



Department of
Environmental
Conservation

Maintenance Guidance for Stormwater Management Practices

NYSDEC Stormwater Management Design Manual

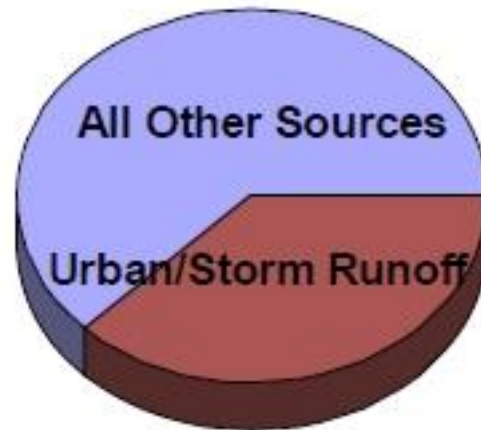
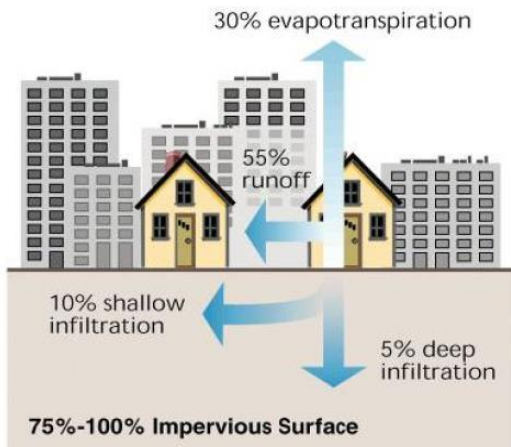
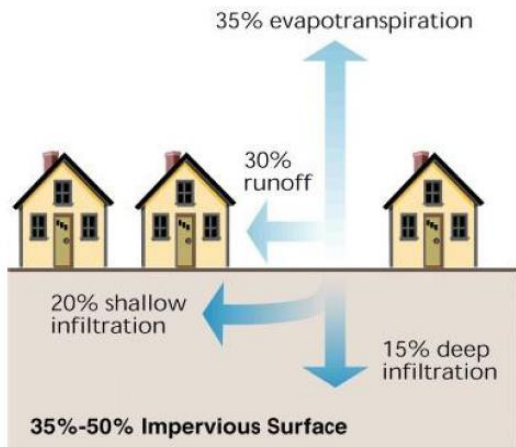
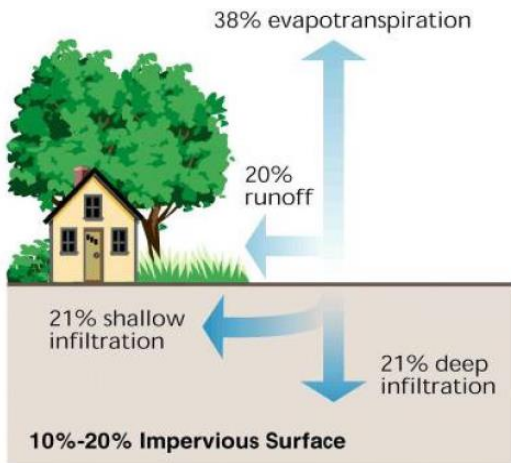
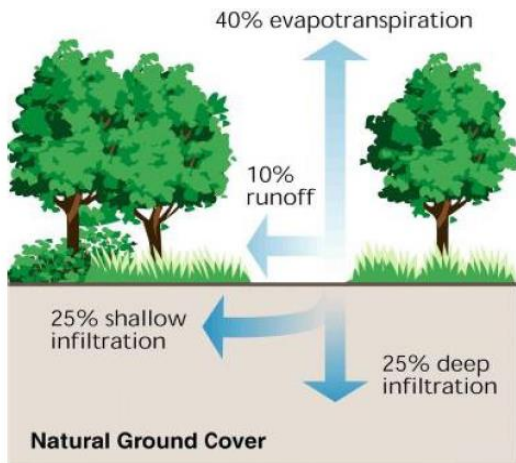
October 20, 2016

Presented by: Ryan Waldron, P.E.

