

CHAPTER 5

ON SITE STORMWATER MANAGEMENT

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CHAPTER 5

ON SITE STORMWATER MANAGEMENT

5.0 INTRODUCTION

This chapter describes the methods for meeting Minimum Requirement #5, On Site Stormwater Management. See Kitsap County Code Title 12.18.050 for applicability.

This chapter covers the selection, design, sizing, and construction of best management practices to reduce stormwater runoff and control it as close to where it is generated as possible. Projects shall employ On-site Stormwater Management BMPs to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent practicable without causing flooding or erosion impacts.

A. Objective

To preserve groundwater recharge and maintain the average annual volume of water that infiltrates on a site at or above predevelopment levels, as predicted by the Western Washington Hydrology Model Recharge Module, through the use of inexpensive practices on individual properties to reduce the amount of disruption of the natural hydrologic characteristics of the site.

B. Impervious Surface Mitigation Requirements:

All developments that create greater than 2,000 square feet of new impervious surface shall use either one of the best management practices found in sections 5.1 or 5.2 to serve those impervious surfaces to match the predevelopment condition groundwater recharge.

C. Pollution Generating Pervious Surface Mitigation Requirements:

All major developments sites that create Pollution Generating Pervious Surfaces shall amend the soils per BMP 5.10

All minor developments that have land disturbing activity of 7,000 square feet or greater shall amend the soils under any Pollution Generating Pervious Surfaces per BMP 5.10.

C. Compliance Pathways:

1. Prescriptive – The applicant can apply one of the pre designed and sized best management practices listed within this chapter.
2. Demonstrative – The applicant must show compliance with minimum criteria 5 through modeling their proposed best management practices according to the

guidelines found in this chapter using the Western Washington Hydrology Model and its associated Recharge Module.

Instructions on how to use the Recharge Module are contained in Appendix 5A.

5.1 SMALL SCALE INFILTRATION BMPS

5.1.1 Infiltration Trenches BMPs 5.01 & 5.02

- A. Application:** These BMPs are intended only for use in infiltrating runoff from roof downspout drains or other impervious surfaces that are not subject to vehicular traffic or industrial activity. They are not designed to directly infiltrate runoff from pollutant-generating impervious surfaces. If these BMPs are used to infiltrate runoff from pollutant-generating impervious surfaces, an appropriate water quality BMP from chapter 6 must precede the infiltration BMP.
- B. Flow Credit for Infiltration:** If runoff is infiltrated according to the requirements of this section, the treated area may be discounted from the project area used for sizing stormwater facilities to satisfy Minimum Requirement #7.
- C. Design Criteria for Infiltration Trenches:** Figure 5.1 shows a typical downspout infiltration trench system and Figure 5.2 presents an alternative infiltration trench system for sites with coarse sand and cobble soils.
- D. General**
1. Maximum length of trench must not exceed 100 feet from the inlet sump.
 2. Minimum spacing between trench centerlines must be 6 feet.
 3. Filter fabric must be placed over the drain rock as shown on Figure 5.1 prior to backfilling.
 4. Infiltration trenches may be placed in fill material if the fill is placed and compacted under the direct supervision of a geotechnical engineer or professional civil engineer with geotechnical expertise, and if the measured infiltration rate is at least 8 inches per hour. Trench length in fill must be 60 linear feet per 1,000 square feet of roof area. Infiltration rates can be tested using the methods described in chapter 7.
 5. Infiltration trenches shall not be built on slopes steeper than 20 percent (5:1). A geotechnical analysis and report is required on slopes over 15 percent or if located within 200 feet of the top of steep slope or geologically hazardous areas.
 6. Trenches may be located under pavement if a small yard drain or catch basin with grate cover is placed at the end of the trench pipe such that overflow would occur out of the catch basin at an elevation at least one foot below that of the pavement, and in a location which can accommodate the overflow without creating a significant adverse impact to downhill properties or drainage systems. This is intended to prevent saturation of the pavement.

7. Trench bottom elevation shall be at least 12 inches above the seasonal maximum groundwater elevation or other impermeable layer as determined by at least one hole of at least 5 ft in depth located in the trench footprint.

E. Setbacks

1. All infiltration systems shall be at least 10 feet from any structure, property line, or sensitive area (except steep slopes).
2. All infiltration systems must be at least 200 feet from the top of any sensitive area steep slope. This setback may be reduced based on a geotechnical evaluation, but in no instances may it be less than the required buffer width.
3. For sites with septic systems, infiltration systems must be downgradient of the drainfield unless the site topography clearly prohibits subsurface flows from intersecting the drainfield. Downgradient individual home infiltration systems must be at least 10 feet from any primary or reserve drainfield. See Kitsap County Health District Regulations for more details on setbacks to on-site sewage systems and wells.

