Blaine Standard Residential Storm-Water Plan

Reference: Storm-water Management Manual for Western Washington (2019 Edition)

1. Use:
   1.1. Single Family and Duplex residential new development or redevelopment homes sites with 2000 square feet but less than 5000 sq ft of new plus replaced hard surface area shall comply with minimum requirements #1 through #5 as detailed in this plan.
   1.2. Single Family and Duplex residential new development or redevelopment homes sites with less than with 2000 square feet of new plus replaced hard surface area that have 7000 sq ft or greater of land disturbing activities shall comply with minimum requirements #1 through #5 as detailed in this plan.
   1.3. All new development less than 2,000 sq ft of new plus replaced hard surface area and less than 7,000 sq ft of land disturbing activities shall comply with Minimum Requirement #2 as detailed in this plan.
   1.4. This plan does not apply to new developments over 5000 sq ft or greater of new or redeveloped hard surface.
2. Notes:
   2.1. If an existing stormwater system is already constructed in the area/neighborhood according to an approved Stormwater Plan, the new residence will comply with that plan as designed and approved.
   2.2. If the new construction is in an area with an existing constructed and vested stormwater plan/system and the proposed residential construction exceeds the design hard surface limits per lot of that plan (regardless of hard surface area), a registered engineer will be required to create a plan that mitigates the excess impervious surface and integrates into the existing SW system.
3. Allowable assumptions for this plan:
   3.1. Discharge to a flow-control exempt Receiving Waters per Appendix I-A of the Reference.
   3.2. Discharge through man-made conveyance to receiving waters
   3.3. The City of Blaine has many sections of developed SW systems, a high water table during the rainy season, and many smaller lots. Because of this, on-site treatment, LID, and flow control options are very limited and could cause problems with neighboring lots.

Minimum Requirements:

MR1—Minimum Requirement #1: Preparation of Stormwater Site Plans:

1. This plan shall constitute the plan for all allowable uses detailed in Para 1.

MR2—Minimum Requirement #2: Construction Stormwater Pollution Prevention Plan (SWPPP):

1. In the absence of an independently developed Construction SWPPP, this Blaine Standard Residential Storm-Water Plan shall be specifically called-out and incorporated into the site drawings or building plans.
2. The Construction SWPPP is a guidance-document that provides a path forward as the project develops. BMPs on site must be amended and adjusted to prevent pollutants from leaving the site as construction continues.

3. Seasonal Work Limitations: From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if silt-laden runoff will be prevented from leaving the site through a combination of the following:
   3.1. Site conditions including existing vegetative coverage, slope, soil type and proximity to receiving waters; and
   3.2. Limitations on activities and the extent of disturbed areas; and
   3.3. Proposed erosion and sediment control measures.
4. All sites shall control erosion and prevent sediment and other pollutants from leaving the site during the construction phase of a project.

MR2:E1—Element 1: Preserve Vegetation / Mark Clearing Limits:

1. Before beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.
2. Retain the duff layer, native top soil, and natural vegetation in an undisturbed state to the maximum degree practicable.
3. Plastic, metal, fabric fence, or other physical barriers may be used to mark the clearing limits.
4. If it is not practical to retain the duff layer in place, then stockpile it on site, cover it to prevent erosion, and replace it immediately when you finish disturbing the site.

Suggested BMPs for Element 1:

BMP C101: Preserving Natural Vegetation
BMP C102: Buffer Zones
BMP C103: High-Visibility Fence
BMP C233: Silt Fence

MR2:E2—Element 2: Establish Construction Access:

1. Limit construction vehicle access and exit to one route, if possible.
2. Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking of sediment onto public roads.
3. Locate wheel wash or tire baths on site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.
4. If sediment is tracked off site, clean the affected roadway(s) thoroughly at the end of each day, or more frequently as necessary (for example, during wet weather). Remove sediment from roads by shoveling, sweeping, or picking up and transporting the sediment to a controlled sediment disposal area.
5. Conduct street washing only after sediment is removed in accordance with Item 4 (above).
6. Control street wash wastewater by pumping back on site, or otherwise prevent it from discharging into systems tributary to any neighboring waters.