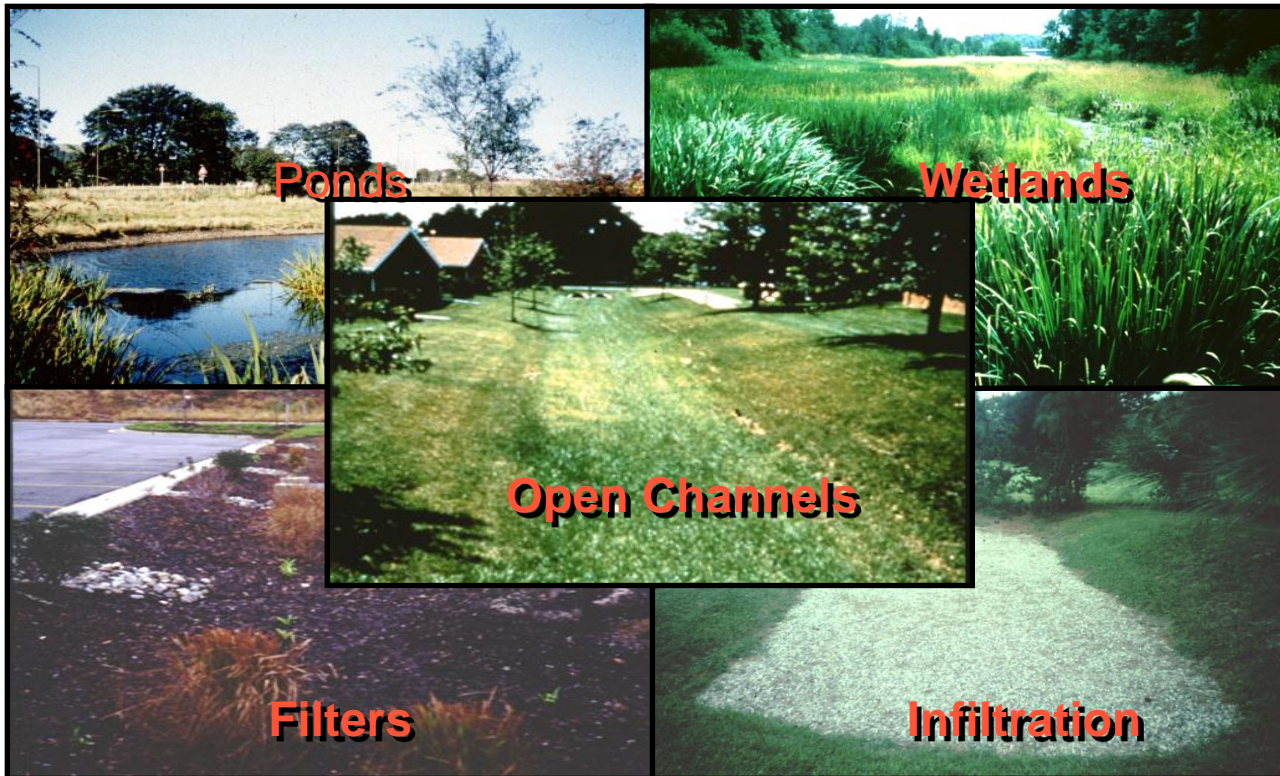
Outline

- Why we care about Stormwater
- History of Stormwater Management
- What is Green Infrastructure?
- Green Infrastructure at Work
- SMP Maintenance Guidance





Traditional Methods of Stormwater Management



Paradigm Shift:
Get away from the curb and gutter, big
basin approach

- Shift from the concept of moving stormwater as far away as quickly as possible in large, buried collection and conveyance systems.



- Shift towards the concept of managing stormwater the way mother nature would do it: where it falls; plants & soils.



What is Green Infrastructure?

- **Green stormwater infrastructure** includes a wide array of practices that provide a cost-effective way to manage wet weather by maintaining and restoring a more natural hydrology.
- On the **local scale** green infrastructure consists of site- and neighborhood-specific practices such as bioretention systems, stormwater street trees, green roofs, permeable pavements and cisterns.
- On a **regional scale**, green infrastructure is the preservation and restoration of natural landscape features, such as forests, floodplains and wetlands that help reduce overall imperviousness in a watershed.

