

# Green Stormwater Operations and Maintenance Manual



Seattle Public Utilities

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**I. Overview**

This manual is a summary of *routine* maintenance activities for the design of Natural Drainage System (NDS) Projects. Several *non-routine* maintenance activities are also included within this chart. The manual is divided into four service levels for the vegetation section and three service levels for the hardscape and Infrastructure section. For some design elements, the service levels are very similar.

This chart is intended to be a Maintenance Manual for scheduling and performing maintenance activities. The manual features images and descriptions for vegetation, hardscape, infrastructure, and infiltration rates. It includes NDS sites used currently in Seattle and several images from NDS projects in other municipalities. It is important to realize that *no single project includes every design element*. (That is, all the NDS portrayed in this chart will *NOT* be found within a given NDS project.) Maintenance crew coordinators need to use the relevant maintenance categories for a given project per the NDS Service Agreement.

**II. How to Use This Manual**





The successful use of this manual hinges on the inspection of project features, which in turn triggers the appropriate maintenance activities. To use this chart first select the desired Service Level for maintenance on an existing NDS project, then maintenance crews will inspect the system for the conditions listed in the left-hand column of the chart. Note that the desired service level may vary from project to project, based on the NDS goals, the project location, the project age (i.e. whether or not the plants have successfully established), and economic considerations. The descriptions and images for each service level may be used to help determine by visual inspection whether recommended maintenance activities, in the right-hand column, will need to be performed.









**III. Contacts**









<b>Name</b>	<b>Phone Number</b>	<b>Title</b>
Drena Donofrio	206-571-1566	GSI O&M Asset Manager
Deb Heiden	206-386-1802	Urban Ecosystems Asset Manager
Tracy Tackett	206-386-0052	GSI Program Manager

**Table I. Landscape and Vegetation Manual**

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service D (Poor Effort)
<p><b>Aesthetics (vegetation and trash)</b></p>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• Healthy and attractive</li> <li>• No bare spots</li> <li>• Plant palette is working for facility</li> <li>• At least 95% survival of establishing plants</li> </ul> </li> <li>• <b>Weeds</b> - Little or no weeds are present</li> <li>• <b>Aesthetics</b> <ul style="list-style-type: none"> <li>• Clean, distinct edges</li> <li>• Vegetation confined to planted areas</li> <li>• No overgrown appearance/dead growth</li> </ul> </li> <li>• <b>Mulch</b> <ul style="list-style-type: none"> <li>• Evenly distributed &amp; approximately 4” of arborist woodchip mulch. No evidence of erosion (stabilized surfaces)</li> <li>• Limited shoulder compaction</li> <li>• Homeowner is fully maintaining (where applicable)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• Healthy with a good appearance</li> <li>• Occasional bare spots</li> <li>• Plant palette is mostly working for facility (At least 75%)</li> </ul> </li> <li>• <b>Weeds</b> - Small quantities of weeds are present</li> <li>• <b>Aesthetics</b> <ul style="list-style-type: none"> <li>• Loose edges: grass/mulch encroaching on swale or vice versa</li> <li>• Some vegetation overlapping into pedestrian areas</li> <li>• Overgrown in isolated areas with some dead material</li> </ul> </li> <li>• <b>Mulch</b> <ul style="list-style-type: none"> <li>• 2”-4” layer of mulch is present</li> <li>• Erosion likely unless maintenance improved</li> <li>• Some shoulder compaction</li> </ul> </li> <li>• Homeowner is providing some maintenance (where applicable)</li> <li>• Able to achieve Level A without complete retrofit</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• Poor vegetation health and appearance</li> <li>• Bare spots are frequent</li> <li>• Plant palette is not working for facility (75%-50%)</li> </ul> </li> <li>• <b>Weeds</b> - Weeds common</li> <li>• <b>Aesthetics</b> <ul style="list-style-type: none"> <li>• No edges;</li> <li>• Surrounding vegetation spills into swale and pedestrian areas</li> </ul> </li> <li>• <b>Mulch</b> <ul style="list-style-type: none"> <li>• Mulch is less than 2”</li> <li>• Substantial eroded areas</li> <li>• Shoulder compaction</li> </ul> </li> <li>• Homeowner is not maintaining swale (where applicable)</li> <li>• Unable to achieve higher service levels without complete retrofit</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• Poor Planted vegetation health and appearance</li> <li>• Bare spots are common</li> <li>• Plant palette has failed Less than 50%</li> </ul> </li> <li>• <b>Weeds</b> - Weeds dominant</li> <li>• <b>Aesthetics</b> <ul style="list-style-type: none"> <li>• No edges; surrounding vegetation spills into swale or vice versa</li> </ul> </li> <li>• <b>Mulch</b> <ul style="list-style-type: none"> <li>• Mulch is absent</li> <li>• Substantial eroded areas</li> <li>• Shoulder compaction</li> </ul> </li> <li>• Homeowner is not maintaining swale (where applicable)</li> <li>• Unable to achieve higher service levels without complete retrofit</li> </ul>

