Insert Community Name

Homeowner Guide for On-Site Stormwater BMP Maintenance and Care

City of Sammamish Washington

Insert Community Name

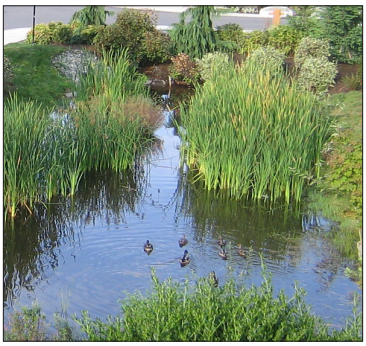
Homeowner Guide for On-Site Stormwater BMP Maintenance and Care

Hello! Welcome to the neighborhood. You recently purchased a home in the City of Sammamish that includes one or more low impact development (LID) best management practices (BMPs). LID BMPs are methods for managing and treating stormwater runoff from developed surfaces that aims to infiltrate the stormwater close to its source, rather than conveying it to pipes or detention facilities. By infiltrating our stormwater close to where it originates, our community is helping to improve the environment, as well as reduce costs of expensive infrastructure the City installs and maintains that drives up monthly stormwater fees passed down to you as a homeowner.

Now that you are the proud owner of these LID BMPs, we want to help you understand how to care for them and ensure that they continue to function to protect all of the wonderful water resources the City of Sammamish has to offer.

On the next page you'll find a site plan of your lot, and locations of various on-site LID BMPs that have been installed to manage the stormwater runoff created by the impervious surfaces on your lot such as your home, driveway, patio and walkways. Bellow are some of the different LID BMPs that could be found on your lot, each of these require some maintenance to keep them functioning as intended. Find the BMPs that are on your lot, then flip to the corresponding page in this brochure for information on how to maintain that BMP. At the end of this brochure, you'll also find information on who to call if your LID BMP is malfunctioning, and helpful resources for where you can get more information on LID.

DISPERSION



INFILTRATION

BIORETENTION

PERMEABLE PAVEMENT

AMENDED SOILS

Insert Property Address

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INDIVIDUAL
SITE PLAN

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Dispersion

WHAT IS DISPERSION?

Dispersion attempts to minimize the hydrologic changes created by impervious surfaces by restoring the natural drainage patterns of sheet flow and infiltration. Dispersion techniques include: splash blocks, rock pads, gravel filled dispersion trenches, and sheet flow. Benefits of managing on-site stormwater runoff by dispersion or infiltration include reducing the discharge volumes and flow rates to off-site facilities thus mitigating and reducing the size and number of formal flow control and treatment facilities.

MAINTAINING YOUR DISPERSION BMP

Dispersion devices must be inspected annually and after major storm events to identify and repair any physical defects. When native soil is exposed or erosion channels are present, the sources of the erosion or concentrated flow need to be identified and mitigated. Concentrated flow can be mitigated by leveling the edge of the pervious area and/or realigning or replenishing the rocks in the dispersion device, such as in rock pads and gravel filled trenches. The following pages will explain what to look for when inspecting your dispersion BMP, and how to maintain it.

Example of a splashblock used to disperse stormwater runoff from a downspout.

Dispersion

Splash Blocks/Rock Pads

Splash blocks are located underneath downspouts and are essential in directing rainwater away from structure foundations. Rock pads used for dispersion are pads of crushed rock, 2 feet wide by 3 feet long by 6 inches deep that may be used to disperse small amounts of concentrated runoff from impervious surfaces. In maintaining your splash block or rock pad, the most important thing is to prevent anything other than clean water from entering the system. Leaves, fir needles, toys, roofing gravel, etc. can clog a system and necessitate repairs or replacement of the system. For the most part, if the water going into your splash block or rock pad goes away and is not pooling around the splash block or rock pad, the system is probably working. The following are some items to check for to keep your system in good working order:

Maintenance DOS:

- ☐ Inspect the general site for any trash or debris that may have accumulated. If present, remove it such that the site is free of any trash or debris that could clog the system.
- ☐ Check to ensure that the splash block is not dislodged from the outlet of the downspout. If so, correctly position the splash block so that it will catch stormwater discharged from the downspout.
- ☐ Check that the water coming off the splash block is not causing erosion to the vegetated area. The vegetated flowpath should appear vegetated, either with lawn or some other soft vegetation. If erosion is occurring that results in a concentrated flow (water discharging to one primary path), replace or restore the soil/vegetation by reseeding or replanting and identify sources or causes of the erosion.
- ☐ Check to make sure that the water from the downspout is discharging from the splash block into the vegetated area and not being misdirected. If so, orient the splash block such that the water is directed into the vegetated flowpath.
- ☐ Check that the rock pad area is 2 feet wide by 3 feet long and 6 inches deep. If not, replenish the rock in the dispersion device.
- ☐ Check to ensure moss or vegetation is not growing in on or through the rock pad. If present, remove vegetation.
- ☐ Check to ensure soil cannot be seen through the rock pad. If so, add additional material so full thickness of rock pad is in place and no soil is visible through rock pad.