Suggested BMPs for Element 2

BMP C105: Stabilized Construction Access
BMP C106: Wheel Wash
BMP C107: Construction Road / Parking Area Stabilization

MR2:E3—Element 3: Control Flow Rates

1. Protect properties and waterways downstream of development sites from erosion and the associated discharge of turbid waters due to increases in the velocity and peak volumetric flow rate of stormwater runoff from the project site.
2. Where necessary to comply with Item 1 (above), construct BMPs as one of the first steps in grading. Assure that detention BMPs function properly before constructing site improvements (e.g., impervious surfaces).

3. If permanent infiltration BMPs are used for temporary flow control during construction, protect these BMPs from siltation during the construction phase.

Suggested BMPs for Element 3

BMP C203: Water Bars
BMP C207: Check Dams
BMP C209: Outlet Protection
BMP C235: Wattles
BMP C240: Sediment Trap
BMP C241: Sediment Pond (Temporary)

MR2:E4—Element 4: Install Sediment Controls

1. Design, install, and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants.
2. Construct sediment control BMPs (sediment ponds, traps, filters, etc.) as one of the first steps in grading. These BMPs must be functional before other land disturbing activities take place.
3. Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site.
4. Direct stormwater runoff from disturbed areas through BMP C241: Sediment Pond (Temporary) or other appropriate sediment removal BMP, before the runoff leaves a construction site or before discharge to an infiltration facility. Clean runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must control flow rates per Element 3: Control Flow Rates.
5. Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible.
6. Where feasible, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration.
7. Full stabilization includes concrete or asphalt paving; quarry spalls used as ditch lining; or the use of rolled erosion products, a bonded fiber matrix product, or vegetative cover in a manner that will fully prevent soil erosion.

Suggested BMPs for Element 4

BMP C231: Brush Barrier
BMP C232: Gravel Filter Berm
BMP C233: Silt Fence
BMP C234: Vegetated Strip
BMP C235: Wattles
BMP C240: Sediment Trap
BMP C241: Sediment Pond (Temporary)

MR2:E5—Element 5: Stabilize Soils

1. Stabilize exposed and unworked soils by application of effective BMPs that prevent erosion.
2. Control stormwater volume and velocity within the site to minimize soil erosion.
3. Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion.
4. Soils must not remain exposed and unworked for more than the time periods set forth below to prevent erosion:
   4.1. During the dry season (May 1 - September 30): 7 days
   4.2. During the wet season (October 1 - April 30): 2 days
5. Stabilize soils at the end of the shift before a holiday or weekend.

6. Stabilize soil stockpiles from erosion, protect with sediment trapping measures, where possible, locate away from storm drain inlets, waterways, and drainage channels. Place any stockpiles on the uphill side of a slope and away from trenches.
7. Minimize the amount of soil exposed during construction activity.
8. Minimize the disturbance of steep slopes.
9. Minimize soil compaction and, unless infeasible, preserve topsoil.
10. Soil stabilization BMPs should be appropriate for the time of year, site conditions, estimated duration of use, and potential water quality impacts that stabilization agents may have on downstream waters or ground water.
11. Ensure that gravel base used for stabilization is clean and does not contain fines or sediment.

Suggested BMPs for Element 5

BMP C120: Temporary and Permanent Seeding
BMP C121: Mulching
BMP C122: Nets and Blankets
BMP C123: Plastic Covering
BMP C124: Sodding
BMP C125: Topsoiling/Composting
BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection
BMP C130: Surface Roughening
BMP C131: Gradient Terraces
BMP C140: Dust Control

MR2:E6—Element 6: Protect Slopes

1. Design and construct cut-and-fill slopes in a manner to minimize erosion. Applicable practices include, but are not limited to, reducing continuous length of slope with terracing and diversions, reducing slope steepness, and roughening slope surfaces.
2. Divert off-site stormwater (run-on) or ground water away from slopes and disturbed areas with interceptor dikes, pipes and/or swales.

