

Appendix A – On-Site Stormwater Management BMP Infeasibility Criteria

Appendix A – On-Site Stormwater Management BMP Infeasibility Criteria

The following tables summarize infeasibility criteria that can be used to justify not using various on-site stormwater management BMPs for consideration in the List No. 1 or List No. 2 option of Minimum Requirement No. 5. Much of this information is also included under the detailed descriptions of each BMP in the SWMMWW, but is summarized here in this Addendum appendix for additional clarity and efficiency. However, note that this appendix also includes several City-specific infeasibility criteria that are not included in the SWMMWW. Therefore, where any inconsistencies or lack of clarity exists between the SWMMWW and this appendix, the requirements of this appendix shall apply, and project proponents should consult with the City for any clarifications.

If a project is limited by one or more of the infeasibility criteria specified below, but still wishes to use the given BMP, they may propose a functionally equivalent design to the City for review and approval.

Lawn and Landscaped Areas	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Post-Construction Soil Quality and Depth	<ul style="list-style-type: none"> • Lawn and landscape area is on till slopes greater than 33 percent.

Roofs	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Full Dispersion	<ul style="list-style-type: none"> • Where the dispersion area is within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA). • The flowpath or dispersal area is 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. • The slope of the flowpath or dispersal area is steeper than 15 percent for any 20-foot reach of the flowpath, or steeper than 33 percent if a level spreader is used upstream and vegetation is established. • The flowpath or dispersal area is 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). • A 65 to 10 ratio of forested or native vegetation area to impervious area cannot be achieved. • A minimum forested or native vegetation flowpath length of 100 feet (25 feet for sheet flow from a nonnative pervious surface) cannot be achieved.

Roofs (continued)	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Full Dispersion (continued)	<ul style="list-style-type: none"> • The flow path cannot be located on site or in a reserved offsite tract or easement area. • The flowpath cannot be located between the dispersion device and any downstream drainage feature such as a pipe, ditch, stream, river, pond, lake, or wetland. • Flowpaths for adjacent dispersion devices cannot be sufficiently spaced to prevent overlap of flows in the flowpath areas. • For sites with onsite or adjacent septic systems, the discharge point must be 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. • The dispersion area is within the buffer of a Category 1 or Category 2 wetland. • The dispersion area is within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer. • The dispersion of runoff would create flooding or erosion impacts.
Downspout Full Infiltration Systems	<ul style="list-style-type: none"> • Where the infiltration system is within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA). • 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. • 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). • The lot(s) or site does not have outwash or loam soils. • There is not at least 3 feet or more of permeable soil from the proposed final grade to the seasonal high groundwater table or other impermeable layer. • There is not 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. • Within 5 feet from any property lines and easements. • If the contributing area is less than 5,000 square feet, within 5 feet from a structure without a basement and 10 feet for a structure with a basement. • If the contributing area is greater than or equal to 5,000 square feet, within a 1Horizontal:1Vertical 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.)

Roofs (continued)	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Downspout Full Infiltration Systems (continued)	<ul style="list-style-type: none"> • For sites with onsite or adjacent septic systems, the discharge point must be 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. • If placed in fill material, the measured infiltration rate is less than 8 inches per hour. • If placed under pavement, overflow cannot be sited at least 1 foot below the pavement (i.e., to prevent saturation of the pavement if system fails). • Within the buffer of a Category 1 or Category 2 wetland. • Within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
Bioretention or Rain Gardens	<p>Note: Criteria with setback distances are as measured from the bottom edge of the bioretention soil mix.</p> <p>Citation of any of the following infeasibility criteria must be based on an evaluation of site-specific conditions and a written recommendation from an appropriate licensed professional (e.g., engineer, geologist, hydrogeologist):</p> <ul style="list-style-type: none"> • Where professional geotechnical evaluation recommends infiltration not be used due to reasonable concerns about erosion, slope failure, or downgradient flooding. • Where the only area available for siting would threaten the safety or reliability of pre-existing underground utilities, pre-existing underground storage tanks, pre-existing structures, or pre-existing road or parking lot surfaces. • Where the only area available for siting does not allow for a safe overflow pathway to stormwater drainage system or private storm sewer system. • Where there is a lack of usable space for bioretention/rain garden areas at development sites, or where there is insufficient space within the existing public right-of-way on public road projects. • Where infiltrating water would threaten shoreline structures such as bulkheads. <p>The following criteria can be cited as reasons for infeasibility without further justification (though some require professional services to make the observation):</p> <ul style="list-style-type: none"> • Where the system is within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA). • 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.