Maintenance DON'TS:

- ⃠ DON'T pave over the vegetated flow path area.
- ⃠ DON'T discharge debris to the downspout dispersion system from roof/gutter cleaning practices.

Inspect your roof downspout, downspout extension (if applicable) and splash block/rock pad annually and after large storm events to ensure that it is functioning properly!

Gravel Filled Dispersion Trenches

A gravel dispersion trench is a level trench filled with open graded gravel. Runoff is discharged to the gravel dispersion trench below the ground surface. Runoff flows out of the gravel trench and is dispersed over a designated vegetated flow path. Trenches are filled with ¾-inch to ½-inch washed rock, and must be placed at least 10 feet from any building. A simple 10-foot-long trench must be at least 2-feet wide by 18 inches deep.

Maintenance DOS:

- ☐ Inspect the site for any trash or debris that could end up in the dispersion trench. If present, remove it so that no trash or debris that could get into the dispersion trench can be found.
- ☐ Check the inlet pipe that water flows from catch basin or drain and into the trench to ensure that the entrance is not blocked due to sediment, trash or debris.
- ☐ Check to ensure water flows freely through the pipe(s) and that vegetation/roots do not reduce the movement. If water does not flow freely, the pipe may be clogged.
- ☐ Check to ensure no sediment or other materials inhibit the movement of water through the pipe(s). Water should not exit the pipe at any other point than the outlet to the trench. If water is seeping out of other points of the pipe or at pipe joints, maintenance will need to be performed.
- ☐ Check the trench to ensure that stormwater flows spread evenly into the vegetated path. During a storm event, water should sheet flow at the end of the trench into the vegetated path.

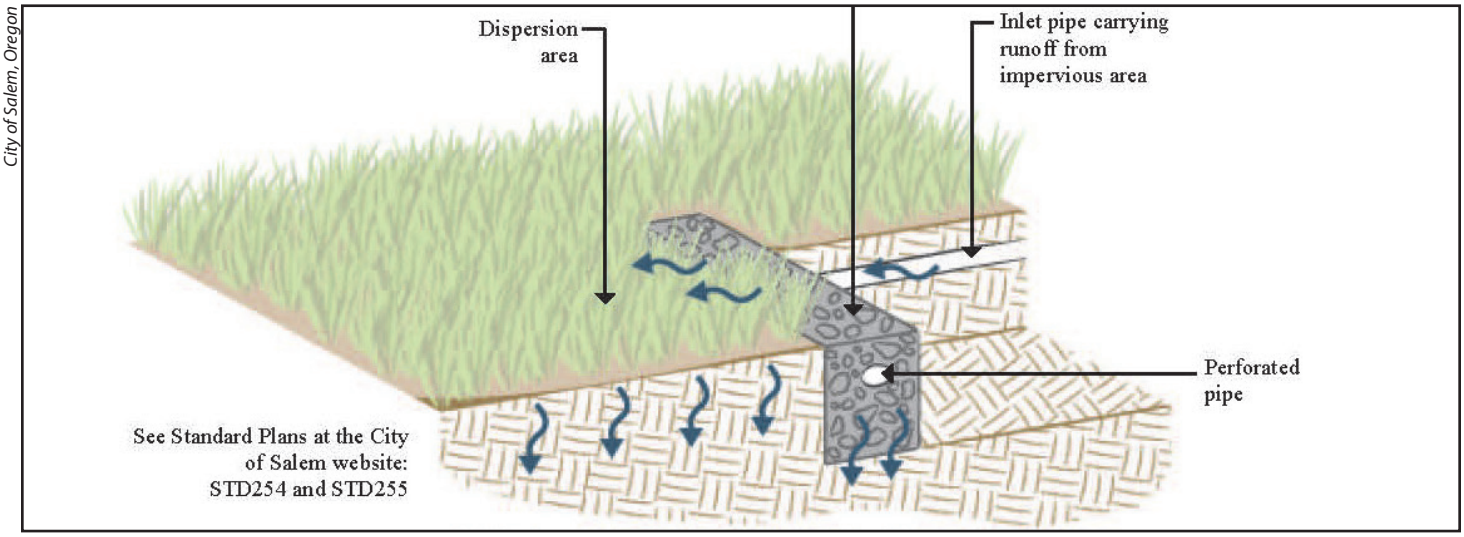
Maintenance DON'TS:

- ⃠ DON'T pave over the vegetated flow path area or gravel dispersion trench.
- ⃠ DON'T remove gravel from dispersion trench.

Inspect your gravel dispersion trench and system annually and after large storm events to ensure that it is functioning properly!

