads.
36	Boundaries and identification of different soil types.
37	Areas of potential erosion problems.
38	Any on-site and adjacent surface waters, critical areas, buffers, flood plain boundaries, and Shoreline Management boundaries.
39	Existing contours and drainage basins and the direction of flow for the different drainage areas.
40	Where feasible, contours extend a minimum of 25 feet beyond property lines and extend sufficiently to depict existing conditions.
41	Final and interim grade contours as appropriate, drainage basins, and the direction of stormwater flow during and upon completion of construction.
42	Areas of soil disturbance, including all areas affected by clearing, grading, and excavation.
43	Locations where stormwater will discharge to surface waters during and upon completion of construction.
44	Existing unique or valuable vegetation and vegetation to be preserved.
45	Cut-and-fill slopes indicating top and bottom of slope catch lines.
46	Total cut-and-fill quantities and the method of disposal for excess material.
48	Stockpile; waste storage; and vehicle storage, maintenance, and washdown areas.
	Temporary and Permanent Conveyance Systems
49	Locations for temporary and permanent swales, interceptor trenches, or ditches.
50	Drainage pipes, ditches, or cut-off trenches associated with erosion and sediment control and stormwater management.
51	Temporary and permanent pipe inverts and minimum slopes and cover.
52	Grades, dimensions, and direction of flow in all ditches and swales, culverts, and pipes.
53	Details for bypassing off-site runoff around disturbed areas.
54	Locations and outlets of any dewatering systems.
	Temporary and Permanent Treatment and Detention BMPs
55	Locations of temporary and permanent stormwater treatment and/or flow control BMPs.
	Temporary and Permanent Erosion and Sediment Control BMPs
56	Shows on the site map and includes details for all structural and nonstructural ESC BMPs (including, but not limited to, silt fences, construction entrances, sedimentation facilities, etc.).
57	Shows on maps and includes details for any construction-phase BMPs or techniques used for LID BMP protection.

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	Other Pollutant BMPs
58	Identifies location of BMPs to be used for the control of pollutants other than sediment. This can include designated concrete washout area, refueling sites, or other BMPs for pollutant control.
	Monitoring Locations
59	Identifies any required water quality sampling locations (sites greater than 1 acre). Sampling stations are located in accordance with applicable permit requirements.
	Standard Notes
60	Notes addressing construction phasing and scheduling are included on the drawings. (Standard Notes are suggested in SWMMWW Appendix II-A.)

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments:



Checklist 4: Methods for Determining Infiltration Rates

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. If infiltration facilities are proposed to meet Minimum Requirement Nos. 5, 6, and/or 7, soil infiltration rates must be measured using approved soil infiltration testing procedures.

Infiltration facilities shall be prepared in accordance with the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), ECDC 18.30, and the requirements in the Edmonds Stormwater Addendum (Addendum). Because the SWMMWW does not always include clear itemization of project procedural and/or submittal requirements, the City of Edmonds developed Appendix B of this Addendum (Methods for Determining Design Infiltration Rates) as well as this accompanying checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30 and the Addendum that are not included in the SWMMWW) are also included in the appendix and checklist.

This checklist reflects most, but not necessarily all, of the items that shall be performed by the project proponent, and documented 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 infiltration evaluation processes 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. Project proponents must review Appendix B in detail to identify complete infiltration testing requirements. Last, methods and procedures outlined herein can vary depending on the project. The headings outlined below represent the City's recommended process, though variations are acceptable as long as all of the required information is evaluated and documented.