Suggested BMPs for Element 6

BMP C120: Temporary and Permanent Seeding
BMP C121: Mulching
BMP C122: Nets and Blankets
BMP C123: Plastic Covering
BMP C124: Sodding
BMP C130: Surface Roughening
BMP C131: Gradient Terraces
BMP C200: Interceptor Dike and Swale
BMP C201: Grass-Lined Channels
BMP C203: Water Bars
BMP C204: Pipe Slope Drains
BMP C205: Subsurface Drains
BMP C206: Level Spreader
BMP C207: Check Dams
BMP C208: Triangular Silt Dike (TSD)

MR2:E7—Element 7: Protect Drain Inlets

1. Protect all storm drain inlets made operable during construction so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

2. Clean or remove and replace inlet protection devices when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

Suggested BMPs for Element 7

BMP C220: Inlet Protection

MR2:E8—Element 8: Stabilize Channels and Outlets

1. Design, construct, and stabilize all on-site conveyance channels to prevent erosion.
2. Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream reaches at the outlets of all conveyance systems.

Suggested BMPs for Element 8

BMP C122: Nets and Blankets
BMP C202: Riprap Channel Lining
BMP C207: Check Dams
BMP C209: Outlet Protection

MR2:E9—Element 9: Control Pollutants

1. Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants. The project proponent must:
   - 1.1. Handle and dispose of all pollutants, including waste materials and demolition debris that occur on site in a manner that does not cause contamination of stormwater.
   - 1.2. Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks must include secondary containment.
     - 1.2.1. Secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume contained in the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment.
   - 1.3. Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.
   - 1.4. Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water or to the sanitary sewer.
   - 1.5. Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.
   - 1.6. Assure that washout of concrete trucks is performed off site or in designated concrete washout areas only. Do not wash out concrete truck drums or concrete handling equipment onto the ground, or into storm drains, open ditches, streets, or streams. Washout of small concrete handling equipment may be disposed of in a formed area awaiting concrete where it will not contaminate surface or ground water. Do not dump excess concrete on site, except in designated concrete washout areas. Concrete spillage or concrete discharge directly to ground water or surface waters is prohibited.
   - 1.7. Woody debris may be chopped and spread on site.
   - 1.8. Do not conduct oil changes, hydraulic system drain down, solvent and degreasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into stormwater runoff.
   - 1.9. Clean contaminated surfaces immediately following any discharge or spill incident. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle.

Suggested BMPs for Element 9

BMP C151: Concrete Handling
BMP C152: Sawcutting and Surfacing Pollution Prevention
BMP C153: Material Delivery, Storage, and Containment
BMP C154: Concrete Washout Area
BMP C250: Construction Stormwater Chemical Treatment
BMP C251: Construction Stormwater Filtration

MR2:E10—Element 10: Control Dewatering

1. Discharge foundation, vault, and trench dewatering water, which have similar characteristics to stormwater runoff at the site, into a controlled conveyance system before discharge to BMP C240: Sediment Trap or BMP C241: Sediment Pond (Temporary).
2. Handle highly turbid or otherwise contaminated dewatering water separately from stormwater.
   2.1. Note: Discharging sediment-laden (muddy) water into waters of the State likely constitutes violation of water quality standards for turbidity. The easiest way to avoid discharging muddy water is through infiltration and preserving vegetation.

Suggested BMPs for Element 10

BMP C203: Water Bars
BMP C236: Vegetative Filtration

MR2:E11—Element 11: Maintain BMPs

1. Maintain and repair all temporary and permanent erosion and sediment control BMPs as needed to assure continued performance of their intended function in accordance with BMP specifications.
2. Remove all temporary erosion and sediment control BMPs within 30 days after achieving final site stabilization or after the temporary BMPs are no longer needed.
   2.1. Some temporary erosion and sediment control BMPs are biodegradable and designed to remain in place following construction. BMP C122: Nets and Blankets is an example of a BMP with biodegradable options.