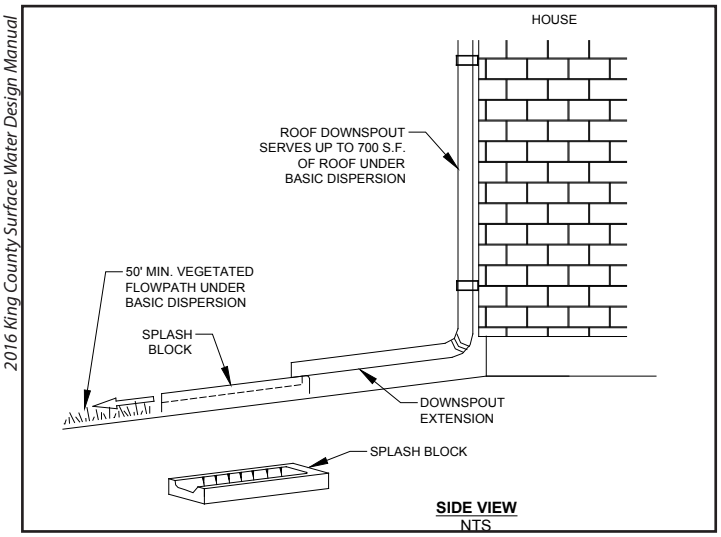
Dispersion

City of Salem, Oregon



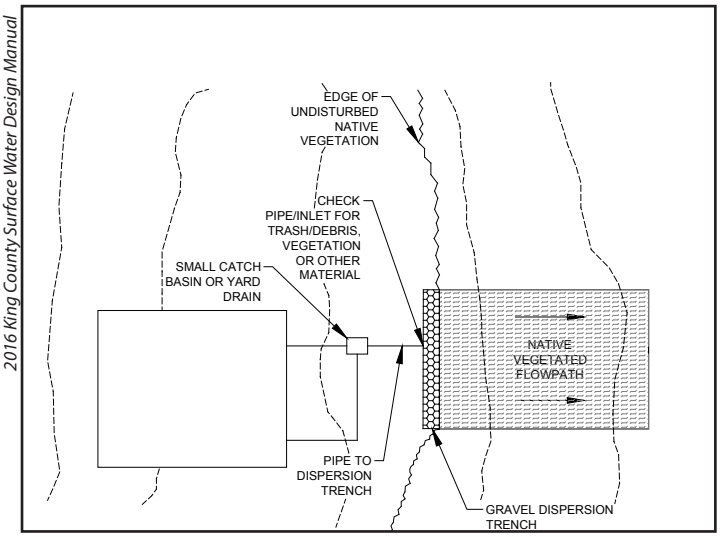
Graphic - example of a dispersion trench.

2016 King County Surface Water Design Manual



Typical Splashblock for Basic Dispersion

2016 King County Surface Water Design Manual



Roof application for gravel dispersion trench.

City of Sammamish

Dispersion trench to a wetland at the Sammamish Commons.

Sheet Flow

Sheet flow, as used for dispersion, is the grading of a developed surface as needed to avoid the concentration of runoff before and after discharge from the surface. There are two types of sheet flow, one for impervious surface and one for pervious surface, a slot drain may be used to discharged to a strip of crushed rock or extended base course of a road or driveway to facilitate dispersal of runoff.

Maintenance DOS:

- ☐ Inspect the site for any trash or debris located in the sheet flow site. If present, remove it such that there is no trash or debris present within the sheet flow site.

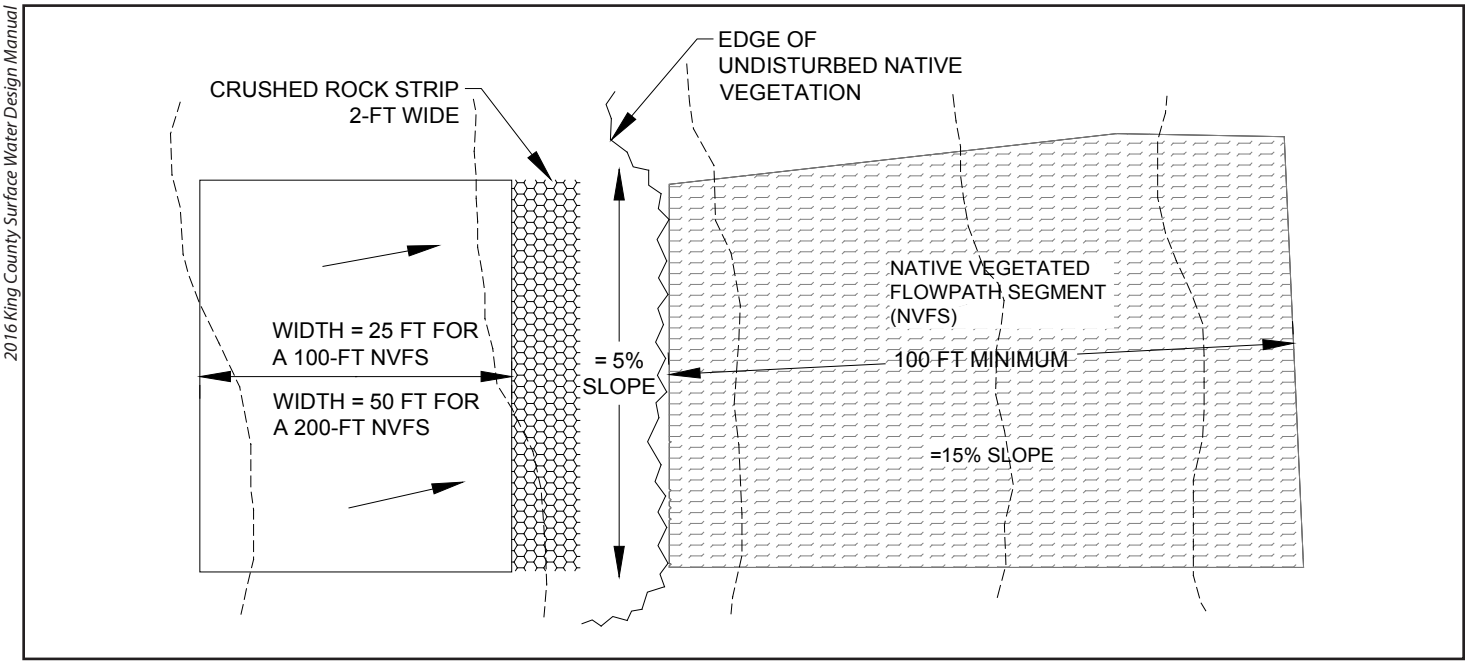
- ☐ Check to ensure that soil erosion is not occurring within the sheet flow zone. If erosion has occurred, any rills or channels created must be repaired back to their original condition.