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APPLICATIONS (SWMMWW Volume III, Section 3.3.5)	
Method 1 – Field Testing	
1	<i>Large-Scale Pilot Infiltration Test (PIT) applies to infiltration facilities with drainage areas greater than 1 acre (i.e., projects that are using the “Detailed Method”- see Addendum Checklist 6), and may be used to demonstrate infeasibility of bioretention, permeable pavement, or rain gardens in meeting Minimum Requirement No. 5.</i>
2	<i>Small-Scale Pilot Infiltration Test (PIT) applies to infiltration facilities with drainage areas less than 1 acre (i.e., projects that are using the “Simple Method”- see Addendum Checklist 6), and may be used to demonstrate infeasibility of bioretention, permeable pavement, or rain gardens in meeting Minimum Requirement No. 5.</i>
3	<i>U.S. EPA Falling Head Percolation Test Procedure (as Modified for the City of Edmonds) may only be used for BMP performance verification testing. May not be used for BMP design or to demonstrate infeasibility of bioretention, permeable pavement, or rain gardens in meeting Minimum Requirement No. 5.</i>
Method 2 – Soil Grain Size Analysis	
4	<i>Soil Grain Size Analysis may only be used at project sites that are underlain by soils not consolidated by glacial advance (e.g., recessional outwash soils), and may not be used to demonstrate infeasibility of bioretention, permeable pavement, or rain gardens in meeting Minimum Requirement No. 5.</i>
PROCEDURES (SWMMWW Volume III, Section 3.3.5 and 3.4)	
5	See Addendum Appendix B – Methods for Determining Design Infiltration Rates, as well as Addendum Checklists 5 and 6.
Correction Factor (SWMMWW Volume III, Section 3.3.6)	
6	For application of correction factors for bioretention, permeable pavement, and rain gardens, refer to SWMMWW Volume III, Section 3.4; Addendum Appendix B; and Addendum Checklist 5: Field and Design Procedures for Bioretention, Permeable Pavement, Rain Gardens, and Downspout Infiltration Systems for application of correction factors.

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Measurement of the Percolation Rate	
45	Except for sandy soils, make percolation rate measurements 15 hours but no more than 30 hours after the soaking period began.
46	Adjust the water level to 6 inches above the gravel (or 8 inches above the bottom of the hole). At no time during the test is the water level allowed to rise more than 6 inches above the gravel.
47	Immediately after adjustment, measure the water level from a fixed reference point to the nearest 1/16th inch at 30-minute intervals. Continue the test until two successive water level drops do not vary by more than 1/16 inch within a 90-minute period. At least three measurements are to be made.
48	After each measurement, readjust the water level to the 6-inch level.
49	Use the last water level drop to calculate the percolation rate.
50	In sandy soils or soils in which the first 6 inches of water added after the soaking period seeps away in less than 30 minutes, make water level measurements at 10-minute intervals for a 1-hour period. Use the last water level drop to calculate the percolation rate.
Calculate the Design Infiltration Rate	
51	Calculate the percolation rate for each test site by dividing the time interval used between measurements by the magnitude of the last water level drop. This calculation results in a percolation rate in minutes/inch. To determine the percolation rate for the area, average the rates obtained from each hole. (If tests in the area vary by more than 20 minutes/inch, variations in soil type are indicated. Under these circumstances, percolation rates should not be averaged.)
52	To compute the design infiltration rate ($K_{sat_{design}}$), adjust the final percolation rates by the appropriate correction factors outlined above.
Method 3 – Soil Grain Analysis (SWMMWW Volume III, Section 3.3.6)	
53	For infiltration basins and trenches, perform the grain size analysis for each defined layer below the infiltration facility to a depth below the facility bottom of 2.5 times the maximum depth of water in the pond, but not less than 10 feet.
54	For large infiltration facilities serving drainage areas of 10 acres or more, soil grain size analyses are performed on layers up to 50 feet deep (or no more than 10 feet below the water table).
55	For bioretention areas, each defined layer is analyzed below the top of the final bioretention area subgrade to a depth of at least 3 times the maximum ponding depth, but not less than 3 feet (1 meter).
56	For permeable pavement, each defined layer is analyzed below the top of the final subgrade to a depth of at least 3 times the maximum ponding depth within the base (reservoir) course, but not less than 3 feet (1 meter).
57	If the licensed professional conducting the investigation determines that deeper layers will influence the rate of infiltration for the facility, soil layers at greater depths may be considered when assessing the site's hydraulic conductivity characteristics.

