Stormwater Infeasibility and Best Management Practices (BMPs) Worksheet

This worksheet is designed to select Stormwater mitigation method that is best for your development project. This is not the code, but a guide, please consult **The Stormwater Design Manual** for more information.

These methods are used to manage your stormwater runoff. They are listed in a preferred order, based on the Best Management Practices (BMPs). If an option is infeasible for your project, you will need to indicate the reason from the options provided, then the worksheet will direct you to the next BMP method.

You will first identify the stormwater management method for your Roof in **Step 1,** and second for all other hard surfaces in **Step 2,** including but not limited to: roads, driveways, sidewalks, parking areas, patios and storage areas. **Step 3** will take you to a separate worksheet for lawns, planting beds, and all other landscaped areas.

A step-by-step introductory video on how to complete this worksheet can be found HERE.

Step 1: Roof structure stormwater mitigation method

Full Dispersion and Downspout Full Infiltration are ranked as the first preferred BMP.

What is full dispersion?

Full dispersion routes stormwater runoff from hard surface and cleared areas of commercial, residential, and roadway development projects to areas of the site that are protected in a natural, vegetative cover condition. The natural vegetation coverage is preserved and maintained in accordance with stormwater guidelines. This BMP is primarily intended for new development.

What is downspout full infiltration?

A Downspout full infiltration system is a buried trench designed to infiltrate runoff from roof downspout drains. They are not designed to directly infiltrate runoff from pollutant-generating impervious surfaces. To see if this option is feasible for your parcel use the Simple Infiltration Test Worksheet.

If applicable, select a reason(s) why Full Dispersion and Downspout Full Infiltration, are not feasible.

If **one or more** of the reasons below apply, then **Full Dispersion** is **not** feasible for your project. Please select any and all that apply:

- ☐ I'm choosing Downspout Full Infiltration.
- ☐ A professional geotechnical evaluation recommends against dispersion, due to erosion, slope failure, or flooding concerns.
- ☐ The only available dispersion flow path is within 10 feet uphill of a septic system or drain field.
- ☐ The only available dispersion flow path is within an erosion hazard or landslide hazard area.
- ☐ The only available dispersion flow path is in a critical area, steep slope (over 15%), or setback to a steep slope.

☐ The only available dispersion flow path is within 100 feet uphill of a contaminated site or abandoned landfill.

☐ The minimum 100-foot flow path through native vegetation cannot be met.

☐ A 65 to 10 ratio of native vegetation area to impervious area is unachievable.

If **one or more** of the reasons below apply, **Downspout Full Infiltration** is **not** feasible for your project. Please select any and all that apply.

☐ A professional geotechnical evaluation recommends against infiltration, due to erosion, slope failure, or flooding concerns.

☐ A professional evaluation finds the only area available for infiltration would threaten the safety or reliability of underground utilities, underground storage tanks, structures, road or parking lot surfaces, or subgrades.

☐ A professional evaluation finds the only area available for infiltration does not allow for a safe overflow pathway.

☐ A professional evaluation finds that infiltration would threaten shoreline structures such as bulkheads.

☐ A professional evaluation finds that infiltration would threaten existing below-grade basements.

☐ The site does not have outwash or loam soils.

☐ Horizontal setbacks cannot be met.

☐ There is not at least 1-foot of permeable soil between the bottom of the bioretention area and the seasonal high water table or impermeable layer (for drainage areas less than 5,000 square feet of pollution generating hard surface, less than 10,000 square feet of hard surface, and less than 3/4 acre of pervious surface).

☐ There is not at least 3-feet of permeable soil between the final grade and the seasonal high water table or impermeable layer (for drainage areas over 5,000 square feet of pollution generating hard surface, OR 10,000 square feet of hard surface, OR 3/4 acre of pervious surface).