- ☐ Check to ensure sheet flow is occurring within the sheet flow zone and that water is not being concentrated in any one area. If a concentrated flow is found in one area, regrade site such that water sheet flows across the site.

Maintenance DON'TS:

- ⃠ DON'T pave over or regrade the sheet flow zone.

Inspect your sheet flow site annually and after large storm events to ensure that it is functioning properly!



Application of sheet flow dispersion.

Infiltration

WHAT IS INFILTRATION?

Infiltration is the hydrologic process of water soaking into the ground. Infiltration facilities are utilized to dispose of surface and storm water runoff created by impervious surfaces. Infiltration techniques include: gravel filled trenches, drywells, and ground surface depressions. Some of the benefits of managing on-site stormwater runoff using infiltration include reducing the discharge volumes and flow rates to off-site facilities thus mitigating and reducing the size and number of formal flow control and treatment facilities.

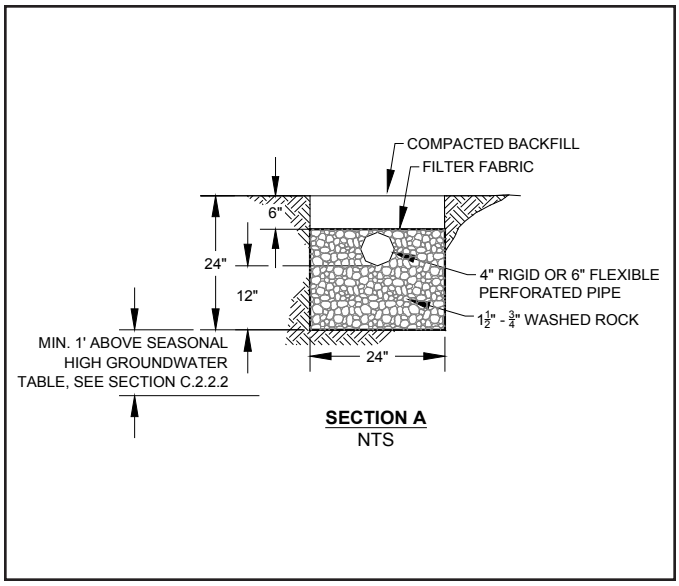
MAINTAINING YOUR INFILTRATION BMP

Infiltration facilities must be inspected annually and should be inspected after major storm events to identify and repair any defects. Depending on the type of facility you have installed on your property, maintenance may slightly differ. Since the facility is designed to soak water into the ground, anything that can clog the base will reduce performance and be a concern. It is important to maintain your infiltration facility to maintain its ability to infiltrate stormwater. The following pages will explain what to look for when inspecting your infiltration BMP, and how to maintain it.

Example of a ground surface depression used to infiltrate stormwater runoff.

Gravel Filled Trenches (Infiltration Trenches)

Similar to gravel filled trenches for dispersion, an infiltration trench is a level trench filled with open graded gravel. Runoff is discharged to the infiltration trench where 18 inches of ¾-inch to ½-inch washed drain rock allows runoff to infiltrate into the water table. dispersion trench below the ground surface. Runoff flows out of the gravel trench and is dispersed over a designated vegetated flow path. Trenches are filled with ¾-inch to ½-inch washed rock, and must be placed at least 15 feet from any building with a crawl space or basement. Depending on soil conditions, an infiltration trench must be 20-30 feet long and at least 2-feet wide by 18 inches deep.



Typical trench infiltration system.