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58	<p>Use the following relationship to determine the initial hydraulic conductivity:</p> $\log_{10}(K_{sat}) = -1.57 + 1.90D_{10} + 0.015D_{60} - 0.013D_{90} - 2.08f_{fines}$ <p>Where, D_{10}, D_{60}, and D_{90} are the grain sizes in mm for which 10 percent, 60 percent, and 90 percent of the sample is more fine and f_{fines} is the fraction of the soil (by weight) that passes the US #200 sieve (K_{sat} is in cm/s).</p>
59	Compaction effects must be taken into account when estimating hydraulic conductivity where applicable.

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments:



Checklist 5: Field and Design Procedures for Bioretention, Permeable Pavement, Rain Gardens, and Downspout 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. If bioretention, rain gardens, permeable pavement, and/or downspout infiltration systems are proposed to meet Minimum Requirement Nos. 5, 6, and/or 7, soil infiltration rates must be measured using approved soil infiltration testing procedures. See the Edmonds Stormwater Addendum (Addendum) Appendix B and Checklist 4.

Bioretention, rain gardens, permeable pavement, and downspout infiltration systems 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. Because the SWMMWW does not always include clear itemization of project procedural and/or submittal requirements, the City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30 and the Addendum that are not included in the SWMMWW) are also included in the checklist. For clarity, the checklist headings and subheadings are generally organized according to the SWMMWW structure, though some requirements specific to ECDC 18.30 and the Addendum are included under the SWMMWW headings.

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Application #:

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	<p>BIORETENTION FIELD AND DESIGN PROCEDURES</p>
1	Soils Report meeting the requirements described in the “Soils Report” section of this checklist. The Soils Report shall be included as part of the required Category 1 or 2 Stormwater Site Plan (see also Addendum Checklists 1 and 2).
	<p>Infiltration Rate (SWMMWW Volume III, Section 3.4; Volume V, BMP T7.30; and Addendum Appendix B)</p>
2	Test hole or test pit explorations should be conducted during mid to late in the wet season (December 1 through April 1).
3	Infiltration testing is performed at the anticipated elevation of the top of the native soil beneath the bioretention area (i.e., at the bottom of the excavated area).
4	Small bioretention cells (bioretention areas receiving water from one or two individual lots or <0.25 acre of pavement or other impervious surface): A single small-scale PIT (or soil grain size analysis, if permitted per Addendum Appendix B and Addendum Checklist 4 ¹) is performed at each potential bioretention site.
5	Large bioretention cells (bioretention areas receiving water from three or more lots or 0.25 acre or more of pavement or other impervious surface): A single small-scale PIT (or soil grain size analysis, if permitted per Addendum Appendix B and Addendum Checklist 4 ¹) is performed every 5,000 square feet of bioretention area. If soil characteristics across the site are consistent, a geotechnical professional may recommend a reduction in the number of tests.
6	Bioretention swales or long, narrow bioretention areas (i.e., one following the road right-of-way): A single small-scale PIT (or soil grain size analysis, if permitted per Addendum Appendix B and Addendum Checklist 4 ¹) is performed every 200 linear feet and within each length of road with varying subsurface characteristics. ²
7	A correction factor is applied to the measured Ksat of the subgrade soils (not the imported bioretention soil mix) to estimate its design (long-term) infiltration rate. Correction factors range from 0.33 – 1 (no correction) and are based on the site variability and number of locations tested (CF _v). See also Addendum Appendix B and Addendum Checklist 4.
	<p>Depth to Groundwater (SWMMWW Volume III, Section 3.4)</p>
8	A soil log or over-excavation of the PIT reveals that there is at least 3 feet of vertical clearance from the lowest elevation of the bioretention soil (or any underlying gravel layer) 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: <ul style="list-style-type: none"> • 5,000 square feet of pollution-generating impervious surface (PGIS) • 10,000 square feet of impervious area • 0.75 acres of lawn and landscape
9	A soil log or over-excavation of the PIT reveals that there is at least 1 foot of vertical clearance from the seasonal high groundwater or other impermeable layer for bioretention systems with a contributing area less than the above threshold.