F. Infiltration Rate Determination

1. This method is for prescriptive sizing only.
2. Dig a hole at least 5 feet deep in the proposed trench footprint. Take at least one soil sample from the hole, at a depth between 3.5 and 4 ft below the ground surface, to determine groundwater depth as required in section 5.1.1 D.7.
3. Have the soils sample analyzed at a soils testing lab to determine the percentage of soil that is retained by the #200 sieve.
4. Go to table 5.1 and choose the design infiltration rate corresponding to the percentage of soil retained by the #200 sieve.

G. Sizing: Sizing of rock trench is based on an assumed trench width of 2-feet.

1. Prescriptive trenches sized per tables 5.1 or 5.2 meet the infiltration standards of minimum requirement #5 and the flow control standards of minimum requirement #7.
 - a. Based on the design infiltration rate determined from table 5.1, and the mean annual precipitation in inches from figure 5.4, use the appropriate equations found in table 5.2 to size the infiltration trench.
 - b. An example of how to use the table is listed below the table.
2. Demonstrative sizing shall be conducted using the Western Washington Hydrology Model Recharge Module and the infiltration guidelines found in chapter 7.

5.1.2 Rain Garden/Bioretenion Filter Systems BMP 5.03

- A. Application:** Rain Gardens and bioretention filter systems may receive runoff from any surface including pollution generating impervious surfaces or pollution generating pervious surfaces.

Rain Gardens and bioretention filter systems shall be designed according to the guidelines contained in the latest version of the *Low Impact Development (LID) Guidance Manual* and maintained per chapter 9 of this manual.

Prescriptive bioretention filter systems sized using the flow control sizing factors in Table 5.3 meet the infiltration requirements of minimum requirement #5 and the flow control standards of minimum requirement #7. Details on how to use Table 5.3 can be found in the *Low Impact Development (LID) Guidance Manual*.

Demonstrative sizing shall be conducted using the Western Washington Hydrology Model Recharge Module, the infiltration guidelines found in chapter 7, and the *Low Impact Development (LID) Guidance Manual*.

5.1.3 Pervious Pavement Systems BMP 5.04

This category of best management practices includes:

- Pervious Pavement – Hot Mix Asphalt
- Pervious Pavement - Concrete
- Reinforced Grass & Gravel Systems
- Pervious Pavers

Pervious pavement systems shall be designed according to the guidelines contained in the latest version of the *Low Impact Development (LID) Guidance Manual* and maintained according to chapter 9 of this manual.

Prescriptive pervious pavement systems sized using the flow control sizing factors in Table 5.3 meet the infiltration requirements of minimum requirement #5 and the flow control standards of minimum requirement #7. Details on how to use Table 5.3 can be found in the *Low Impact Development (LID) Guidance Manual*.

Demonstrative sizing shall be conducted using the Western Washington Hydrology Model Recharge Module, the infiltration guidelines found in chapter 7, and the *Low Impact Development (LID) Guidance Manual*.

5.2 DISPERSION AND SOIL QUALITY BMPS

5.2.1 Amendment of Disturbed Soils BMP 5.10

All major developments sites that create Pollution Generating Pervious Surfaces shall amend the soils under these surfaces per the guidelines found in the *Low Impact Development (LID) Guidance Manual*.

All minor developments that have land disturbing activity of 7,000 square feet or greater shall amend the soils under any Pollution Generating Pervious Surfaces per the guidelines found in the *Low Impact Development (LID) Guidance Manual*.

5.2.2 Dispersion BMPs (BMPs 5.11 Through 5.14)

Dispersion BMPs shall be designed according to the guidelines contained in the latest version of the *Low Impact Development (LID) Guidance Manual* and maintained per chapter 9 of this manual.

Sites using BMP 5.14 full dispersion as described in the *Low Impact Development (LID) Guidance Manual* meet the infiltration standards of minimum requirement #5 and the flow control standards of minimum requirement #7.

A. BMP Sizing

Demonstrative sizing for all partial dispersion and soil quality BMPs shall be conducted using the Western Washington Hydrology Model Recharge Module, the guidelines found in chapter 7, and the *Low Impact Development (LID) Guidance Manual*.

5.3 SITE DESIGN BMPS

Site Design BMPs shall be designed and maintained according to the guidelines contained in the latest version of the *Low Impact Development (LID) Guidance Manual*.

Demonstrative sizing for all site design BMPs shall be conducted using the Western Washington Hydrology Model Recharge Module, the guidelines found in chapter 7, and the *Low Impact Development (LID) Guidance Manual*.

5.4 WATER REUSE BMPS

Water Reuse BMPs shall be designed and maintained according to the guidelines contained in the latest version of the *Low Impact Development (LID) Guidance Manual*.

Demonstrative sizing for all site design BMPs shall be conducted using the Western Washington Hydrology Model Recharge Module, the guidelines found in chapter 7, and the *Low Impact Development (LID) Guidance Manual*.

5.5 TREE CREDITS

Impervious surface mitigation credits for new and retained trees shall be calculated per the instructions found in the *Low Impact Development (LID) Guidance Manual*.