Green Roof
Binghamton, NY



Runoff Reduction/ Green Infrastructure Techniques

Regional Scale GI

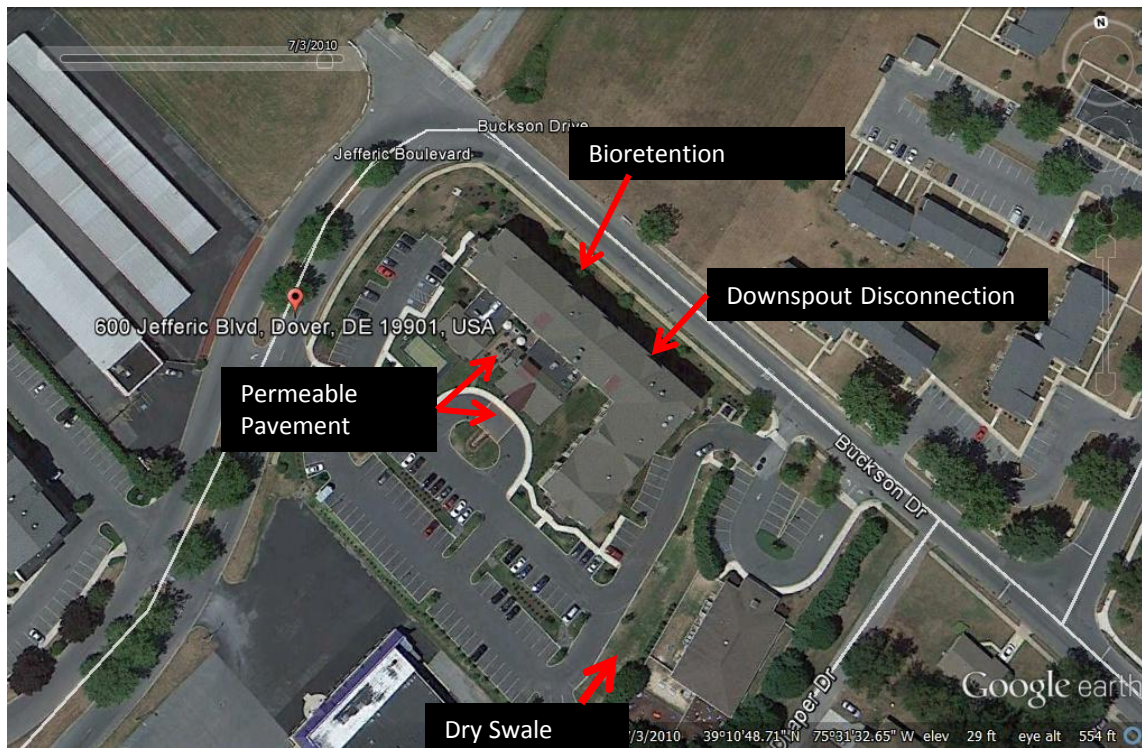
- Conservation of Natural Areas
- Stream Daylighting
- Flood Plain Restoration
- Constructed Wetlands

Local Scale GI

- Bioretention/Rain Gardens
- Tree Planting/Tree Box
- Downspout Disconnection
- Green Roofs
- Permeable Paving
- Stormwater Planters
- Rainwater Reuse/Cisterns



Green Infrastructure at Work





New Maintenance Guidance

MAINTENANCE GUIDANCE

Stormwater Management Practices

September 7, 2016



DRAFT

- Developed in partnership with the Center for Watershed Protection
- Provides guidance on how to inspect and maintain stormwater management practices (SMPs)
- New chapter for the NYS Stormwater Design Manual!!!



SMPs Discussed

Table 1.1 Practices Discussed in this Chapter, by Group

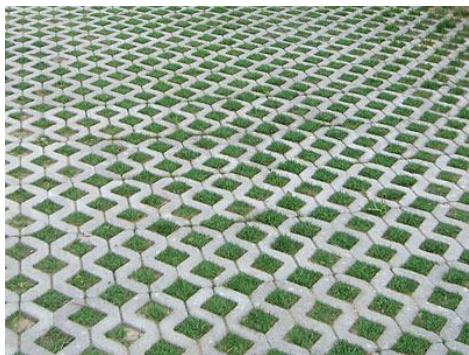
SMP Group	Practices Included
Rainwater Harvesting	<ul style="list-style-type: none"> • Rain Barrel • Cistern
Disconnection and Sheetflow	<ul style="list-style-type: none"> • Rooftop Disconnection • Sheetflow to Filter Strip • Sheetflow to Riparian Buffers
Swales	<ul style="list-style-type: none"> • Vegetated Swale • Wet Swale
Tree Planting	<ul style="list-style-type: none"> • Tree Planting
Bioretention	<ul style="list-style-type: none"> • Bioretention Cell • Dry Swale • Rain Garden • Stormwater Planters • Tree Pits
Green Roofs	<ul style="list-style-type: none"> • Green Roofs
Permeable Pavements	<ul style="list-style-type: none"> • Permeable Pavers • Porous Asphalt/Concrete
Ponds and Wetlands	<ul style="list-style-type: none"> • Wet Pond Design Options • Stormwater Wetland Design Options
Infiltration	<ul style="list-style-type: none"> • Infiltration Trench • Infiltration Basin • Dry Well
Sand and Organic Filters	<ul style="list-style-type: none"> • Surface Sand Filters • Underground Sand Filters • Underground Organic Filters