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	<p>Groundwater Mounding Analysis (SWMMWW Volume III, Section 3.4.2)</p> <p><i>Applies to bioretention areas with drainage areas exceeding 1 acre.</i></p>
10	If a single bioretention area serves a drainage area exceeding 1 acre, and has less than 15 feet depth to seasonal high ground water or other low permeability stratum (as measured from the bottom of the infiltration basin or trench), a groundwater mounding analysis is performed. (See also SWMMWW Volume III, Section 3.3.8, Step 10.)
11	Final design infiltration rate determined using an analytical ground water model to investigate the effects of the local hydrologic conditions on facility performance. (Use MODRET or an equivalent subject to approval by the City.)
	<p>RAIN GARDEN FIELD AND DESIGN PROCEDURES (SWMMWW Volume III, Section 3.4)</p>
12	Soils Report meeting the Category 1 Stormwater Site Plan Soils Report requirements described in the “Soils Report” section of this checklist.
	Infiltration Rate
13	Test hole or test pit explorations should be conducted during mid to late in the wet season (December 1 through April 1).
14	A single small-scale PIT (or soil grain size analysis, if permitted per Addendum Appendix B and Addendum Checklist 4 ¹) is performed at each potential rain garden site.
15	Infiltration testing is performed at the anticipated elevation of the top of the native soil beneath the rain garden area (i.e., at the bottom of the excavated area).
	Depth to Groundwater
16	A soil log or over-excavation of the PIT reveals that there is at least 1 foot between the bottom of the lowest elevation of the rain garden soil (or any underlying gravel layer) and the seasonal high groundwater or an underlying impermeable/low permeable layer.
	<p>PERMEABLE PAVEMENT FIELD AND DESIGN PROCEDURES (SWMMWW Volume III, Section 3.4)</p>
17	Soils Report meeting the requirements described in the “Soils Report” section of this checklist. The Soils Report shall be included as part of the required Category 1 or 2 Stormwater Site Plan (see also Addendum Checklists 1 and 2).
	Infiltration Rate
18	Test hole or test pit explorations should be conducted during mid to late in the wet season (December 1 through April 1).
19	Infiltration testing is performed in the soil profile at the estimated bottom elevation of base materials for the permeable pavement. If no base materials (e.g., a pervious concrete sidewalk), the testing is performed at the estimated bottom elevation of the pavement.