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service D (Poor Effort)
<b>Special Considerations for Noxious Weeds</b>	Zero tolerance of Class A, B, C and non-designated noxious weeds	Zero tolerance of Class A and B. Class C weeds are controlled or absent. Non-designated weeds are controlled or absent.	Zero tolerance of Class A weeds. Class B and C are controlled. Non-designated are present (Control Prog. Is minimal)	Zero tolerance of Class A weeds. Class B, C, and Non-Designated are largely uncontrolled except for public safety reasons (illegal dumping, obstructs vision)
<a href="#"><u>Link to King County Noxious Weed List</u></a>				
<b>Vegetation</b>	Lush vegetation; excellent appearance 	Mostly healthy vegetation with good appearance 	Mostly healthy vegetation with neglected appearance 	Poorly planted vegetation health and neglected appearance 





Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service D (Poor Effort)
<b>Aesthetics</b>	<p>Healthy, well-maintained vegetation; excellent appearance</p> 	<p>Appearance is good</p> 	<p>Moderate appearance</p> 	<p>Poorly maintained appearance</p> 
<b>Mulch</b>	<p>Deep mulch layer(4"-6"), clean edges, limited compaction</p> 	<p>Some mulch(2"-4"), loose edges, some compaction</p> 	<p>Little mulch(Less than 2"), no defined edge, shoulder compaction</p> 	<p>No mulch present, no defined edge, shoulder compaction</p> 





Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service D (Poor Effort)
<b>Weeds</b>	<p>No weedy species present</p> 	<p>Occasional weedy species (5-10%)</p> 	<p>Lots of Weedy species (10-20%)</p> 	<p>Weedy species predominant (More than 20%)</p> 
<b>Erosion and bare spots</b>	<p>No erosion or bare spots</p> 	<p>Some erosion and bare spots (0-5%)</p> 	<p>Substantial erosion and bare spots (5-10%)</p> 	<p>Completely eroded and bare spots (More than 10%)</p> 