Maintenance Hierarchy



Maintenance Hierarchy

- Each SMP includes “Maintenance Triggers”, which identify problems encountered during inspection that require a higher level inspection
- Permeable Paver Example:



Level 1 Maintenance



Level 2 Maintenance






Level 3 Maintenance

How the Guidance Works





Table 2.7.1 BR Drainage Area

BR1: Drainage Area

Problem (Check if Present)	Follow-Up Actions
 <ul style="list-style-type: none"> <input type="checkbox"/> Bare soil, erosion of the ground (rills washing out the dirt) 	<ul style="list-style-type: none"> <input type="checkbox"/> Seed and straw areas of bare soil to establish vegetation. <input type="checkbox"/> Fill in erosion areas with soil, compact, and seed and straw to establish vegetation. <input type="checkbox"/> If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted. <input type="checkbox"/> Other: <hr/> <ul style="list-style-type: none"> <input type="checkbox"/> Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths.
 <ul style="list-style-type: none"> <input type="checkbox"/> Piles of grass clippings, mulch, dirt, salt, or other materials 	<ul style="list-style-type: none"> <input type="checkbox"/> Remove or cover piles of grass clippings, mulch, dirt, etc. <input type="checkbox"/> Other:
 <ul style="list-style-type: none"> <input type="checkbox"/> Open containers of oil, grease, paint, or other substances 	<ul style="list-style-type: none"> <input type="checkbox"/> Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous. <input type="checkbox"/> Other:

BR2: Inlet

Table 2.7.2 BR Inlets

Problem (Check if Present)	Follow-Up Actions
 <ul style="list-style-type: none"><input type="checkbox"/> Inlets collect grit and debris or grass/weeds. Some water may not be getting into the Bioretention cell. The objective is to have a clear pathway for water to flow into the cell.	<ul style="list-style-type: none"><input type="checkbox"/> Use a flat shovel to remove grit and debris (especially at curb inlets or openings). Parking lots generate fine grit that will accumulate at these spots.<input type="checkbox"/> Pull out clumps of growing grass or weeds and scoop out the soil or grit that the plants are growing in.<input type="checkbox"/> Remove any grass clippings, leaves, sticks, and other debris that is collecting at inlets.<input type="checkbox"/> For pipes and ditches, remove sediment and debris that is partially blocking the pipe or ditch opening where it enters the Bioretention area.<input type="checkbox"/> Dispose of all material properly where it will not re-enter the Bioretention area.<input type="checkbox"/> Other: <p><input type="checkbox"/> Kick-Out to Level 2 Inspection: Inlets are blocked to the extent that most of the water does not seem to be entering the Bioretention cell.</p>
 <ul style="list-style-type: none"><input type="checkbox"/> Some or all of the inlets are eroding so that rills, gullies, and other erosion is present, or there is bare dirt that is washing into the Bioretention cell.	<ul style="list-style-type: none"><input type="checkbox"/> For small areas of erosion, smooth out the eroded part and apply rock or stone (e.g., river cobble) to prevent further erosion. Usually, filter fabric is placed under the rock or stone.<input type="checkbox"/> In some cases, reseeding and applying erosion-control matting can be used to prevent further erosion. Some of these materials may be available at a garden center, but it may be best to consult a landscape contractor.<input type="checkbox"/> Other: <p><input type="checkbox"/> Kick-Out to Level 2 Inspection: Erosion is occurring at most of the inlets, and it looks like there is too much water that is concentrating at these points. The inlet design may have to be modified.</p>

BR3: Ponding Area

Table 2.7.3 BR Ponding Area

Problem (Check if Present)

Follow-Up Actions



- Mulch (if used) needs to be replaced or replenished. The mulch layer had decomposed or is less than 1-inch thick.