Suggested BMPs for Element 11

BMP C150: Materials on Hand
BMP C160: Certified Erosion and Sediment Control Lead

MR2:E12—Element 12: Manage the Project

1. Inspect, maintain and repair all BMPs as needed to assure continued performance of their intended function.
2. Maintain, update, and implement the Construction SWPPP.
3. The project manager must ensure that the project is built in such a way to comply with all Construction SWPPP Elements, as detailed in this section. Considerations for the project manager include, but are not limited to:
   3.1. construction phasing
   3.2. seasonal work limitations
   3.3. coordination with utilities and other contractors
   3.4. inspection
   3.5. monitoring
   3.6. maintaining an updated construction SWPPP
4. Minimize removing trees and disturbing or compacting native soils within the establishing permitted clearing and grading areas. Show on the site plans and the development site permitted clearing and grading areas and any other areas required to preserve critical or sensitive areas, buffers, native growth protection easements, or tree retention areas as may be required by the building permit.

5. All BMPs must be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections must be conducted by a person knowledgeable in the principles and practices of erosion and sediment control. The person must have the skills to 1) assess the site conditions and construction activities that could impact the quality of stormwater, and 2) assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.
6. Appropriate BMPs or design changes shall be implemented as soon as possible whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate, due to the actual discharge of or potential to discharge any pollutant. The inspector must examine stormwater visually for the presence of suspended sediment, turbidity, discoloration, and oil sheen. They must evaluate the effectiveness of BMPs and determine if it is necessary to install, maintain, or repair BMPs to improve the quality of stormwater discharges. Based on the results of the inspection, construction site operators must immediately correct the problems identified.
7. The Construction SWPPP must be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the Construction SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. Modify the Construction SWPPP as necessary to include additional or modified BMPs designed to correct problems identified.

Suggested BMPs for Element 12

BMP C150: Materials on Hand
BMP C160: Certified Erosion and Sediment Control Lead
BMP C162: Scheduling

MR2:E13—Element 13: Protect Low Impact Development BMPs

1. Based on allowed assumptions with this plan, LID BMPs are required under this plan in the following situations:
   1.1. There is no developed ditch system/SW system to discharge to
   1.2. There would be discharge affecting a neighboring property
2. For all other situations, LID BMPs are highly-encouraged but not mandatory.
3. At a minimum:
   3.1. Protect all LID BMPs from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the LID BMPs. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden Bioretention/Rain Garden soils, and replacing the removed soils with soils meeting the design specification.
   3.2. Maintain the infiltration capabilities of LID BMPs by protecting against compaction by construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.
   3.3. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements or base materials.
   3.4. Permeable pavement fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures in accordance with the reference manual or the manufacturer's procedures.
   3.5. Keep all heavy equipment off existing soils that have been excavated to final grade to retain the infiltration rate of the soils.

Suggested BMPs for Element 13 (if required)

BMP C102: Buffer Zones
BMP C103: High-Visibility Fence
BMP C200: Interceptor Dike and Swale

BMP C201: Grass-Lined Channels
BMP C207: Check Dams
BMP C208: Triangular Silt Dike (TSD)
BMP C231: Brush Barrier
BMP C233: Silt Fence
BMP C234: Vegetated Strip

MR3: Source Control of Pollution

1. Based on allowed assumptions with this plan, Source Control is required under this plan in the following situations:
    1.1.1. There is no developed ditch system/SW system to discharge to
    1.1.2. There would be discharge affecting a neighboring property
2. In other applications covered by this plan, Source Control is considered but rejected.

MR4: Preservation of Natural Drainage Systems and Outfalls

1. Natural drainage patterns shall be maintained, and discharges from the Project Site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the Project Site must not cause a significant adverse impact to downstream receiving waters and downgradient properties.