**Table II. System Functionality**




Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Poor Effort)
<b>SYSTEM FUNCTIONALITY</b>				
<b>Bioretention (vegetation &amp; soils/substrate)</b>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• 100% of swale bottom is covered with healthy, wetland vegetation</li> <li>• No bare spots</li> </ul> </li> <li>• <b>Infiltration</b> <ul style="list-style-type: none"> <li>• Soil is well aerated, no evidence of compaction</li> <li>• Water drains within 48 hours</li> </ul> </li> <li>• <b>Maintenance</b> <ul style="list-style-type: none"> <li>• No erosion, channelization or scouring</li> <li>• No significant sediment or debris accumulation</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• At least 80% of swale bottom is covered with healthy, wetland vegetation</li> <li>• Minimal bare spots 10%</li> </ul> </li> <li>• <b>Infiltration</b> <ul style="list-style-type: none"> <li>• Some evidence of compaction (2" of mulch)</li> <li>• Most water drains within 24 hours, minimal long-term ponding</li> </ul> </li> <li>• <b>Maintenance</b> <ul style="list-style-type: none"> <li>• Some erosion, channelization or scouring</li> <li>• Sediment or debris accumulation does not affect the function of the facility.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• Between 60-80% of swale bottom is covered with healthy, wetland vegetation</li> <li>• A few bare spots 10-20%</li> </ul> </li> <li>• <b>Infiltration</b> <ul style="list-style-type: none"> <li>• Compacted soils (Lack of Mulch)</li> <li>• The presence of long-term ponding (&gt; 72 hours)</li> </ul> </li> <li>• <b>Maintenance</b> <ul style="list-style-type: none"> <li>• Erosion, channelization or scouring</li> <li>• Sediment and debris accumulations inhibit the water quality function of the facility without affecting conveyance</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• Less than 60% of swale bottom is covered with healthy, wetland vegetation</li> <li>• Many bare spots</li> </ul> </li> <li>• <b>Infiltration</b> <ul style="list-style-type: none"> <li>• Compacted soils (Lack of Mulch)</li> <li>• The presence of long-term ponding (&gt; 72 hours)</li> </ul> </li> <li>• <b>Maintenance</b> <ul style="list-style-type: none"> <li>• Erosion, channelization or scouring</li> <li>• Sediment and debris accumulations inhibit the water quality and conveyance of the system</li> </ul> </li> </ul>
<b>Biofiltration (vegetation &amp; soils/substrate)</b>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• At least 80% of swale bottom covered with healthy, uniformed fine-stemmed vegetation at least 18 - 24 inches high</li> <li>• No bare spots</li> </ul> </li> <li>• <b>Maintenance</b> <ul style="list-style-type: none"> <li>• No erosion, channelization or scouring</li> <li>• No ponding</li> <li>• No significant sediment or debris accumulation</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• Between 60-80% of swale bottom covered with healthy, uniformed fine-stemmed vegetation at least 18 - 24 inches high</li> <li>• A few bare spots 10%</li> </ul> </li> <li>• <b>Maintenance</b> <ul style="list-style-type: none"> <li>• Some erosion, channelization or scouring</li> <li>• No ponding</li> <li>• Sediment and debris does not affect the function of the facility.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• Between 60-40% of swale bottom covered with healthy, uniformed fine-stemmed vegetation, of at least 18 -24 inches high</li> <li>• Many bare spots 10-30%</li> </ul> </li> <li>• <b>Maintenance</b> <ul style="list-style-type: none"> <li>• Erosion, channelization or scouring</li> <li>• The presence of ponding</li> <li>• Sediment and debris affect the water quality function of the facility with out affecting conveyance.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Vegetation</b> <ul style="list-style-type: none"> <li>• Less than 40% of swale bottom covered with healthy, uniformed fine-stemmed vegetation, of at least 18 -24 inches high</li> <li>• Many bare spots</li> </ul> </li> <li>• <b>Maintenance</b> <ul style="list-style-type: none"> <li>• Erosion, channelization or scouring</li> <li>• The presence of ponding</li> <li>• Sediment and debris accumulations inhibit the water quality and conveyance of the system</li> </ul> </li> </ul>















Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Poor Effort)
<b>Bioretention + biofiltration (vegetation &amp; soils/substrate)</b>	<ul style="list-style-type: none"> <li>• At least 100% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least 18 - 24 inches high</li> <li>• Soil is well aerated, no evidence of vehicle compaction</li> <li>• No erosion, channelization or scouring</li> <li>• Water drains within 24 hours</li> <li>• No visible bare spots</li> <li>• Acceptable level of sediment or debris accumulation</li> </ul>	<ul style="list-style-type: none"> <li>• 80% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least 18 - 24 inches high</li> <li>• Some evidence of vehicle compaction (lack of mulch)</li> <li>• Some erosion, channelization or scouring</li> <li>• Most water drains within 24 hours, minimal long-term ponding</li> <li>• A few bare spots 10-20%</li> <li>• Acceptable level of sediment or debris accumulation</li> </ul>	<ul style="list-style-type: none"> <li>• Less than 80-50% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least 18 - 24 inches high</li> <li>• Compacted soils</li> <li>• Erosion, channelization or scouring</li> <li>• The presence of long-term ponding (&gt; 72 hours)</li> <li>• Many bare spots</li> <li>• Significant build up of sediment or debris</li> </ul>	<ul style="list-style-type: none"> <li>• Less than 50% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least 18 - 24 inches high</li> <li>• Compacted soils</li> <li>• Erosion, channelization or scouring</li> <li>• The presence of long-term ponding (&gt; 72 hours)</li> <li>• Many bare spots or noxious weeds/grass</li> <li>• Significant build up of sediment or debris</li> </ul>
<b>Swale bottom vegetation</b>				







Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Poor Effort)
<b>Sediment or debris accumulation</b>				
<b>Conveyance (vegetation &amp; soils/substrate)</b>	<ul style="list-style-type: none"> <li>• Healthy vegetation</li> <li>• No erosion, channelization or scouring</li> <li>• No bare spots</li> <li>• No build up of sediment or debris</li> <li>• No non-designed obstructions to flow</li> </ul>	<ul style="list-style-type: none"> <li>• Mostly healthy vegetation</li> <li>• Some erosion, channelization or scouring</li> <li>• Minimal bare spots 10-20%</li> <li>• Some build up of sediment or debris</li> <li>• Minimal non-designed obstructions to flow (over-grown vegetation, trash rack blockages)</li> </ul>	<ul style="list-style-type: none"> <li>• Some vegetation</li> <li>• Erosion, channelization or scouring</li> <li>• Many bare spots 20-40%</li> <li>• Significant build up of sediment or debris</li> <li>• Significant non-designed obstructions to flow (over-grown vegetation, trash rack blockage)</li> </ul>	<ul style="list-style-type: none"> <li>• Poor or no vegetation</li> <li>• Erosion, channelization or scouring</li> <li>• Many bare spots 40% or more</li> <li>• Significant build up of sediment or debris</li> <li>• Significant non-designed obstructions to flow (over-grown vegetation, trash rack blockage)</li> </ul>







**Table III. Hardscape Manual**

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
<b>HARDSCAPE &amp; INFRA-STRUCTURE</b>	<p style="text-align: center;"><b>Summary</b></p> <ul style="list-style-type: none"> <li>• sediment is minimal</li> <li>• infrastructure is always accessible</li> <li>• no competition between roots(/dense plant material?) and pipes</li> <li>• no trash is present</li> <li>• small accumulation of organic debris on grates or screens</li> <li>• limited buildup of sediment behind check dams or log weirs</li> <li>• no erosion or undercutting surrounding weir walls</li> <li>• rockery and walls are stable and secure</li> <li>• stormwater sedimentation structures less than ½ full (NPDES)</li> </ul>	<p style="text-align: center;"><b>Summary</b></p> <ul style="list-style-type: none"> <li>• some sediment is present</li> <li>• infrastructure is usually accessible</li> <li>• some competition between roots(/dense plant material?) and pipes</li> <li>• small amounts of trash are present</li> <li>• moderate accumulation of organic debris on grates or screens</li> <li>• occasional large sediment deposits behind check dams or log weirs</li> <li>• minimal erosion and/or undercutting surrounding weir walls</li> <li>• occasional loose rocks; walls are secure</li> <li>• stormwater sedimentation structures less than ½ full (NPDES)</li> </ul>	<p style="text-align: center;"><b>Summary</b></p> <ul style="list-style-type: none"> <li>• Lots of sediment buildup is observed</li> <li>• infrastructure is mostly inaccessible</li> <li>• Significant competition between roots(/dense plant material?) and pipes</li> <li>• Trash is present</li> <li>• Heavy accumulations of organic debris on grates or screens</li> <li>• frequent large sediment deposits behind check dams or log weirs</li> <li>• Erosion and/or undercutting surrounding weir walls</li> <li>• Loose rocks; walls are not secure</li> <li>• stormwater sedimentation structures less than ½ full (NPDES)</li> </ul>	
Sedimentation structures— TYPE 2	Sediment is blocking 10% of structure 	Sediment is blocking 30% of structure 	Sediment is blocking 50% of structure 	<ul style="list-style-type: none"> <li><input type="checkbox"/> if sediment present, remove trash and unwanted organic debris</li> <li><input type="checkbox"/> muck out / vacator structure and dispose of waste properly</li> </ul>






Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Grates and debris screens on catch basins (CBs)	Accumulation of organic debris covers 10% of structure 	Accumulation of organic debris covers 30% of structure 	Accumulation of organic debris covers 50% of structure 	<input type="checkbox"/> if present, muck out / vactor catch basins and dispose of waste properly. Clear debris and vegetation growth around intakes.
<input type="checkbox"/> Outlet structures— TYPE 2	Accumulation of organic debris covers 10% of structure 	Accumulation of organic debris covers 30% of structure 	Accumulation of organic debris covers 50% of structure 	<input type="checkbox"/> remove debris and dispose of waste properly

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Flow control structures and overflow structures or pipes	Accumulation of organic debris covers 10% of structure 	Accumulation of organic debris covers 30% of structure 	Accumulation of organic debris covers 50% of structure 	Remove debris and vegetation growth and dispose of waste properly
<input type="checkbox"/> Log weirs and check dams	Sediment deposit of check dams or log weirs is about 10% 	Sediment deposits of check dams or log weirs is about 30% 	Sediment deposits of check dams or log weirs is about 50% or more 	<input type="checkbox"/> add splash-pool (rocks) to reduce scouring of swale-bottom for undercutting or eroding  <input type="checkbox"/> remove sediment, debris, and trash if ponding upstream of check-dam