Maintenance DOS:

- ☐ Inspect the site for any trash or debris that could limit flow to the infiltration trench. If present, remove it such that the infiltration trench is able to receive the full flow prior to and during the wet season.
- ☐ Check the inlet pipe that water flows from catch basin or drain and into the trench to ensure that the entrance is not blocked due to sediment, trash or debris.
- ☐ Check to ensure water flows freely through the pipe(s) and that vegetation/roots do not reduce the movement. If water does not flow freely, the pipe may be clogged.
- ☐ Check to ensure no sediment or other materials inhibit the movement of water through the pipe(s). Water should not exit the pipe at any other point than the outlet to the trench. If water is seeping out of other points of the pipe or at pipe joints, maintenance will need to be performed.
- ☐ Check to ensure that water enters and exits trench as designed. If water does not exit trench, check filter media to ensure that it is not plugged and flow through filter media is normal.

Maintenance DON'TS:

- ⃠ DON'T pave over the infiltration dispersion trench.
- ⃠ DON'T remove gravel from infiltration trench.

Inspect your gravel infiltration trench and system annually and after large storm events to ensure that it is functioning properly!

Infiltration

Drywells

Drywells are gravel filled holes as opposed to trenches and therefore may allow for a more compact design in areas where the depth to the maximum wet-season water table is relatively deep (e.g. greater than 6 feet). Drywells are intended to infiltrate runoff from impervious surface areas by holding the runoff long enough to soak most of it into the ground. The following are some items to check for to keep your system in good working order:

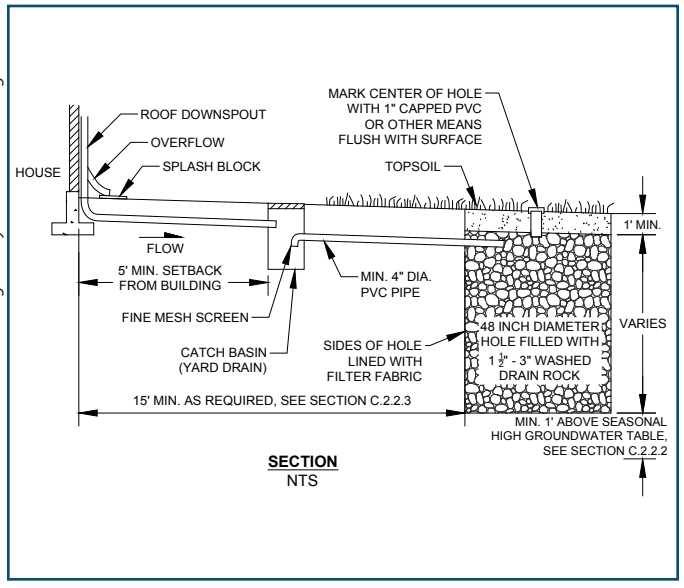
Maintenance DOS:

- ☐ Inspect the drywell for any obstructions that may limit flow into the drywell. If present, remove obstructions that could clog the system.
- ☐ The entrance to the pipe should be free of any sediment, trash, or debris. Check to ensure no trash or debris that could get into the drywell can be found.
- ☐ Water should flow freely through the pipes. If water does not flow freely, check to ensure that vegetation/roots or sediment or other material is not present that prevents free flow of water through the pipe and remove to restore free flow of water.
- ☐ Check to ensure that water does not exist the pipe or pipe joints anywhere other than the outlet. If so, damage to the pipe or pipe joints may have occurred that would require replacement so that water exits the pipe only at the outlet to the drywell.
- ☐ Check the drywell basin for any cracks, holes or leaks. The basin should be sealed and allow water to exit only where designed.
- ☐ Check to ensure that water exits the drywell as designed. If water does not exit the drywell, check filter media to ensure that it is not plugged and flow through filter media is normal.

Maintenance DON'TS:

- ⃠ DON'T remove gravel from the drywell.

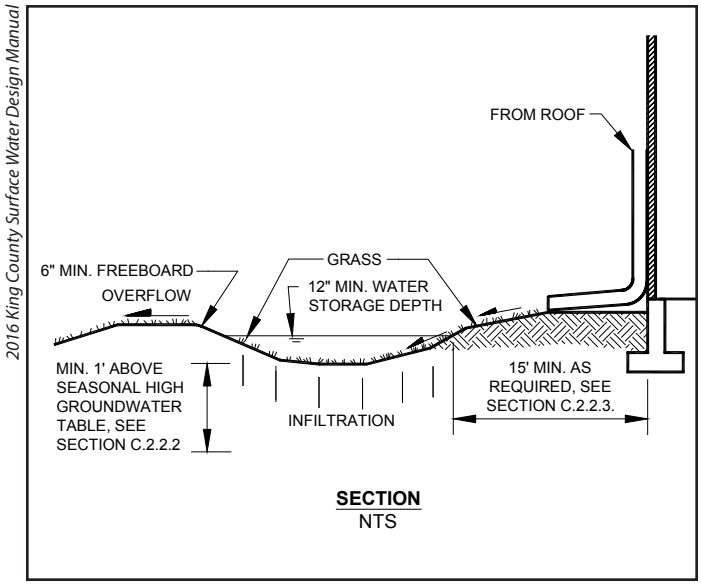
Inspect your drywell annually and after large storm events to ensure that it is functioning properly!