Roofs (continued)	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
<p>Bioretention or Rain Gardens (continued)</p>	<ul style="list-style-type: none"> • 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). • Where they are not compatible with surrounding drainage system as determined by the City (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning bioretention/rain garden area). • Where the site cannot be reasonably designed to locate bioretention/rain garden areas on slopes less than 8 percent. • Properties with known soil or groundwater contamination (typically federal Superfund sites or state cleanup sites under the Model Toxics Control Act [MTCA]): <ul style="list-style-type: none"> ○ 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. ○ Wherever surface soils have been found to be contaminated unless those soils are removed within 10 horizontal feet from the infiltration area. ○ 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. • For sites with onsite or adjacent septic systems, the discharge point must be 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. • 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. 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. • 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.

Roofs (continued)	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Bioretention or Rain Gardens (continued)	<ul style="list-style-type: none"> • Where field testing indicates potential bioretention/rain garden sites have a measured (a.k.a., initial) native soil saturated hydraulic conductivity less than 0.30 inches per hour. A small-scale or large-scale PIT in accordance with Appendix B shall be used to demonstrate infeasibility. If the measured native soil infiltration rate is less than 0.30 in/hour, bioretention/rain garden BMPs are not required to be evaluated as an option in List No. 1 or List No. 2. In these slow draining soils, a bioretention area with an underdrain may be used to treat pollution-generating surfaces to help meet Minimum Requirement No. 6. If the underdrain is elevated within a base course of gravel, it will also provide some modest flow reduction benefit that will help achieve Minimum Requirement No. 7. • Where the minimum vertical separation of 3 feet to the seasonal high groundwater elevation or other impermeable layer would not be achieved below bioretention that would serve a drainage area that exceeds the following thresholds (and cannot reasonably be broken down into amounts smaller than indicated): <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. • Where the minimum vertical separation of 1 foot to the seasonal high groundwater or other impermeable layer would not be achieved below bioretention that would serve a drainage area less than the above thresholds. • If the contributing area is less than 5,000 square feet, within 5 feet from a structure without a basement and 10 feet for a structure with a basement. • If the contributing area is greater than or equal to 5,000 square feet, within a 1Horizontal:1Vertical 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.) • Within 5 feet from any property lines and easements. • Within the buffer of a Category 1 or Category 2 wetland. • Within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
Downspout Dispersion Systems	<ul style="list-style-type: none"> • Where dispersion area is within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA). • 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. • For splashblocks, a vegetated flowpath at least 50 feet in length from the downspout to the downstream property line, structure, stream, wetland, slope over 15 percent (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system), or other impervious surface is not feasible.

Roofs (continued)	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Downspout Dispersion Systems (continued)	<ul style="list-style-type: none"> • For trenches, a vegetated flowpath of at least 25 feet in between the outlet of the trench and any property line, structure, stream, wetland, or impervious surface is not feasible. A minimum vegetated flowpath of at least 50 feet between the outlet of the trench and any slope steeper than 15 percent is not feasible (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system). • For trenches, a trench width of at least 10 feet is not feasible. • Flowpaths for adjacent dispersion devices cannot be sufficiently spaced to prevent overlap of flows in the flowpath areas. • For trenches within 5 feet from any property lines and easements. • For sites with onsite or adjacent septic systems, the discharge point must be 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. • Within the buffer of a Category 1 or Category 2 wetland. • Within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
Perforated Stub-Out Connections	<ul style="list-style-type: none"> • Where the system is within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA). • 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. • 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). • There is not at least 1 foot of permeable soil from the proposed bottom of the perforated stub-out connection trench to the highest estimated groundwater table or other impermeable layer. • The only location available for the perforated stub-out connection is under impervious or heavily compacted soils. • For sites with onsite or adjacent septic systems, the discharge point must be 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. • Within the buffer of a Category 1 or Category 2 wetland. • Within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.