- Add new mulch to a total depth (including any existing mulch that is left) of 2 to 3 inches. The mulch should be shredded hardwood mulch that is less likely to float away during rainstorms.
- Avoid adding too much mulch so that inlets are obstructed or certain areas become higher than the rest of the Bioretention surface.
- Other:





- Minor areas of sediment, grit, trash, or other debris are accumulating on the bottom.

- Use a shovel to scoop out minor areas of sediment or grit, especially in the spring after winter sanding materials may wash in and accumulate. Dispose of the material where it cannot re-enter the Bioretention area.
- If removing the material creates a hole or low area, fill with soil mix that matches original mix and cover with mulch so that the Bioretention surface area is as flat as possible.
- Remove trash, vegetative debris, and other undesirable materials.
- Other:

- Kick-Out to Level 2 Inspection: Sediment has accumulated more than 2-inches deep and covers 25% or more of the Bioretention surface.
- Kick-Out to Level 2 Inspection: The Bioretention area is too densely vegetated to assess sediment accumulation or ponding; see BR-4, Vegetation.


BR4: Vegetation

Table 2.7.4 BR Vegetation

Problem (Check if Present)	Follow-Up Actions
 <ul style="list-style-type: none"><li data-bbox="852 492 1315 576"><input type="checkbox"/> Vegetation requires regular maintenance—pulling weeds, removing dead and diseased plants, replacing mulch around plants, adding plants to fill in areas that are not well vegetated, etc.	<ul style="list-style-type: none"><li data-bbox="1360 102 1875 161"><input type="checkbox"/> If you can identify which plants are weeds or not intended to be part of the planting plan, eliminate these, preferably by hand pulling.<li data-bbox="1360 168 1850 227"><input type="checkbox"/> If weeds are widespread, check with the local stormwater authority and/or Extension Office about proper use of herbicides for areas connected with the flow of water.<li data-bbox="1360 233 1881 292"><input type="checkbox"/> Even vegetation that is intended to be present can become large, overgrown, and/or crowd out surrounding plants. Prune and thin accordingly.<li data-bbox="1360 299 1881 380"><input type="checkbox"/> If weeds or invasive plants have overtaken the whole Bioretention area, bush-hog the entire area before seedheads form in the spring. It will be necessary to remove the root mat manually or with appropriate herbicides, as noted above.<li data-bbox="1360 386 1843 430"><input type="checkbox"/> Re-plant with species that are aesthetically pleasing and seem to be doing well in the Bioretention cell.<li data-bbox="1360 436 1450 456"><input type="checkbox"/> Other: <p data-bbox="1360 514 1887 573"><input type="checkbox"/> Kick-Out to Level 2 Inspection: You are unsure of the original planting design, or the vegetation maintenance task is beyond your capabilities of time, expertise, or resources.</p>
 <ul style="list-style-type: none"><li data-bbox="852 1019 1286 1063"><input type="checkbox"/> Vegetation is too thin, is not healthy, and there are many spots that are not well vegetated.	<ul style="list-style-type: none"><li data-bbox="1360 648 1866 768"><input type="checkbox"/> The original plants are likely not suited for the actual conditions within the Bioretention area. If you are knowledgeable about plants, select and plant more appropriate vegetation (preferably native plants) so that almost the entire surface area will be covered by the end of the second growing season.<li data-bbox="1360 775 1450 794"><input type="checkbox"/> Other: <p data-bbox="1360 921 1862 983"><input type="checkbox"/> Kick-Out to Level 2 Inspection: For all but small practices (e.g., rain gardens), this task will likely require a landscape design professional or horticulturalist.</p>

BR5: Outlet

Table 2.7.5 BR Outlets

Problem (Check if Present)	Follow-Up Actions
<input type="checkbox"/> Erosion at outlet	<input type="checkbox"/> Add stone to reduce the impact from the water flowing out of the outlet pipe or weir during storms. <input type="checkbox"/> Other: <input type="checkbox"/> Kick-Out to Level 2 Inspection: Rills have formed and erosion problem becomes more severe.
 <input type="checkbox"/> Outlet obstructed with mulch, sediment, debris, trash, etc.	<input type="checkbox"/> Remove the debris and dispose of it where it cannot re-enter the Bioretention area. <input type="checkbox"/> Other: <input type="checkbox"/> Kick-Out to Level 2 Inspection: Outlet is completely clogged or obstructed; there is too much material to remove by hand or with simple hand tools.

Contact Information

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