Typical drywell infiltration system.

Ground Surface Depressions

A ground surface depression is another option for full infiltration if the maximum wet-season water table is at least 3 feet below the bottom of the depression. Ground surface depressions are intended to infiltrate runoff from impervious surface areas by putting runoff in direct contact with the soil and holding the runoff long enough to soak most of it into the ground. The following are some items to check for to keep your system in good working order:



Typical ground surface depression infiltration system.

Maintenance DOS:

- ☐ Excessive sedimentation will result in a plugged or non-functioning facility. Preventing sediment-laden flows from entering the device is key to ensuring the system's viability. Sediment accumulation must be removed if present at least on a yearly basis.
- ☐ Inspect the vegetated area for any trash or debris that may result in a plugged or non-functioning facility. If present, remove obstructions that could clog the system.
- ☐ Mow grass or groundcover to a height no greater than 6 inches. Remove any noxious or nuisance vegetation that may have rooted.
- ☐ If there is any evidence of rodent holes, or if there is evidence of water piping through berm via rodent holes, remove rodents and repair berm.

Maintenance DON'TS:

- ⃠ DON'T pave over or fill in the depression.
- ⃠ When adjacent to a driveway, DON'T discharge contaminants or pollutants such as oil, gasoline, concrete slurries or paint into the depression.

Inspect your ground surface depression annually and after large storm events to ensure that it is functioning properly!

Bioretention

WHAT IS BIORETENTION?

Bioretention areas are shallow landscaped depressions, with a designed soil mix and plants adapted to the local climate and soil moisture conditions that receive stormwater from a contributing area. Bioretention includes vegetated closed depressions (ponds), swales, and/or planters that retain and filter stormwater from an area of impervious surface or non-native pervious surface. The soil in the bioretention area has been enhanced to encourage and support vigorous plant growth that serves to filter the water and sustain infiltration capacity. Depending on soil conditions, the bioretention area may have water in them throughout the wet season and may overflow during major storm events.

MAINTAINING YOUR BIORETENTION BMP

Bioretention BMPs must be inspected annually for physical defects. After major storm events, the system should be checked to see that the overflow system is working properly. If erosion channels or bare spots are evident, they should be stabilized with soil, plant material, mulch, or landscape rock. A supplemental watering program may be needed the first year to ensure the long-term survival of the bioretention BMP. Vegetation should be maintained as follows: 1) replace all dead vegetation as soon as possible; 2) remove fallen leaves and debris as needed; 3) remove all noxious vegetation when discovered; 4) manually weed without herbicides or pesticides; 5) during drought conditions, use mulch to prevent excess solar damage and water loss. The following pages will explain what to look for when inspecting your bioretention BMP, and how to maintain it.

Example of a maintained bioretention planting area.

Bioretention Cells, Swales, Planters and Road-side Ditches

Bioretention cells are shallow depressions with a designed planting soil mix and a variety of plant material, including trees, shrubs, grasses, and/or other herbaceous plants.

Bioretention swales incorporate the same design features as bioretention cells, however they are designed as part of a system that can convey stormwater when the maximum ponding depth is exceeded, as opposed to bioretention cells which are not designed as a conveyance system.

Bioretention planters include a designed soil mix and a variety of plant materials including trees, shrubs, grasses and/or other herbaceous plants within a vertical walled contained usually constructed from formed concrete. Planters have an open bottom and allow infiltration to the subgrade.

Road-side ditches also use a designed soil mix underlain by drain rock for increased storage, low maintenance vegetation typical of road-side ditches and requires no permanent ponding - allowing for road side conveyance to function per current design and maintenance standards.

The following are some items to check for to keep these systems in good working order:

Maintenance DOS:

- ☐ Inspect the bioretention area for trash, debris, leaf drop, and sediment accumulation. Remove any trash or debris present that may inhibit infiltration.

- ☐ After large storm events, inspect the bioretention area for excessive ponding or standing water. Water should infiltrate at the designed rate.

- ☐ Check the inflow area to ensure that water is getting into the bioretention area. Remove any debris/sediment blockage at the inlet and check for any signs of erosion or areas where native soil may be exposed. Stormwater inflow into the bioretention area should be unobstructed and the inlet should be stabilized with landscape rock.

- ☐ At least 80% of the vegetated material should be thriving. After the initial planting, watering is necessary until the plantings have established or during dry periods. Water weekly for the first year, then bimonthly for years 2 and 3. Overly dense vegetation requires pruning. Mulch should be applied to a minimum of 2 inches to maintain healthy growth. Any weeds growing within the bioretention area should be removed.

- ☐ The side slopes and/or containment berms within the bioretention area should be free of erosion, settlement or any voids that may have been created by nuisance animals (e.g. rodents). Repair eroded areas and correct the cause of erosion. Containment berms should have 6" of freeboard from the maximum pond level to the top of the berm. If damage has been caused by nuisance animals, consult a specialist for an integrated pest management plan.