Roofs (continued)	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Detention Vaults and Pipes	<p>Subject to review and approval by the City; infeasibility may be determined when a project meets any of the following infeasibility criteria:</p> <ul style="list-style-type: none"> • Where the downstream analysis in Minimum Requirement No. 4, or available City data, indicate that peak flow control from the site is not beneficial. • Where there is less than 1,000 square feet of contributing site impervious surfaces that are not proposed to be managed by other On-Site Stormwater Management BMPs. (This includes combining of areas from multiple types of surfaces listed under the list options for Minimum Requirement No. 5, e.g., roofs and other hard surfaces.) • Where there is not a downstream drainage system that allows for connection to the City storm system or an appropriate dispersion and overflow path.

Other Hard Surfaces	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Full Dispersion	<ul style="list-style-type: none"> • See Full Dispersion under “Roofs” section above.
Permeable Pavement	<p>Citation of any of the following infeasibility criteria must be based on an evaluation of site-specific conditions and a written recommendation from an appropriate licensed professional (e.g., engineer, geologist, hydrogeologist):</p> <ul style="list-style-type: none"> • Where professional geotechnical evaluation recommends infiltration not be used due to reasonable concerns about erosion, slope failure, or downgradient flooding. • Where infiltrating and ponded water below the new permeable pavement area would compromise adjacent impervious pavements. • Where infiltrating water below a new permeable pavement area would threaten existing below grade basements. • Where infiltrating water would threaten shoreline structures such as bulkheads. • Down slope of steep, erosion prone areas that are likely to deliver sediment. • Where fill soils are used that can become unstable when saturated. • Excessively steep slopes where water within the aggregate base layer or at the subgrade surface cannot be controlled by detention structures and may cause erosion and structural failure, or where surface runoff velocities may preclude adequate infiltration at the pavement surface. • Where permeable pavements cannot provide sufficient strength to support heavy loads at industrial facilities such as ports. • Where installation of permeable pavement would threaten the safety or reliability of pre-existing underground utilities, pre-existing underground storage tanks, or pre-existing road subgrades.

Other Hard Surfaces (continued)	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Permeable Pavement (continued)	<p>The following criteria can be cited as reasons for infeasibility without further justification (though some require professional services to make the observation):</p> <ul style="list-style-type: none"> • Where the permeable pavement is within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA). • 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. • 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). • For sites with onsite or adjacent septic systems, the discharge point must be 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. • 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. • At multi-level parking garages, and over culverts and bridges. • Where the site design cannot avoid putting pavement in areas likely to have long-term excessive sediment deposition after construction (e.g., construction and landscaping material yards). • Where the site cannot reasonably be designed to have a porous asphalt surface at less than 5 percent slope, or a pervious concrete surface at less than 10 percent slope, or a permeable interlocking concrete pavement surface (where appropriate) at less than 12 percent slope. Grid systems upper slope limit can range from 6 to 12 percent; check with manufacturer and local supplier. • Where the subgrade soils below a pollution-generating permeable pavement (e.g., road or parking lot) do not meet the soil suitability criteria for providing treatment. See soil suitability criteria for treatment in SWMMWW, Volume III, Section 3.3.7. Note: In these instances, the City may approve installation of a 6-inch sand filter layer meeting City specifications for treatment as a condition of construction. • Where underlying soils are unsuitable for supporting traffic loads when saturated. Soils meeting a California Bearing Ratio of 5 percent are considered suitable for residential access roads.