Based on the above answers, select which method you will be using:

☐ **Full Dispersion** ☐ **Downspout Full Infiltration** ☐ **Both methods are infeasible**

If you selected "Both methods are infeasible", please continue on to Rain Garden.
If you selected Full Dispersion or Downspout Full Infiltration, please skip to Step 2.

Rain Garden is ranked as the second preferred BMP.

Rain Garden - *A rain garden is a shallow planted depression designed to retain or detain stormwater before it is infiltrated or discharged downstream. The size of the rain garden will determine the volume of runoff that can be stored or reduced, as well as the treatment benefits.*

If **one or more** of the reasons below apply, **Rain Garden** is **not** feasible for your project. Please select any and all that apply and continue on to Downspout Dispersion System:

☐ A professional evaluation indicates that bioretention with an underdrain will likely direct infiltrated water to a nutrient sensitive waterbody.

☐ Ground water modeling indicates bioretention will likely alter the movement of pollutants in groundwater.

☐ Horizontal setbacks cannot be met.

☐ There is not at least 1-foot of permeable soil between the bottom of the bioretention area and the seasonal high water table or impermeable layer (for drainage areas less than 5,000 square feet of pollution generating hard surface, and 10,000 square feet of hard surface, and 3/4 acre of pervious surface).

☐ Rain Garden is feasible and is the selected method

Downspout Dispersion System is ranked as the third preferred BMP.

Downspout Dispersion System - *Downspout dispersion systems are splash blocks or gravel filled trenches, which serve to spread roof runoff over vegetated pervious areas. Dispersion attenuates peak flows by slowing the runoff entering into the conveyance system, allowing some infiltration, and providing some water quality benefits.*

If **one or more** of the reasons below apply, then **Downspout Dispersion System** is **not** feasible for your project. Please select any and all that apply and continue on to Perforated Stub-Out Connection:

☐ The flow path cannot be properly vegetated.

☐ A professional geotechnical evaluation recommends against dispersion due to erosion, slope failure, or flooding concerns.

☐ The only available dispersion flow path is within 10 feet uphill of a septic system or drain field.

☐ The only available dispersion flow path is within an erosion hazard or a landslide hazard area.

☐ The only available dispersion flow path is in a critical area, steep slope (over 15%), or setback to a steep slope.

☐ The only available dispersion flow path is within100 feet uphill of a contaminated site or abandoned landfill.

☐ The minimum dispersion trench length cannot be met (10 feet of trench for every 700 square feet of drainage area).

☐ The minimum 25-foot flow path for dispersion trenches cannot be met.

☐ A vegetated flow path of 50 feet between the dispersion trench and a slope over 15% cannot be met.

☐ The minimum 50-foot flow path for splash blocks cannot be met.

☐ The drainage area to any splash block exceeds 700 square feet.

☐ Downspout Dispersion System is feasible and is the selected method

Perforated Stub-Out Connection is ranked as the fourth preferred BMP.

Perforated Stub-Out Connection - *A perforated stub-out connection is a length of perforated pipe within a gravel-filled trench that is placed between roof downspouts and a stub-out to the local drainage system.*

If **one or more** of the reasons below apply, then **Perforated Stub-Out Connection** is **not** feasible for your project. Please select any and all that apply:

☐ A professional geotechnical evaluation recommends against infiltration due to erosion, slope failure, or flooding concerns.

☐ Horizontal setbacks cannot be met.

☐ A professional evaluation finds the only area available for infiltration does not allow for a safe overflow pathway.

☐ A professional evaluation finds the infiltration pathway would intersect a septic drainfield or reserve area.

☐ A professional evaluation finds that infiltration would threaten shoreline structures such as bulkheads.

☐ A professional evaluation finds that infiltration would threaten existing below-grade basements.

☐ There is not a minimum of 1-foot of permeable soil between the bottom of the perforated pipe and the seasonal high water table or impermeable layer.

☐ The only location for the perforated pipe is under impervious or compacted (e.g., driveways, parking areas) surfaces.