Bioretention

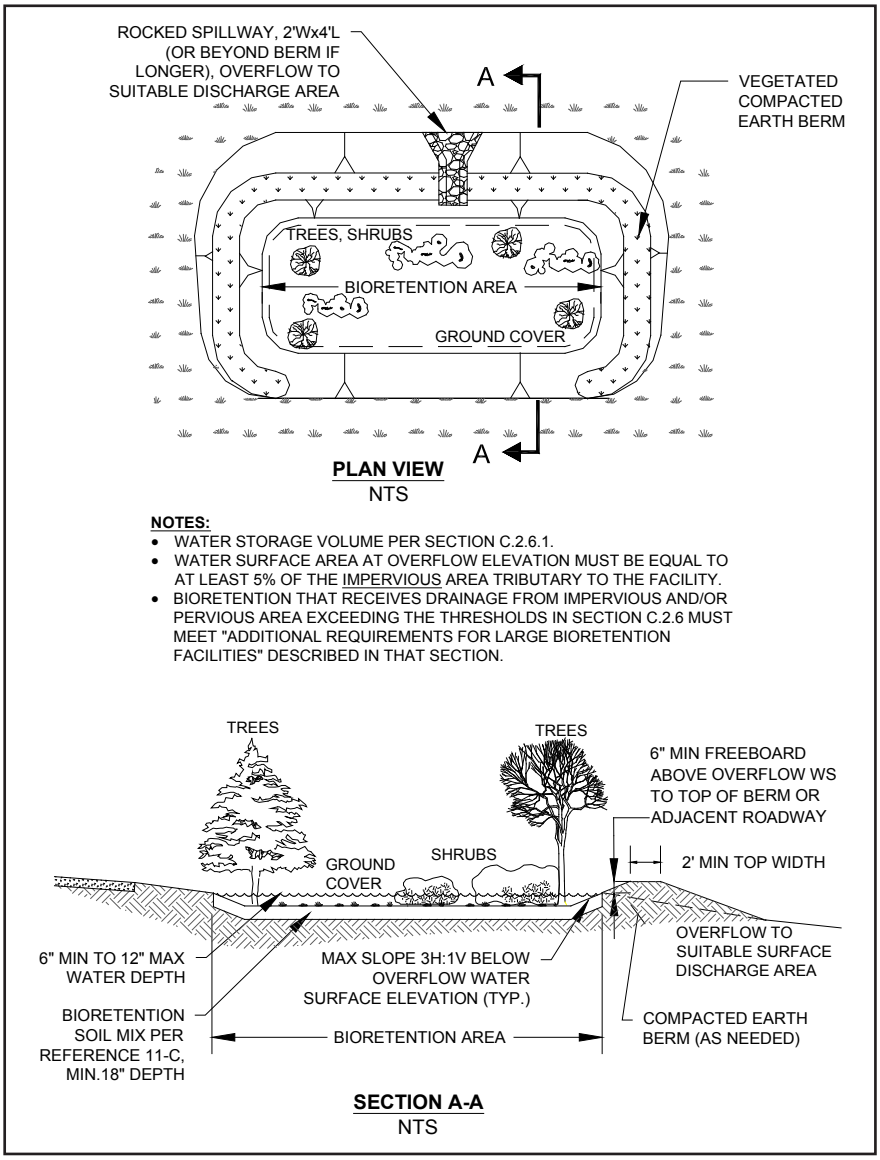
Maintenance DOS (continued):

☐ Inspect the amended soil material for bare spots or areas of excessive compaction. The amended soil provides the plants nutrients necessary for them to thrive. Bare spots should be covered with vegetation or mulch mixed into the underlying soil

Maintenance DON'TS:

⃠ Chemical fertilizers and pesticides must not be used on the bioretention area or on any areas that convey stormwater to the bioretention area.

Inspect your bioretention area annually and after large storm events to ensure that it is functioning properly!



Plan and section view of a typical bioretention cell.

Bioretention

City of Sammamish

Several roadways in the City of Sammamish have been retrofitted to include bioretention swales for managing stormwater runoff from impervious surfaces.

AHBL

Bioretention swales can be attractive landscape features while also serving the dual purpose of managing stormwater runoff.

City of Sammamish

New developments often incorporate rain gardens or bioretention swales into roadway design to meet stormwater requirements.

Permeable Pavement

WHAT IS PERMEABLE PAVEMENT?

Permeable pavements include porous concrete, porous asphalt, cellular confinement gravel systems, unit pavers with a gravel bed, and grassed modular grid systems. There are many types of permeable pavements on the market today. Permeable pavement systems require careful design, construction, and maintenance in order to provide good service life and proper drainage.

MAINTAINING YOUR PERMEABLE PAVEMENT

Permeable pavements reduce the amount of rainfall that becomes runoff by allowing water to seep through the pavement into a free-draining gravel or sand bed, where it can be infiltrated into the ground. Permeable pavement systems must be inspected after one major storm each year to identify and repair any defects. Prolonged ponding or standing water on the pavement is a sign that the system is defective and may need replaced. A typical permeable pavement system has a life expectancy of approximately 25-years. To help extend the useful life of the system, the surface of the permeable pavement should be kept clean and free of leaves, debris, and sediment through regular sweeping or vacuum sweeping. The following pages will explain what to look for when inspecting your permeable pavement, and how to maintain it.