<p>Within each blank cell, enter comment codes as follows:</p> <p>C = Complete R = Revise (i.e., make corrections)</p> <p>N/A = Not Applicable M = Missing (i.e., please include)</p> <p>IC = Incomplete</p>	
	Depth to Groundwater
29	Site-specific test indicates there is 12 inches or more of permeable soil from the proposed bottom (final grade) of the infiltration system to the seasonal high groundwater table or other impermeable layer.
	CATEGORY 1 STORMWATER SITE PLAN SOILS REPORT (SWM Volume I, Section 3.1.1; Addendum Chapter 7 and Checklist 1)
30	In support of the requirements of Minimum Requirement No. 5, includes a Soils Report prepared by: a professional soil scientist certified by the Soil Science Society of America (or an equivalent national program); a locally licensed on-site sewage designer; or by other suitably trained persons working under the supervision of a professional engineer, geologist, hydrogeologist, or engineering geologist registered in the State of Washington.
31	Soil surveys, soil test pits, soil borings, or soil grain analyses sufficient to identify underlying soils on the site. Soil testing should occur between December 1 and April 1.
32	Includes the results of saturated hydraulic conductivity (Ksat) testing to assess infiltration capability and the feasibility of rain gardens, bioretention, and permeable pavement.
33	Includes the results of saturated hydraulic conductivity (Ksat) testing to assess infiltration capability and the feasibility of rain gardens, bioretention, and permeable pavement (see Addendum Appendix B and Addendum Checklist 4: Methods for Determining Infiltration Rates).
34	Includes the results of testing for a hydraulic restriction layer (groundwater, soil layer with less than 0.3 in/hr Ksat, bedrock, etc.) under possible sites for a rain garden, bioretention area, or permeable pavement. Testing with a monitoring well or an excavated pit must extend to a depth at least 1 foot below the estimated bottom elevation of a rain garden/bioretention excavation and at least 1 foot below the subgrade surface of a permeable pavement. This analysis should be performed in the winter season (December 21 through March 21). Site historical information and evidence of high groundwater in the soils can also be used.
35	For downspout infiltration systems, identifies the limits of any outwash type soils (i.e., those meeting USDA soil texture classes ranging from coarse sand and cobbles to medium sand) versus other soil types and include an inventory of topsoil depth. Any evidence of high groundwater level, such as mottling, is noted.
	CATEGORY 2 STORMWATER SITE PLAN SOILS REPORT (SWMMWW Volume I, 3.1.1; Addendum Chapter 7 and Checklist 2)
36	The Soils Report is prepared and stamped by a professional soil scientist certified by the Soil Science Society of America (or equivalent program), professional engineer, a licensed geologist, an engineering geologist, or a hydrogeologist registered in the State of Washington.
37	Soils Report prepared meeting the requirements outlined in Addendum Checklist 2, and including BMP-specific information listed below where applicable.

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38	Includes the results of testing for a hydraulic restriction layer (groundwater, soil layer with less than 0.3 in/hr Ksat, bedrock, etc.) under possible sites for a bioretention area or permeable pavement. Testing with a monitoring well or an excavated pit must extend to a depth at least 3 feet below the estimated bottom elevation of a bioretention excavation and at least 1 foot below the subgrade surface of a permeable pavement. This analysis should be performed in the winter season (December 21 through March 21). Site historical information and evidence of high groundwater in the soils can also be used.
39	For downspout infiltration systems, identifies the limits of any outwash type soils (i.e., those meeting USDA soil texture classes ranging from coarse sand and cobbles to medium sand) versus other soil types and include an inventory of topsoil depth.
40	Where required for bioretention (see above), documents of the results of groundwater mounding analyses and the impacts of mounding on the design infiltration rate.
	¹ Small-scale and large-scale PITs are required to determine feasibility of bioretention, permeable pavement, and rain gardens. The Soil Grain Size Analysis methods outlined in SWMMWW Volume III, Section 3.3.6; Addendum Appendix B; and Addendum Checklist 4 may be used to determine infiltration rate of underlying soils (for outwash soils only), but may not be used to determine infeasibility.
	² If the site subsurface characterization, including soil borings across the development site, indicates consistent soil characteristics and depths to seasonal high groundwater conditions, the number of test locations may be reduced to a frequency recommended by a geotechnical professional.

Reviewer: _____

Review Date: _____

Reviewer Phone #: _____

Reviewer Comments:



Checklist 6: Procedures for Infiltration Trenches and Basins

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. If infiltration facilities are proposed to meet Minimum Requirement Nos. 5, 6, and/or 7, soil infiltration rates must be measured using approved soil infiltration testing procedures. See the Edmonds Stormwater Addendum (Addendum) Appendix B and Checklist 4.