☐ A minimum of 10 feet of perforated pipe per 5,000 square foot of contributing roof area is not possible. The only location for the perforated pipe is on slopes of 20% or greater.

☐ A professional evaluation finds the only area available for infiltration would threaten the safety or reliability of underground utilities, underground storage tanks, structures, road or parking lot surfaces, or subgrades.

☐ Perforated Stub-Out Connection is feasible and is the selected method.

If all the options above are infeasible to use for the project, then no other Best Management Practice (BMP) is required to mitigate the stormwater for Rooftop surfaces.

Step 2: All Other Hard Surface stormwater mitigation method - gravel, paved roads, driveways, sidewalks, etc

Full Dispersion is ranked as the first preferred BMP.

Full Dispersion – *Full dispersion routes stormwater runoff from impervious surfaces and cleared areas of commercial, residential and roadway development projects areas of the site that are protected in a natural, vegetative cover condition. The natural vegetation is preserved and maintained in accordance with stormwater guidelines. This BMP is primarily intended for new development.*

If **one or more** of the reasons below apply, **Full Dispersion** is **not** feasible for your project. Please select any and all that apply.

☐ A professional geotechnical evaluation recommends against it, due to erosion, slope failure, or flooding concerns.

☐ The only available dispersion flow path is within 10 feet uphill of a septic system or drain field.

☐ The only available dispersion flow path is within an erosion hazard or landslide hazard area.

☐ The only available dispersion flow path is in a critical area, steep slope (over 15%), or setback to a steep slope.

☐ The only available dispersion flow path is within100 feet uphill of a contaminated site or abandoned landfill.

☐ The minimum 100-foot flow path through native vegetation cannot be met.

☐ A 65 to 10 ratio of native vegetation area to impervious area is unachievable.

☐ Full Dispersion is feasible and is the selected method

Permeable Pavement and Rain Garden are ranked as the second preferred BMP.

Permeable Pavement - *permeable pavement (also known as pervious or porous concrete) is a specific type of pavement with a high porosity that allows rainwater to pass through it into the ground.*

Rain Garden - *A rain garden is a shallow planted depression designed to retain or detain stormwater before it is infiltrated or discharged downstream. The size of the rain garden will determine the volume of runoff that can be stored or reduced, as well as the treatment benefits.*

If **one or more** of the reasons below apply, **Permeable Pavement** is **not** feasible for your project. Please select any and all that apply:

☐ A professional recommends against it due to erosion, slope failure, or flooding concerns.

☐ Areas with steep slopes where water within the aggregate base layer or at the subgrade surface cannot be controlled by detention structures and may cause erosion or structural failure.

☐ Areas with steep slopes where surface runoff velocity may prevent adequate infiltration.

☐ Pavement is within 100 feet of a drinking water well or spring.

☐ Pavement is within 30 feet uphill or 10 feet downhill or a residential septic drainfield.

☐ The seasonal high water table or an impermeable layer would create saturated conditions within a 1-foot of the bottom of the lowest gravel base course.

☐ Subgrade slopes exceed 5%.

☐ Pavement is within 50 feet of the top of the slope greater than 20%.

☐ Pavement is within 10 feet of surface contaminated soils or 100 feet of deep contaminated soils.

☐ Ground water modeling indicates infiltration will likely alter the movement of pollutants in groundwater.

☐ The pavement is in an area likely to have long term sediment deposition after construction (e.g., construction and landscaping material yards).

☐ The pavement is downhill of steep, erosion prone slopes that are likely to deposit sediment on the pavement.

- [ ] The site cannot be designed for porous asphalt surfaces at less than 5% slope, pervious concrete surfaces at less than 10% slope, or permeable paver surfaces at less than 12% slope.
- [ ] The paved surface has an ADT exceeding 400 vehicles per day.
- [ ] The paved surface exceeds "very low truck traffic" (no through truck traffic, weekly utility truck traffic).
- [ ] The surface is subject to industrial activity incompatible with permeable surfaces.
- [ ] The surface is subject to pollutant spills, such as at gas stations, truck stops, and industrial chemical storage sites.
- [ ] Field testing indicates soils have been measured initial infiltration rate less than 0.3 inches per hour.
- [ ] The site is contaminated or an abandoned landfill.
- [ ] The pavement would be within 10 feet of an underground petroleum, chemical, or waste storage tank or underground connecting pipes.