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Weir walls w/ flow control notch  	Sediment deposit downstream of check dams or log weirs is about 10% 	Sediment deposit downstream of check dams or log weirs is about 30% 	Sediment deposit downstream of check dams or log weirs is about 50% or more 	add rocks to splash-pool to prevent scouring  reinforce weir wall ( <i>non-routine</i> ) if leakage occurs at structure edges
Rockery / boulders  PHOTOS TO BE UPDATED (shown here with little vegetative cover, but rocks may become covered in plant growth in well-established projects)	10% of rocks or walls are unsecured 	30% of rocks or walls are unsecured 	50% of rocks or walls are unsecured 	<input type="checkbox"/> ensure large rocks and boulders are stable

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Manufactured block sidewalls	<p>10% of rocks or walls are unsecured</p> 	<p>30% of rocks or walls are unsecured</p> 	<p>50% of rocks or walls are unsecured</p> 	<p>ensure blocks and bricks are stable</p>
Soil-wrap walls ("green walls")	<p>Erosion or undercutting of 10% is walls visible around rockery, walls and weirs</p> 	<p>Erosion or undercutting of 30% is visible around rockery, walls and weirs</p> 	<p>Erosion or undercutting of 50% is walls visible around rockery, walls and weirs</p> 	<p><input type="checkbox"/> repair as needed stabilize loose soil-bricks, notify vegetation crew if weeds present, water needed, or re-planting required</p>

**Table IV. Porous Pavement Manual**




Level of Service	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
<b>Street</b>	Infiltration rate of 20 +in/hr	Infiltration rate of 10 in/hr	Infiltration rate of 3 in/hr	based on peak flows for 100yr design storm 3 in/hr and excess capacity for localized failure
<b>Sidewalk</b>	Infiltration rate of 20 +in/hr	Infiltration rate of 10 in/hr	Infiltration rate of 1 in/hr	
				Test infiltration rates per SPU Materials Lab procedure.
	Pressure wash @2500 psi bi-annually	Pressure wash @ 2500 psi annually	Pressure wash @ 2500 psi annually	
				Pressure wash pavement with an industrial machine












Level of Service	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
	Remove 100% of Garbage	Remove 75% of Garbage	Remove 20% of Garbage	
				Remove all garbage and debris as required with wire brush, broom, or pressure washer. Dispose of debris and garbage off site.
	Remove 100% vegetation growth (moss/creeping plants) adjacent to pavement	Remove 75% vegetation growth (moss/creeping plants) adjacent to pavement	Remove 40% vegetation growth (moss/creeping plants) adjacent to pavement	
				Vegetated, landscaped, eroded, or soiled areas need to be maintained to prevent growth on to porous pavement, debris clogging, and lateral transport of adjacent materials. Keep joints free of material mechanically, with a weed burner, or pressure washer.

Level of Service	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
<b>Infiltration Failure</b>	Any evidence ponding water needs to be reported to USM Green Stormwater Infrastructure O&M Asset Manager for monitoring and restoration. Contact: Drena Donofrio at 206-571-1566			
<b>Misc.</b>	Inspect pavement for spalling, cracking edges, pot holes, depressions, large cracks, skid resistance, and raveling concrete 2X per year.	Inspect pavement for spalling, cracking edges, pot holes, depressions, large cracks, skid resistance, and raveling concrete 1X per year.	Inspect pavement for spalling, cracking edges, pot holes, depressions, large cracks, skid resistance, and raveling concrete every other year.	<i>SPU Materials lab (to quantify variability in field testing)</i>
	Pavement condition survey every 2 years	Pavement condition survey every 3 years	Pavement condition survey every 7 years	SDOT - contact Ben Hansen or current manager
	Address all safety issue to SDOT			Contact 684-ROAD for repair.