Porous Concrete, Porous Asphalt, Permeable Pavers, Modular Grid Pavement & Grassed Modular Grid Pavement

Porous concrete is similar to conventional concrete except that it contains less fine aggregate than conventional concrete which allows water to drain through the surface into the subgrade.

Porous asphalt is also similar to conventional asphalt except that voids in the pavement created by using less fine aggregate allow for water to pass through the pavement and infiltrate into the subgrade below.

Permeable pavers provide a solid surface but allow natural drainage and migration of water into the earth by permitting water to drain through the spaces between the pavers.

Modular grid pavement and grassed modular grid pavement (also know as grasscrete) consist of a lattice of concrete, plastic or other load bearing material over a permeable base of gravel or sand (or both). Grassed modular grid pavement has grass planted in the openings or in a thin layer of soil over the grid material.

The following are some items to check for to keep these systems in good working order:

Maintenance DOS:

- ☐ Preventative surface vacuuming or pressure washing should occur annually. Moss, vegetation and weed growth may suggest sediment accumulation and limit infiltration. Moss, vegetation, weeds, dirt, sediment, trash or debris should be cleared from the pavement when present, especially after leaf drop in the fall season.

- ☐ Uneven pavement surface or broken or cracked pavement all indicate settlement of the subsurface layer. When this occurs, the system may need to be replaced if the pavement no longer infiltrates at a rate of 10 inches per hour.

☐ Replace any missing or broken pavers, when using a paver system.

☐ Grass within the interstices of a grassed modular grid pavement system should be healthy. Remove and replace any dead grass.

Maintenance DON'TS:

⃠ The most common permeable pavement concern is clogging. The best way to avoid clogging and to reduce maintenance requirements is to not introduce clogging sources onto your permeable pavement facility. Some common landscaping activities that can result in clogging include re-mulching and discharging of grass clippings when lawn mowing. When re-mulching, do not place mulch piles directly onto the pavement - place the mulch pile on a tarp that can be carefully removed to prevent mulch from falling onto the permeable pavement. When lawn mowing, bag clippings before placing on permeable pavement areas.

Inspect your permeable pavement area annually and after large storm events to ensure that it is functioning properly!

AHBL

Example of a permeable paver sidewalk.

City of Sammamish

Example of a grasscrete (grassed modular grid pavement) parking area.

Center for Watershed Protection Inc.

Example of a modular grid pavement parking area in need of maintenance. Leaves and debris pose clogging hazards, and reduce infiltration.

Amended Soils

SOILS AMENDMENTS - WHAT ARE THEY?

Soil amendments are required for all new areas to be permanently landscaped. Soils are amended by tilling in good quality top soil into the top size inches of native soil to reduce the need for fertilizer and improve the overall soil quality. Amended soils typically consist of a topsoil layer with a minimum organic matter content that is met using compost that is specified by the City's stormwater manual.

BEST PRACTICES FOR AMENDED SOIL

Areas of your property that have amended soils are probably those that have been replanted with vegetation or lawn as they were disturbed/compacted during the construction process. However, soils that have been retained in their natural state that include the "duff layer" and native soil may not have been amended. Native soil and soil amendments can reduce the need for irrigation by retaining water and slowly releasing moisture. Infiltration is also increased, reducing the volume of stormwater runoff. For soils that have been amended adhere to the following recommendations to ensure your yard continues performing its function of reducing stormwater:

- ☐ Avoid the use of fertilizers, herbicides and pesticides.
- ☐ Mulch plant debris back into the soil surface to replenish organic matter.
- ☐ Maintain vegetation to avoid soil erosion.

Soil amendments help to increase infiltration capacity of soils that were disturbed or compacted during construction.

Resources & Links

SAMMAMISH STORMWATER WEBSITE

https://www.sammamish.us/government/departments/public-works/stormwater-management-program/

KING COUNTY SURFACE WATER DESIGN MANUAL

http://kingcounty.gov/services/environment/water-and-land/stormwater/documents/surface-water-design-manual.aspx

Appendix A - Maintenance Requirements
http://your.kingcounty.gov/dnrp/library/water-and-land/stormwater/surface-water-design-manual/Appendix_A_FINAL_4_18_2016.pdf

Appendix C - Simplified Drainage Review Requirements
http://your.kingcounty.gov/dnrp/library/water-and-land/stormwater/surface-water-design-manual/Appendix_C_FINAL_4_18_2016.pdf

LOW IMPACT DEVELOPMENT RESOURCES

Washington Stormwater Center
http://www.wastormwatercenter.org/

Department of Ecology Low Impact Development (LID) Resources
http://www.ecy.wa.gov/programs/wq/stormwater/municipal/LID/Resources.html

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