Infiltration facilities 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. Because the SWMMWW does not always include clear itemization of project procedural and/or submittal requirements, the City of Edmonds developed the following checklist to aid project proponents and plan reviewers in complying with the applicable SWMMWW requirements. In addition, City-specific requirements (i.e., requirements presented in ECDC 18.30 and the Addendum that are not included in the SWMMWW) are also included in the checklist. For clarity, the checklist headings and subheadings are generally organized according to the SWMMWW structure, though some requirements specific to ECDC 18.30 and the Addendum are included under the SWMMWW headings.

This checklist reflects most, but not necessarily all, of the items that shall be performed by the project proponent, and documented 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 field and design procedures 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. Last, the methods and procedures outlined herein can vary depending on the project. The headings outlined below represent the City's recommended process, though variations are acceptable as long as all of the required information is evaluated and documented.

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IC = Incomplete	
DETERMINE METHOD OF ANALYSIS	
1	Typically use the Simple Method for the following types of sites (subject to City approval): <ul style="list-style-type: none"> • For small facilities serving short plats or commercial developments less than 1 acre of contributing area • High infiltration capacity soils (NRCS [SCS] soil types A or B) • Other infiltration facilities performing successfully at nearby locations • No drinking water wells, steep slopes, or other sensitive features within 500 feet • Low risk of flooding and property damage in the event of clogging or other failure of the infiltration system
2	Typically use the Detailed Method for the following types of sites (subject to City approval): <ul style="list-style-type: none"> • A large contributing drainage area • Low infiltration capacity soils (NRCS [SCS] soil types C or D) • History of unsuccessful infiltration facility performance, or no history of successful infiltration performance at nearby locations • High groundwater levels or depth to low permeability layer less than 10 feet • High risk of flooding in the event of clogging or other failure
STEPS FOR THE DESIGN OF INFILTRATION FACILITIES SIMPLIFIED APPROACH (SWMMWW Volume III, Section 3.3.4) Applies to Infiltration Ponds/Basins, Trenches, Vaults, and Tanks (Note: does not apply to Downspout Full Infiltration Systems)	
Step 1: Select a Location	
3	Location selected based on preliminary surface and sub-surface characterization study (SWMMWW Volume III, Section 3.3.5) and preliminary check of Site Suitability Criteria (SWMMWW Volume III, Section 3.3.7). (See also Step 4.)
Step 2: Estimate Volume of Stormwater	
4	WWHM, MGSFlood, or other approved continuous runoff model is used to generate an influent file to size the infiltration facility. (See also Step 6 for sizing criteria.) Required Puget East 36 long-term precipitation time series is used.
Step 3: Develop Trial Infiltration Facility Geometry (for initial modeling purposes only, see SWMMWW Volume III, Section 3.3.4, Step 3)	
Step 4: Complete More Detailed Site Characterization Study and Consider Site Suitability Criteria	
5	Required information gathered through geotechnical and surface investigations to determine whether infiltration is feasible. (See SWMMWW Volume III, Section 3.3.5 and 3.3.7, and the later portions of this checklist for details.)
Step 5: Determine the Design Infiltration Rate	
6	Test hole or test pit exploration should be conducted between December 1 and April 1. (See also Addendum Checklist 2 for detailed Soils Report requirements that must be considered during the soils testing period.)