If **one or more** of the reasons below apply, then **Rain Garden** is **not** feasible for your project. Please select any and all that apply.

- [ ] A professional recommends against it, due to erosion, slope failure, or flooding concerns.
- [ ] Ground water modeling indicates bioretention will likely alter the movement of pollutants in groundwater.
- [ ] Horizontal setbacks cannot be met.
- [ ] There is not at least 1-foot of the bioretention area and the seasonal high water table or impermeable layer (for drainage areas less than 5,000 square feet of pollution generating hard surface, and 10,000 square feet of hard surface, and 3/4 acre of pervious surface).
- [ ] There is not at least 3-feet of permeable soil between the final grade and the seasonal high water table or impermeable layer (for drainage areas over 5,000 square feet of pollution generating hard surface, OR 10,000 square feet of hard surface, OR 3/4 acre of pervious surface).
- [ ] Bioretention is not compatible with the surrounding drainage system as determined by Kitsap County DCD (e.g., where the project drains to an existing approved stormwater collection system).
- [ ] The site cannot be reasonably designed to locate bioretention on slopes less than 8%.

Which Stormwater mitigation method will you be using?

- [ ] **Permeable Pavement**
- [ ] **Rain Garden**
- [ ] **Both methods are infeasible**

If you selected "Both methods are infeasible", continue on to Sheet Flow Dispersion or Concentrated Flow Dispersion

If you selected Permeable Pavement or Rain Garden, please skip to Step 3.

Sheet Flow Dispersion or Concentrated Flow Dispersion is ranked as the third preferred BMP.

Sheet Flow Dispersion or Concentrated Flow Dispersion – *Sheet flow dispersion is the simplest method of runoff control. This BMP can be used for any impervious or pervious surface that is graded to avoid concentrating flows. Because flows are already dispersed as they leave the surface, they need only traverse a narrow band of adjacent vegetation for effective attenuation and treatment.*

If **one or more** of the reasons below apply, then **Sheet Flow Dispersion** or **Concentrated Flow Dispersion** is **not** feasible for your project. Please select any and all that apply:

- ☐ A professional geotechnical evaluation recommends against dispersion due to erosion, slope failure, or flooding concerns.
- ☐ The only available dispersion flow path is within 10 feet uphill of a septic system or drain field.
- ☐ The only available dispersion flow path is within an erosion hazard or a landslide hazard area.
- ☐ The only available dispersion flow path is within 100 feet uphill of a contaminated site or abandoned landfill.
- ☐ Horizontal setbacks cannot be met.
- ☐ Dispersion and flow path requirements cannot be met: A minimum 10-foot dispersion trench followed by a 25- foot minimum flow path, or a 3-foot rock pad with a minimum 50-foot flow path. A maximum of 700 square feet of drainage area to any dispersion device.
- ☐ For flat to moderately sloped areas, a minimum 10-foot wide vegetated flow path is not possible.
- ☐ For variably sloped areas, a minimum 25-foot wide vegetated flow path is not possible.
- ☐ The only available dispersion flow path is in a critical area, steep slope (over 15%), or setback to a steep slope.
- ☐ Positive drainage is not possible.
- ☐ The drainage area has a slope of 15% or more.
- ☐ Sheet Flow Dispersion is feasible and is the selected method

If all the options above are infeasible to use for the project, then no other Best Management Practice (BMP) is required to mitigate the stormwater for all other hard surfaces.

Step 3: All Lawns, Planting Beds, and other Landscaped Areas

Soil amendment is required for post construction, soil quality, and depth. The worksheet can be found HERE.