Other Hard Surfaces (continued)	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Permeable Pavement (continued)	<ul style="list-style-type: none"> • Where appropriate field testing indicates soils have a measured (a.k.a., initial) subgrade soil saturated hydraulic conductivity less than 0.3 inches per hour. A small-scale or large-scale PIT in accordance with Appendix B shall be used to demonstrate infeasibility. (Note: In these instances, unless other infeasibility restrictions apply, roads and parking lots may be built with an underdrain, preferably elevated within the base course, if flow control benefits are desired.) • Roads that receive more than very low traffic volumes, and areas having more than very low truck traffic. Roads with a projected average daily traffic volume of 400 vehicles or less are very low volume roads (AASHTO 2001) (U.S. Department of Transportation 2013). Areas with very low truck traffic volumes are roads and other areas not subject to through truck traffic but may receive up to weekly use by utility trucks (e.g., garbage, recycling), daily school bus use, and multiple daily use by pick-up trucks, mail/parcel delivery trucks, and maintenance vehicles. Note: This infeasibility criterion does not extend to sidewalks and other non-traffic bearing surfaces associated with the collector or arterial. • Where replacing existing impervious surfaces unless the existing surface is a non-pollution generating surface over an outwash soil with a saturated hydraulic conductivity of 4 inches per hour or greater. • At sites defined as “high-use sites.” For more information on high-use sites, refer to the Glossary in SWMMWW, Volume I. • In areas with “industrial activity” as identified in 40 CFR 122.26(b)(14). • Where the risk of concentrated pollutant spills is more likely such as gas stations, truck stops, and industrial chemical storage sites. • Where routine, heavy applications of sand occur in frequent snow zones to maintain traction during weeks of snow and ice accumulation. • 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. • Within the buffer of a Category 1 or Category 2 wetland. • Within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
Bioretention or Rain Gardens	<ul style="list-style-type: none"> • See Bioretention or Rain Gardens under “Roofs” section above.
Sheet Flow Dispersion	<ul style="list-style-type: none"> • Where the dispersion area is within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA). • 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.

Other Hard Surfaces (continued)	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Sheet Flow Dispersion (continued)	<ul style="list-style-type: none"> • Where the dispersion area is 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). • Positive drainage for sheet flow runoff cannot be achieved. • Area to be dispersed (e.g., driveway, patio) cannot be graded to have less than a 15 percent slope. • For flat to moderately sloped areas, at least a 10-foot-wide vegetation buffer for dispersion of the adjacent 20 feet of contributing surface cannot be achieved. For variably sloped areas, at least a 25-foot vegetated flowpath between berms cannot be achieved. • The dispersion of runoff would create flooding or erosion impacts. • For sites with onsite or adjacent septic systems, the discharge point must be 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. • The dispersion area is within the buffer of a Category 1 or Category 2 wetland. • The dispersion area is within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
Concentrated Flow Dispersion	<ul style="list-style-type: none"> • Where the dispersion area is within the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA). • 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. • A minimum vegetated flowpath of 50 feet between the discharge point and the top of slopes greater than 15 percent is not feasible (unless a geotechnical assessment and soils report is prepared addressing the potential impact of the proposed system). • A minimum 3-foot length of rock pad and 50-foot flowpath OR a dispersion trench and 25-foot flowpath for every 700 sq. ft. of drainage area (within applicable setbacks) cannot be achieved. • More than 700 square feet drainage area drains to any dispersion device. • The dispersion of runoff would create flooding or erosion impacts. • A minimum vegetated flowpath of 50 feet (if using rock pads) or 25 feet (if using dispersion trenches) between the discharge point and any property line, structure, stream, lake, wetland, or other impervious surface is not feasible.

Other Hard Surfaces (continued)	
BMP	Infeasibility Criteria – This BMP is INFEASIBLE under the following conditions:
Concentrated Flow Dispersion (continued)	<ul style="list-style-type: none"> • For sites with onsite or adjacent septic systems, the discharge point must be 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. • The dispersion area is within the buffer of a Category 1 or Category 2 wetland. • The dispersion area is within the buffer of a Category 3 or Category 4 wetland, except for the outer 25 percent of the buffer.
Detention Vaults and Pipes	<ul style="list-style-type: none"> • See Detention Vaults and Pipes under “Roofs” section above.