**Table V. Other Elements**

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
<p><b>OTHER ELEMENTS</b></p>	<ul style="list-style-type: none"> <li>• up to 10% blockage caused by organic matter, sediment, debris or trash</li> <li>• irrigation system functions properly with no blockages or breaks in drip system</li> <li>• ponding only to intended depth (varies by location)</li> <li>• pond capacity is maintained</li> <li>• no liner leakages reported</li> </ul>	<ul style="list-style-type: none"> <li>• between 10-30% blockage caused by organic matter, sediment, debris or trash</li> <li>• irrigation system functions properly with no blockages or breaks in drip system</li> <li>• ponding only to intended depth (varies by location)</li> <li>• some sediment may reduce pond capacity</li> <li>• no liner leakages reported</li> </ul>	<ul style="list-style-type: none"> <li>• more than 30% blockage caused by organic matter, sediment, debris or trash</li> <li>• irrigation system has occasional blockages or breaks in drip lines</li> <li>• ponding only to intended depth (varies by location)</li> <li>• sediment buildup causes reduced pond capacity</li> <li>• no leakages reported</li> </ul>	
<p><input type="checkbox"/> Curb cuts</p>	<p>Curb is up to 10% blocked</p> 	<p>Curb is between 10-40% blocked</p> 	<p>Curb is above 40% blocked</p> 	<p><input type="checkbox"/> remove trash and organic debris and dispose properly</p>





Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Culverts	<p>Culvert is up to 10% blocked</p> 	<p>Culvert is between 10-40% blocked</p> 	<p>Culvert is more than 40% blocked</p> 	remove trash and organic debris and dispose properly
<input type="checkbox"/> Irrigation systems (for establishing vegetation)	<p>holes in drip irrigation correspond with plant locations; nozzles have no breaks, leaks, or blocks</p> 	<p>plants and drip holes mostly aligned minimal seeping of water when system is off; no breaks or blockages</p> 	<p>system has breaks or leaks; vegetation is not being adequately watered; complaints of ponding</p> 	repair as needed (for establishing vegetation 0-3 years old)

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Porous/pervious pavers	<p>water infiltrates well, pavers are up to 10% clogged or minimal ponding is observed</p> 	<p>water infiltrates well, pavers are between 10-40% clogged and minimal ponding is observed</p> 	<p>water does not infiltrate well, pavers are more than 40% clogged</p> 	<p>vactor debris, weed burn as required</p>

**Table VI. Infiltration**

<b>Infiltration Failure</b>	Any evidence of a cell holding water for more than 24 hours needs to be reported to USM Green Stormwater Operations and Maintenance Asset Manager for monitoring or retrofitting.  Contact: Drena Donofrio at 206-571-1566
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**Table VII. Safety, Spill Prevention and Response, and Pest Control**

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)
<p><b>SAFETY, MOBILITY, ACCESS</b></p>	<ul style="list-style-type: none"> <li>• Vegetation causes no visibility (line of sight) or driver safety issues</li> <li>• Infrastructure is always accessible and has clear access path</li> <li>• Vegetation around infrastructure is maintained at height to prevent damage during routine maintenance</li> <li>• Fire hydrant access clearly visible and accessible</li> <li>• Vegetation does not impede pedestrian access</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetation causes minimal visibility (line of sight) or driver safety issues</li> <li>• Infrastructure is mostly accessible and has access path</li> <li>• Most vegetation around infrastructure is maintained at height to prevent damage during routine maintenance</li> <li>• Fire hydrant access clearly visible and accessible</li> <li>• Vegetation does not impede pedestrian access</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetation causes visibility (line of sight) or driver safety issues</li> <li>• Infrastructure is not accessible and has clear access path</li> <li>• Vegetation around infrastructure is will be damaged during routine maintenance</li> <li>• Fire hydrant access clearly visible and accessible</li> <li>• Vegetation does not impede pedestrian access</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetation causes visibility (line of sight) or driver safety issues</li> <li>• Infrastructure is not accessible and has clear access path</li> <li>• Vegetation around infrastructure is will be damaged during routine maintenance</li> <li>• Fire hydrant access clearly visible and accessible</li> <li>• Vegetation does not impede pedestrian access</li> </ul>
				
<p><b>SPILL PREVENTION</b></p>	<ul style="list-style-type: none"> <li>• Exercise spill prevention measures whenever handling or storing potential contaminants.</li> <li>• Fertilizers, Herbicides, Fungicides and Insecticides are prohibited in GSI.</li> </ul>			

<b>SPILL RESPONSE</b>	<ul style="list-style-type: none"><li>• Clean up spills as soon as possible to prevent contamination of stormwater.</li></ul>
<b>PEST CONTROL</b>	<p>Insects:</p> <ul style="list-style-type: none"><li>• Standing water remains in the basin for time periods suitable to insect development.</li><li>• Identify the cause of the standing water and take appropriate actions to address the problem.</li></ul> <p>Rodents:</p> <ul style="list-style-type: none"><li>• Rodent holes are present near the facility.</li><li>• Fill and compact soil around the holes.</li></ul>





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