Within each blank cell, enter comment codes as follows:	
	C = Complete N/A = Not Applicable IC = Incomplete
	R = Revise (i.e., make corrections) M = Missing (i.e., please include)
32	At sites with shallow groundwater (less than 15 feet from the estimated base of facility) and where groundwater mounding analysis is necessary (drainage area exceeding 1 acre), the thickness of the saturated zone is also determined.
33	Continuous sampling (representative samples from each soil type and/or unit within the infiltration receptor) is conducted to a depth below the base of the infiltration facility of 2.5 times the maximum design ponded water depth, but not less than 10 feet.
34	For large infiltration facilities serving drainage areas of 10 acres or more, soil grain size analysis is performed on layers up to 50 feet deep (or no more than 10 feet below the water table).
35	To estimate infiltration rates, the following minimum number of test pits or test holes are developed (see also Addendum Appendix B): <ul style="list-style-type: none"> • For infiltration basins, one test pit or test hole per 5,000 square feet of basin infiltrating surface (minimum of two per basin) • For infiltration trenches, one test pit or test hole per 200 feet of trench length (minimum of two per trench)
36	If using the soil grain size analysis method to estimate infiltration rate, a minimum of one grain size analysis per soil stratum is conducted in each test hole within 2.5 times the maximum design water depth, but not less than 10 feet.
37	If using the soil grain size analysis method for estimating infiltration rates, lab test results are included.
38	Detailed logs are prepared for each test pit or test hole, as well as a map showing the location of the test pits or test holes. Logs include at a minimum, depth of pit or hole, soil descriptions, depth to water, presence of stratification. (See also Addendum Checklist 2.)
39	For facilities serving a drainage area less than 1 acre, it is established that the depth to groundwater or other hydraulic restriction layer is at least 10 feet below the base of the facility.
40	For facilities serving a drainage area 1 acre or larger, groundwater monitoring wells are installed to locate the groundwater table and establish its gradient, direction of flow, and seasonal variations, considering both confined and unconfined aquifers.
41	A minimum of three groundwater monitoring wells per infiltration facility are installed, unless the highest groundwater level is known to be at least 50 feet below the proposed base of the infiltration facility. Note: one monitoring well may be sufficient if in the assessment of the site professional, the surrounding site conditions indicate that gradient and flow are not critical.
42	Groundwater levels are monitored at the site during at least one wet season (December 1 through April 1), or equivalent site historical groundwater level data is provided.
43	The design infiltration rate is determined using the acceptable methods in Addendum Appendix B and Addendum Checklist 4.

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Soil Testing	
44	A soils report is prepared by a professional soil scientist certified by the Soil Science Society of America (or an equivalent national program); a locally licensed on-site sewage designer; or by other suitably trained persons working under the supervision of a professional engineer licensed in the State of Washington in civil engineering, geologist, hydrogeologist, or licensed engineering geologist registered in the State of Washington.
45	Soils Report is prepared meeting the requirements outlined in Addendum Checklist 2, and including BMP-specific information as required (see items below, as well as the Addendum and other applicable checklists).
46	For infiltration facilities used to provide treatment and flow control, the soil characterization also includes: <ul style="list-style-type: none"> • Cation exchange capacity (CEC) and organic content for each soil type and strata where distinct changes in soil properties occur to a depth below the base of the facility of at least 2.5 times the maximum design water depth, but not less than 6 feet. • For soils with low CEC and organic content, deeper characterization of soils may be required (see SWMMWW Volume III, Section 3.3.7 Site Suitability Criteria).
Infiltration Receptor Characterization	
47	Assesses the ambient groundwater quality (if of concern).
48	Documents volumetric water holding capacity of the infiltration receptor soils.
49	Determines depth to groundwater and to bedrock/impermeable layers.
50	Describes seasonal variation of the groundwater table based on well water levels and observed mottling of soils.
51	Documents existing groundwater flow direction and gradient.
52	Documents approximation of the lateral extent of infiltration receptor.
53	Documents horizontal hydraulic conductivity of the saturated zone.
54	Describes impact of the infiltration rate and proposed added volume from the project site on local groundwater mounding, flow direction, and water table determined by hydrogeologic methods.
55	Conducts a groundwater mounding analysis if required by the City.
Consider Site Suitability Criteria (SWMMWW Volume III, Section 3.3.7)	
56	SSC-1: The proposed design meets the setbacks for infiltration facilities.
57	SSC-3: Provides sufficient pollutant removal upstream of infiltration facilities in high vehicle traffic areas or industrial sites.
58	SSC-4: For infiltration facilities used for treatment, the measured infiltration rate is 9 inches per hour or less, the design infiltration rate is 3 inches per hour or less, and drawdown time is 48 hours or less.