MR5: On-Site Stormwater Management

1. Based on the allowed assumptions, the following are the requirements for each surface:
    1.1. Lawn and Landscaped Areas BMP T5.13: Post-Construction Soil Quality and Depth
    1.2. Roofs: List 3 BMPs considered and rejected based on assumptions.
    1.3. Other Hard Surfaces: BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion

Figure I-3.1: Flow Chart for Determining Requirements for New Development

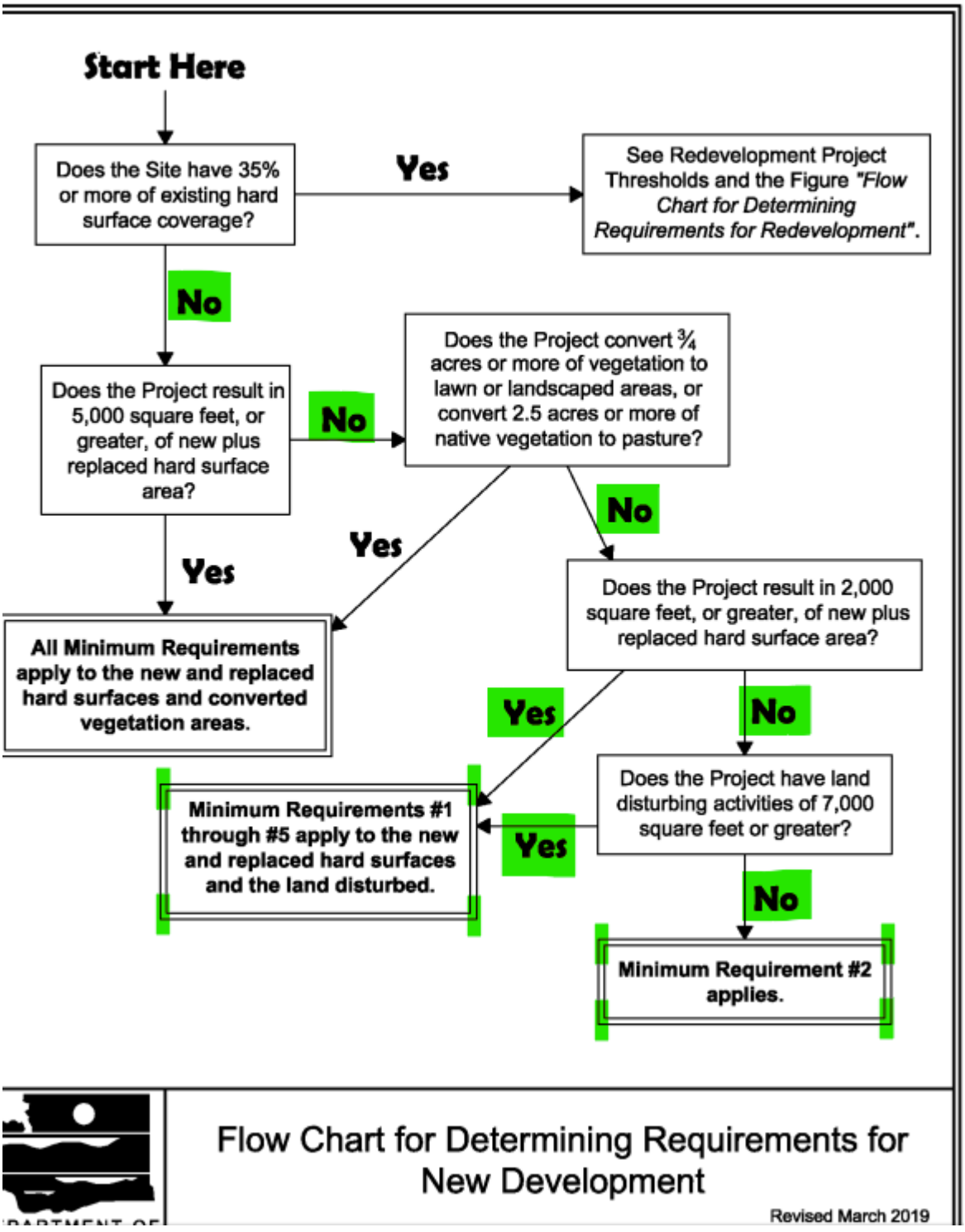

Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment