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# #1 – Maintenance Checklist for Detention Ponds:

| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance**  **Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Trash and Debris | Any trash and debris which exceed five cubic feet per 1,000 square feet. If less than threshold, all trash and debris will be removed as part of next scheduled maintenance. | Trash and debris cleared from site. |  |  |
| General | Poisonous Vegetation and Noxious Weeds | Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined in the [Thurston County Noxious Weeds List.](http://piercecountyweedboard.wsu.edu/weedlist.html) (Apply requirements of adopted integrated pest management policies for the use of herbicides.) | No danger of poisonous vegetation where maintenance personnel or the public might normally be. Noxious and nuisance vegetation removed according to applicable regulations. *(Coordinate with Thurston County.) Complete eradication of noxious weeds may not be possible. Compliance with state or local eradication policies required.* |  |  |
| General | Contaminants and Pollution | Any evidence of contaminants such as oil, gasoline, concrete slurries, or paint. | No contaminants or pollutants present. *(Coordinate source control, removal, and/or cleanup with Thurston County Water Resources 360-754-4681 and/or Dept. of Ecology Spill Response 800-424-8802.)* |  |  |
| General | Rodent Holes | If the facility is constructed with a dam or berm, look for rodent holes or any evidence of water piping through the dam or berm. | Rodents removed and dam or berm repaired. *(Coordinate with Thurston County; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)* |  |  |
| General | Beaver Dams | Beaver dam results in an adverse change in the functioning of the facility. | Facility is returned to design function. (*Contact WDFW Region 6 to identify the appropriate Nuisance Wildlife Control Operator.)* |  |  |
| General | Insects | When insects such as wasps and hornets interfere with maintenance activities. | Insects destroyed or removed from site. *Apply insecticides in compliance with adopted integrated pest management policies.* |  |  |
| General | Tree Growth and Dense Vegetation | Tree growth and dense vegetation impedes inspection, maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). | Trees and vegetation do not hinder inspection or maintenance activities. |  |  |
| General | Hazard Trees | If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements). | Hazard trees removed. |  |  |
| General | Performance | Check crest gauge against design expectations (see Maintenance and Source Control Manual). | Reading recorded. County notified if not meeting design performance. |  |  |
| Crest Gauge | Crest Gauge Missing/ Broken | Crest gauge is not functioning properly, has been vandalized, or is missing. | Repair/replace. |  |  |
| Side Slopes of Pond | Erosion | Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. | Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. |  |  |
| Side Slopes of Pond | Erosion | Any erosion observed on a compacted berm embankment. | Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.  *If erosion is occurring on compacted berms, a professional engineer should be consulted to resolve source of erosion.* |  |  |
| Storage Area | Sediment | Accumulated sediment that exceeds 10 percent of the designed pond depth unless otherwise specified or affects facility inlets or outlets. | Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.  *(If sediment contamination is a potential problem, sediment should be tested regularly to determine leaching potential prior to disposal.)* |  |  |
| Storage Area | Liner (If Applicable) | Liner is visible and has more than three one-fourth inch holes in it. | Liner repaired or replaced. Liner is fully covered. |  |  |
| Pond Berms (Dikes) | Settlements | Any part of berm which has settled 4 inches lower than the design elevation. | Dike is built back to the design elevation.  *If settlement is significant, a professional engineer should be consulted to determine the cause of the settlement.* |  |  |
| Pond Berms Over 4 ft in height (Dikes) | Tree Growth | Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm. | Trees on berms removed.  *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.* |  |  |
| Pond Berms (Dikes) | Piping | Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. | Piping eliminated. Erosion potential eliminated. *Recommend a geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.* |  |  |
| Emergency Overflow/ Spillway | Tree Growth | Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. | Trees on emergency spillway removed. *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.* |  |  |
| Emergency Overflow/ Spillway | Rock Missing | Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway. | Rocks and pad depth restored to design standards. (Riprap on inside slopes need not be replaced.) |  |  |
| Emergency Overflow/ Spillway | Erosion | Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.  Any erosion observed on a compacted berm embankment. | Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.  *If erosion is occurring on compacted berms a professional engineer should be consulted to resolve source of erosion.* |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #2 – Maintenance Checklist for Infiltration Basins and Trenches:

| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance**  **Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Trash and Debris | Any trash and debris which exceed five cubic feet per 1,000 square feet. If less than threshold, all trash and debris will be removed as part of next scheduled maintenance. | Trash and debris cleared from site. |  |  |
| General | Poisonous Vegetation and Noxious Weeds | Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined in the [Thurston County Noxious](http://piercecountyweedboard.wsu.edu/weedlist.html)  [Weeds List.](http://piercecountyweedboard.wsu.edu/weedlist.html) (Apply requirements of adopted integrated pest management policies for the use of herbicides.) | No danger of poisonous vegetation where maintenance personnel or the public might normally be. *(Coordinate with Tacoma-Pierce*  *County Health Department) Complete eradication of noxious weeds may not be possible. Compliance with state or local eradication policies required.* |  |  |
| General | Contaminants and Pollution | Any evidence of oil, gasoline, contaminants or other pollutants. | No contaminants or pollutants present. *(Coordinate removal/cleanup with Thurston County Water Resources 360-754-4681 and/or Dept. of Ecology Spill Response 800- 424-8802.)* |  |  |
| General | Rodent Holes | If the facility is constructed with a dam or berm, look for rodent holes or any evidence of water piping through the dam or berm. | Rodents removed and dam or berm repaired. *(Coordinate with Thurston County; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)* |  |  |
| General | Beaver Dams | Beaver dam results in an adverse change in the functioning of the facility. | Facility returned to design function. *(Contact WDFW Region 6 to identify the appropriate Nuisance Wildlife Control Operator)* |  |  |
| General | Insects | When insects such as wasps and hornets interfere with maintenance activities. | Insects destroyed or removed from site. *Apply insecticides in compliance with adopted integrated pest management policies.* |  |  |
| General | Performance | Check crest gauge against design expectations (see Maintenance and Source Control Manual). | Crest gauge results reflect design performance expectations. Reading recorded. County notified if not meeting design performance. |  |  |
| Crest Gauge | Crest Gauge Missing/ Broken | Crest gauge is not functioning properly, has been vandalized, or is missing. | Crest gauge present and functioning. Repair/replace crest gauge if missing or broken. |  |  |
| Storage Area | Water Not Infiltrating | Water ponding in infiltration basin after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events.  (A percolation test pit or test of facility indicates facility is only working at  90 percent of its designed capabilities. If 2 inches or more sediment is present, remove). | Facility infiltrates as designed. Sediment is removed and/or facility is cleaned so that infiltration system works according to design. |  |  |
| Filter Bags (if applicable) | Filled with Sediment and Debris | Sediment and debris fill bag more than one-half full. | Filter bag less than one-half full. Filter bag is replaced or system is redesigned. |  |  |
| Rock Filters | Sediment and Debris | By visual inspection, little or no water flows through filter during heavy rain storms. | Water flows through filter. Replace gravel in rock filter if needed. |  |  |
| Trenches | Observation Well (Use Surface of Trench if Well is Not Present) | Water ponds at surface during storm events. Less than 90 percent of design infiltration rate. | Remove and replace/clean rock and geomembrane. |  |  |
| Ponds | Vegetation | Exceeds 18 inches. | Grass or groundcover mowed to a height no greater than 6 inches. |  |  |
| Ponds | Vegetation | Bare spots. | No bare spots. Revegetate and stabilize immediately. |  |  |
| Side Slopes of Pond | Erosion | Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. | Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.  *If erosion is occurring on compacted slope, a professional engineer should be consulted to resolve source of erosion.* |  |  |
| Pond Berms (Dikes) | Settlements | Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works. | Dike is built back to the design elevation.  *If settlement is significant, a professional engineer should be consulted to determine the cause of the settlement.* |  |  |
| Pond Berms (Dikes) | Piping | Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. | No water flow through pond berm. Piping eliminated. Erosion potential eliminated. *Recommend a geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.* |  |  |
| General | Hazard Trees | If dead, diseased, or dying trees are identified. | Hazard trees removed. (*Use a certified Arborist to determine health of tree or removal requirements).* |  |  |
| General | Tree Growth and Dense Vegetation | Tree growth and dense vegetation which impedes inspection, maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). | Trees and vegetation do not hinder inspection or maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). |  |  |
| Pond Berms (Dikes) | Tree Growth | Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm. | Trees on berms removed.  *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.* |  |  |
| Emergency Overflow/ Spillway | Tree Growth | Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. | Trees on emergency spillways removed.  *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.* |  |  |
| Emergency Overflow/ Spillway | Rock Missing | Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of outflow path of spillway. | Rocks and pad depth restored to design standards. (Riprap on inside slopes need not be replaced.) |  |  |
| Emergency Overflow/ Spillway | Erosion | Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.  Any erosion observed on a compacted berm embankment. | Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.  *If erosion is occurring on compacted berms a professional engineer should be consulted to resolve source of erosion*. |  |  |
| Presettling Ponds and Vaults | Facility or sump filled with Sediment and/or Debris | 6 inches or designed sediment trap depth of sediment. | No sediment present in presettling pond or vault. Sediment is removed. |  |  |
| Drain Rock | Water Ponding | If water enters the facility from the surface, inspect to see if water is ponding at the surface during storm events.  If buried drain rock, observe drawdown through observation port or cleanout. | No water ponding on surface during storm events.  *Clear piping through facility when ponding occurs. Replace rock material/sand reservoirs as necessary. Tilling of subgrade below reservoir may be necessary (for trenches) prior to backfill.* |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #3 – Maintenance Checklist for Closed Detention Systems (Tanks/Vaults):

| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance**  **Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Storage Area | Plugged Air Vents | One-half of the cross-section of a vent is blocked at any point or the vent is damaged. | Vents open and functioning. Remove blockage or replace air vent if damaged. |  |  |
| Storage Area | Debris and Sediment | Accumulated sediment depth exceeds 10 percent of the diameter of the storage area for one-half length of storage vault or any point depth exceeds 15 percent of diameter. | All sediment and debris removed from storage area. |  |  |
| Storage Area | Joints Between Tank/Pipe Section | Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability.) | All joint between tank/pipe sections are sealed. |  |  |
| Storage Area | Tank Pipe Bent Out of Shape | Any part of tank/pipe is bent out of shape more than 10 percent of its design shape. (Review required by engineer to determine structural stability.) | Tank/pipe repaired or replaced to design. |  |  |
| Storage Area | Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound. | Vault replaced or repaired to design specifications and is structurally sound. |  |  |
| Storage Area | Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls. | No cracks more than one-fourth inch wide at the joint of the inlet/outlet pipe. No water or soil entering vault through joints or walls. |  |  |
| Crest Gauge | Crest Gauge Missing/Broken | Crest gauge is not functioning properly, has been vandalized, or is missing. | Crest gauge present and functioning. *Repair/replace crest gauge if missing or broken.* |  |  |
| Manhole | Cover Not in Place | Cover is missing or only partially in place. Any open manhole requires maintenance. | Manhole access cover/ lid is in place and secure. |  |  |
| Manhole | Locking Mechanism Not Working | Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than one-half inch of thread (may not apply to self-locking lids). | Mechanism opens with proper tools. |  |  |
| Manhole | Cover Difficult to Remove | One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance. | Cover can be removed and reinstalled by one maintenance person. |  |  |
| Manhole | Ladder Rungs Unsafe | Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks. | Ladder meets design standards. Allows maintenance person safe access. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

Tanks and vaults are a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.

# #4 – Maintenance Checklist for Control Structure/Flow Restrictor:

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Trash and Debris (Includes Sediment) | Material exceeds 25 percent of sump depth or 1 foot below orifice plate. | No trash and debris blocking or potentially blocking control structure orifice. |  |  |
| General | Structural Damage | Structure is not securely attached to manhole wall. | Structure securely attached to wall and outlet pipe. |  |  |
| General | Structural Damage | Structure is not in upright position (allow up to 10 percent from plumb). | Structure in correct position. |  |  |
| General | Structural Damage | Connections to outlet pipe are not watertight and show signs of rust. | Connections to outlet pipe are water tight; structure repaired or replaced and works as designed. |  |  |
| General | Structural Damage | Any holes–other than designed holes–in the structure. | Structure has no holes other than designed holes. |  |  |
| Cleanout Gate | Damaged or Missing | Cleanout gate is not watertight or is missing. | Gate is watertight and works as designed. |  |  |
| Cleanout Gate | Damaged or Missing | Gate cannot be moved up and down by one maintenance person. | Gate moves up and down easily and is watertight. |  |  |
| Cleanout Gate | Damaged or Missing | Chain/rod leading to gate is missing or damaged. | Chain is in place and works as designed. |  |  |
| Cleanout Gate | Damaged or Missing | Gate is rusted over 50 percent of its surface area. | Gate is repaired or replaced to meet design standards. |  |  |
| Orifice Plate | Damaged or Missing | Control device is not working properly due to missing, out of place, or bent orifice plate. | Plate is in place and works as designed. |  |  |
| Orifice Plate | Obstructions | Any trash, debris, sediment, or vegetation blocking the plate. | Plate is free of all obstructions and works as designed. |  |  |
| Overflow Pipe | Obstructions | Any trash or debris blocking (or having the potential of blocking) the overflow pipe. | Pipe is free of all obstructions and works as designed. |  |  |
| Manhole | Cover Not in Place | Cover is missing or only partially in place. Any open manhole requires maintenance. | Manhole access cover/ lid is in place and secure. |  |  |
| Manhole | Locking Mechanism Not Working | Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than one-half inch of thread (may not apply to self- locking lids). | Mechanism opens with proper tools. |  |  |
| Manhole | Cover Difficult to Remove | One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance. | Cover can be removed and reinstalled by one maintenance person. |  |  |
| Manhole | Ladder Rungs Unsafe | Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks. | Ladder meets design standards. Allows maintenance person safe access. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

Control structures are usually considered a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.

# #5 – Maintenance Checklist for Catch Basins:

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | “Dump no pollutants” (or similar) stencil or stamp not visible | Stencil or stamp should be visible and easily read. | Warning signs (e.g., “Dump No Waste- Drains to Stream” or “Only rain down the drain”/ “Puget Sound starts here”) painted or embossed on or adjacent to all storm drain inlets. |  |  |
| General | Trash and Debris | Trash or debris which is located immediately in front of the catch basin opening or is blocking inlet capacity by more than 10 percent. | No trash or debris located immediately in front of catch basin or on grate opening. |  |  |
| General | Trash and Debris | Trash or debris (in the basin) that exceeds 1/3 of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the debris surface to the invert of the lowest pipe. | No trash or debris in the catch basin. |  |  |
| General | Trash and Debris | Trash or debris in any inlet or outlet pipe blocking more than one-third of its height. | Inlet and outlet pipes free of trash or debris. |  |  |
| General | Trash and Debris | Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane). | No dead animals or vegetation present within the catch basin. |  |  |
| General | Sediment | Sediment (in the basin) that exceeds 1/3 of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe. | No sediment in the catch basin. |  |  |
| General | Structure Damage to Frame and/or Top Slab | Top slab has holes larger than 2 square inches or cracks wider than one-fourth inch. | No holes and cracks in the top slab allowing material to run into the basin. |  |  |
| General | Structure Damage to Frame and/or Top Slab | Frame not sitting flush on top slab, i.e., separation of more than three-fourth inch of the frame from the top slab. Frame not securely attached. | Frame is sitting flush on the riser rings or top slab and firmly attached. |  |  |
| General | Fractures or Cracks in Basin Walls/ Bottom | Maintenance person judges that structure is unsound. | Basin replaced or repaired to design standards. |  |  |
| General | Fractures or Cracks in Basin Walls/ Bottom | Grout fillet has separated or cracked wider than one-half-inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks. | Pipe is regrouted and secure at basin wall. |  |  |
| General | Settlement/ Misalignment | If failure of basin has created a safety, function, or design problem. | Basin replaced or repaired to design standards. |  |  |
| General | Vegetation | Vegetation growing across and blocking more than 10 percent of the basin opening. | No vegetation blocking opening to basin. |  |  |
| General | Vegetation | Vegetation growing in inlet/outlet pipe joints that is more than 6 inches tall and less than 6 inches apart. | No vegetation or root growth present. |  |  |
| General | Contamination and Pollution | Any evidence of oil, gasoline, contaminants or other pollutants. | No contaminants or pollutants present. *(Coordinate removal/cleanup with Thurston County Water Resources 360-754-4681 and/or Dept. of Ecology Spill Response 800- 424-8802.)* |  |  |
| Catch Basin Cover | Cover Not in Place | Cover is missing or only partially in place. Any open catch basin requires maintenance. | Catch basin cover is in place and secured. |  |  |
| Catch Basin Cover | Locking Mechanism Not Working | Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than one-half- inch of thread. | Mechanism opens with proper tools. |  |  |
| Catch Basin Cover | Cover Difficult to Remove | One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.) | Cover can be removed by one maintenance person. |  |  |
| Ladder | Ladder Rungs Unsafe | Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges. | Ladder meets design standards and allows maintenance person safe access. |  |  |
| Grates | Grate Opening Unsafe | Grate with opening wider than seven- eighths of an inch. | Grate opening meets design standards. |  |  |
| Grates | Trash and Debris | Trash and debris that is blocking more than 20 percent of grate surface inletting capacity. | Grate free of trash and debris. |  |  |
| Grates | Damaged or Missing | Grate missing or broken member(s) of the grate. | Grate is in place and meets design standards. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #6 – Maintenance Checklist for Debris Barriers (e.g., Trash Racks):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| General | Trash and Debris | Trash or debris that is plugging more than 20 percent of the openings in the barrier. | Barrier cleared to receive design flow capacity. |  |  |
| General | Damaged/Missing Bars | Bars are bent out of shape more than 3 inches. | Bars in place with no bends more than three-fourth inch. |  |  |
| General | Damaged/Missing Bars | Bars are missing or entire barrier missing. | Bars in place according to design. |  |  |
| General | Damaged/Missing Bars | Bars are loose and rust is causing 50 percent deterioration to any part of barrier. | Barrier replaced or repaired to design standards. |  |  |
| General | Inlet/Outlet Pipe | Debris barrier missing or not attached to pipe. | Barrier firmly attached to pipe. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #7 – Maintenance Checklist for Energy Dissipaters:

| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| External: | | | | | |
| Rock Pad | Missing or Moved Rock | Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil. | Rock pad replaced to design standards. |  |  |
| Rock Pad | Erosion | Soil erosion in or adjacent to rock pad. | Rock pad replaced to design standards. |  |  |
| Dispersion Trench | Pipe Plugged with Sediment | Accumulated sediment that exceeds 20 percent of the design depth. | Pipe cleaned/flushed so that it matches design. |  |  |
| Dispersion Trench | Not Discharging Water Properly | Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” of water along trench). Intent is to prevent erosion damage. | Water discharges from feature by sheet flow. Trench redesigned or rebuilt to standards. |  |  |
| Dispersion Trench | Perforations Plugged | Over one-half of perforations in pipe are plugged with debris and sediment. | Perforations freely discharge flow. Perforated pipe cleaned or replaced. |  |  |
| Dispersion Trench | Water Flows Out Top of “Distributor” Catch Basin | Water flows out of distributor catch basin during any storm less than the design storm or is causing or appears likely to cause damage. | No flow discharges from distributor catch basin. Facility rebuilt or redesigned to standards. |  |  |
| Dispersion Trench | Receiving Area Over-Saturated | Water in receiving area is causing or has potential of causing landslide problems. | No danger of landslides. |  |  |
| Internal: | | | | | |
| Manhole/ Chamber | Worn or Damaged Post, Baffles, Side of Chamber | Structure dissipating flow deteriorates to one-half of original size or any concentrated worn spot exceeding 1 square foot which would make structure unsound. | Structure in no danger of failing. Structure replaced to design standards if needed. |  |  |
| Manhole/ Chamber | Trash and Debris | Trash or debris (in the basin) that exceeds 1/3 of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the debris surface to the invert of the lowest pipe. | No trash or debris in the catch basin. |  |  |
| Manhole/ Chamber | Trash and Debris | Trash or debris in any inlet or outlet pipe blocking more than one-third of its height. | Inlet and outlet pipes free of trash or debris. |  |  |
| Manhole/ Chamber | Trash and Debris | Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane). | No dead animals or vegetation present within the catch basin. |  |  |
| Manhole/ Chamber | Sediment | Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe. | No sediment in the catch basin. |  |  |
| Manhole/ Chamber | Structure Damage to Frame and/or Top Slab | Top slab has holes larger than 2 square inches or cracks wider than one-fourth inch. | No holes and cracks in top slab allowing material to run into the basin. |  |  |
| Manhole/ Chamber | Structure Damage to Frame and/or Top Slab | Frame not sitting flush on top slab, i.e., separation of more than three-fourth inch of the frame from the top slab. Frame not securely attached. | Frame is sitting flush on the riser rings or top slab and firmly attached. |  |  |
| Manhole/ Chamber | Fractures or Cracks in Basin Walls/ Bottom | Maintenance person judges that structure is unsound. | Basin replaced or repaired to design standards. |  |  |
| Manhole/ Chamber | Fractures or Cracks in Basin Walls/ Bottom | Grout fillet has separated or cracked wider than one-half-inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks. | Pipe is regrouted and secure at basin wall. |  |  |
| Manhole/ Chamber | Settlement/ Misalignment | If failure of basin has created a safety, function, or design problem. | Basin replaced or repaired to design standards. |  |  |
| Manhole/ Chamber | Contamination and Pollution | Any evidence of oil, gasoline, contaminants or other pollutants. | No contaminants or pollutants present. *(Coordinate removal/cleanup with Thurston County Water Resources 360-754-4681 and/or Dept. of Ecology Spill Response 800- 424-8802.)* |  |  |
| Catch Basin Cover | Cover Not in Place | Cover is missing or only partially in place. Any open catch basin requires maintenance. | Catch basin cover is closed. |  |  |
| Catch Basin Cover | Locking Mechanism Not Working | Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than one-half- inch of thread. | Mechanism opens with proper tools. |  |  |
| Catch Basin Cover | Cover Difficult to Remove | One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.) | Cover can be removed by one maintenance person. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #8 – Maintenance Checklist for Basic and Compost-Amended Biofiltration Swales:

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Sediment Accumulation on Grass | Sediment depth exceeds 2 inches or inhibits vegetation growth in 10 percent or more of swale. | No sediment deposits in treatment area of the biofiltration swale. Remove sediment deposits on grass treatment area of the swale. When finished, swale should be level from side to side and drain freely toward outlet.  There should be no areas of standing water once inflow has ceased. |  |  |
| General | Standing Water | When water stands in the swale between storms and does not drain freely. | Swale drains freely and no standing water in swale between storms.  *Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, remove clogged check dams, add underdrains or convert to a wet biofiltration swale.* |  |  |
| General | Flow Spreader | Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale width. | Spreader leveled and cleaned and flow spread evenly over entire swale width. |  |  |
| General | Constant Base Flow | When small quantities of water continually flow through the swale, even when it has been dry for weeks, and an eroded, muddy channel has formed in the swale bottom. | Base flow removed from swale by a low-flow pea-gravel drain the length of the swale, or by-passed around the swale. |  |  |
| General | Poor Vegetation Coverage | When grass is sparse or bare or eroded patches occur in more than 10 percent of the swale bottom. | Swale has no bare spots and grass is thick and healthy.  *If grass growth is poor, determine and address the cause. Re-plant with plugs of grass from the upper slope: plant in the swale bottom at 8-inch intervals. Or re-seed into loosened, fertile soil.* |  |  |
| General | Vegetation | When the grass becomes excessively tall (greater than 10 inches); when nuisance weeds and other vegetation starts to take over. | Vegetation mowed or nuisance vegetation removed so that flow not impeded.  *Grass mowed to a height of 3 to 4 inches. No grass clippings left in swale.* |  |  |
| General | Excessive Shading | Grass growth is poor because sunlight does not reach swale. | Over-hanging limbs trimmed back and brushy vegetation on adjacent slopes removed. |  |  |
| General | Inlet/Outlet | Inlet/outlet areas clogged with sediment and/or debris. | Inlet and outlet areas clear of sediment and debris. Material clogging or blocking the inlet/outlet area removed. |  |  |
| General | Trash and Debris Accumulation | Trash and debris accumulated in the bioswale. | Leaves, litter, and oily materials removed as needed. Curb cuts and level spreaders cleaned as needed. |  |  |
| General | Erosion/Scouring | Eroded or scoured swale bottom due to flow channelization, or higher flows. | No eroded or scoured areas in biofiltration swale. Cause of erosion or scour addressed. *For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. If bare areas are large, generally greater than 12 inches wide, the swale should be re-graded and re- seeded. For smaller bare areas, overseed when bare spots are evident, or take plugs of grass from the upper slope and plant in the swale bottom at 8-inch intervals.* |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #9 – Maintenance Checklist for Wet and Continuous Inflow Biofiltration Swales:

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Sediment Accumulation | Sediment depth exceeds 2 inches in 10 percent of the swale treatment area. | No sediment deposits in treatment area. |  |  |
| General | Water Depth | Water not retained to a depth of about 4 inches during the wet season. | Water depth of four inches throughout swale for most of wet season. Build up or repair outlet berm so that water is retained in the wet swale. |  |  |
| General | Wetland Vegetation | Vegetation becomes sparse and does not provide adequate filtration, OR vegetation is crowded out by very dense clumps of cattail, which do not allow water to flow through the clumps. | Wetland vegetation fully covers bottom of swale. Cause of lack of vigor of vegetation addressed. Replant as needed.  *No cattails or nuisance vegetation present. For excessive cattail growth, cut cattail shoots back and compost offsite. Note: normally wetland vegetation does not need to be harvested unless die-back is causing oxygen depletion in downstream waters.* |  |  |
| General | Inlet/Outlet | Inlet/outlet area clogged with sediment and/or debris. | Inlet and outlet areas clear of sediment and debris. |  |  |
| General | Trash and Debris Accumulation | Any trash and debris which exceed one cubic foot per 1,000 square feet. If less than threshold, all trash and debris will be removed as part of next scheduled maintenance. | No trash and debris present. Any trash and debris removed from wet swale. |  |  |
| General | Erosion/Scouring | Swale has eroded or scoured due to flow channelization, or higher flows. | No eroded or scoured areas in biofiltration swale.  *Cause of erosion or scour addressed, Design flows checked to assure swale is large enough to handle flows. Excess flows are bypassed or swale enlarged. Eroded areas replanted with fibrous- rooted plants such as Juncus effusus (soft rush) in wet areas or snowberry (Symphoricarpos albus) in dryer areas.* |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #10 – Maintenance Checklist for Filter Strips (Basic and CAVFS):

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Sediment Accumulation on Grass | Sediment depth exceeds 2 inches. | No sediment deposits in treatment areas. Slope re-leveled to be even and pass flows evenly through strip. |  |  |
| General | Vegetation | When the grass becomes excessively tall (greater than 10 inches); when nuisance weeds and other vegetation starts to take over. | Grass is healthy and nuisance vegetation controlled such that flow not impeded. Grass should be mowed to a height between 3-4 inches. |  |  |
| General | Trash and Debris Accumulation | Trash and debris accumulated on the filter strip. | No trash or debris present. Any trash and debris removed from filter. |  |  |
| General | Erosion/Scouring | Eroded or scoured areas due to flow channelization, or higher flows. | No eroded or scoured areas, cause of erosion or scour addressed.  *For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel (basic filter strip) or a 50/50 mixture of crushed gravel and compost (CAVFS). The grass will creep in over the rock in time. If bare areas are large, generally greater than 12 inches wide, the filter strip should be re-graded and re- seeded.*  *For smaller bare areas, overseed when bare spots are evident.* |  |  |
| General | Flow Spreader | Flow spreader uneven or clogged so that flows are not uniformly distributed through entire filter width. | Flows are spread evenly over entire filter width. Spreader is level and clean. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #11 – Maintenance Checklist for Wet Ponds:

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Water level | First cell is empty, does not hold water. | Water retained in first cell for most of the year.  *Line the first cell to maintain at least 4 feet of water. Although the second cell may drain, the first cell must remain full to control turbulence of the incoming flow and reduce sediment resuspension.* |  |  |
|  | Trash and Debris | Accumulation that exceeds one cubic foot per 1,000 square feet of pond area. | No trash or debris on site. Any trash and debris removed from pond. |  |  |
|  | Inlet/Outlet Pipe | Inlet/Outlet pipe clogged with sediment and/or debris material. | No clogging or blockage in the inlet and outlet piping. |  |  |
|  | Sediment Accumulation in Pond Bottom | Sediment accumulations in pond bottom that exceeds the depth of sediment zone plus 6 inches, usually in the first cell. | Sediment removed from pond bottom. (*If sediment contamination is a potential problem, sediment should be tested regularly to determine leaching potential prior to disposal.)* |  |  |
|  | Oil Sheen on Water | Prevalent and visible oil sheen. | Oil removed from water using oil- absorbent pads or vactor truck. Source of oil located and corrected.  *If chronic low levels of oil persist, plant wetland plants such as Juncus effusus (soft rush) which can uptake small concentrations of oil.* |  |  |
|  | Erosion | Erosion of the pond’s side slopes and/or scouring of the pond bottom that exceeds 6 inches, or where continued erosion is prevalent. | Slopes stabilized using proper erosion control measures and repair methods. |  |  |
|  | Settlement of Pond Dike/Berm | Any part of these components that has settled 4 inches or lower than the design elevation, or inspector determines dike/berm is unsound. | Dike/berm is repaired to specifications. |  |  |
|  | Internal Berm | Berm dividing cells should be level. | Berm surface is leveled so that water flows evenly over entire length of berm. |  |  |
|  | Overflow Spillway | Rock is missing and soil is exposed at top of spillway or outside slope. | Rocks replaced to specifications. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #12 – Maintenance Checklist for Wet Vaults:

| **Drainage System Feature** | **Defect or**  **Problem** | **Conditions to Check For** | **Results Expected When Maintenance is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Trash/Debris Accumulation | Trash and debris accumulated in vault, pipe or inlet/outlet (includes floatables and non-floatables). | No trash or debris present. Any trash and debris removed from vault. |  |  |
| General | Sediment Accumulation in Vault | Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6 inches. | No sediment in vault.  *(If sediment contamination is a potential problem, sediment should be tested regularly to determine leaching potential prior to disposal.)* |  |  |
| General | Damaged Pipes | Inlet/outlet piping damaged or broken and in need of repair. | Pipe repaired and/or replaced. |  |  |
| General | Access Cover Damaged/Not Working | Cover cannot be opened or removed, especially by one person. | Pipe repaired or replaced to proper working specifications. |  |  |
| General | Ventilation | Ventilation area blocked or plugged. | Blocking material removed or cleared from ventilation area. A specified percentage of the vault surface area must provide ventilation to the vault interior (see design specifications). |  |  |
| Vault Structure | Damage – Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab | Maintenance/inspection personnel determine that the vault is not structurally sound. | Vault replaced or repairs made so that vault meets design specifications and is structurally sound. |  |  |
| Vault Structure | Damage – Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Vault repaired so that no cracks exist wider than one-fourth inch at the joint of the inlet/outlet pipe. |  |  |
| Vault Structure | Baffles | Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection staff. | Baffles repaired or replaced to specifications. |  |  |
| Access Ladder | Damage | Ladder is corroded or deteriorated, not functioning properly, not attached to structure wall, missing rungs, has cracks and/or misaligned.  Confined space warning sign missing. | Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel. Replace sign warning of confined space entry requirements. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

A vault is a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.

# #13 – Maintenance Checklist for Sand Filters (aboveground/open):

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Above ground (open sand filter) | Sediment and Silt Accumulation On Top Layer | Sediment and silt depth exceeds one- half inch over 10 percent of surface area of sand filter. | No sediment deposit on grass layer of sand filter that would impede permeability of the filter section. Silt scraped off during dry periods using steel rakes or other devices. Surface layer of the media striated. |  |  |
| Above ground (open sand filter) | Trash and Debris Accumulations | Trash and debris accumulated on sand filter bed. | No trash or debris present. Any trash and debris removed from sand filter bed. |  |  |
| Above ground (open sand filter) | Sediment/ Debris in Cleanouts | When the cleanouts become full or partially plugged with sediment and/or debris. | No sediment or debris present. Any sediment and debris removed from cleanouts and/or drainpipes. |  |  |
| Above ground (open sand filter) | Sand Filter Media | Drawdown of water through the sand filter media takes longer than 24-hours, flow through the overflow pipes occurs frequently, or hydraulic conductivity is less than 1 inch per hour. | Sand filter infiltrates as designed. Top several inches of sand are scraped. May require replacement of entire sand filter depth depending on extent of plugging and influent suspended solids loads (a sieve analysis is helpful to determine if the lower sand has too high a proportion of fine material). *Other options include removal of thatch, aerating the filter surface, tilling the filter surface, replacing the top 4 inches of filter media, and inspecting geotextiles for clogging.* |  |  |
| Above ground (open sand filter) | Prolonged Flows | Sand is saturated for prolonged periods of time (several weeks) and does not dry out between storms due to continuous base flow or prolonged flows from detention facilities. (Consider 4-8 hour drawdown tests). | Low, continuous flows are limited to a small portion of the facility by using a low wooden divider or slightly depressed sand surface. |  |  |
| Above ground (open sand filter) | Short Circuiting | Drawdown greater than 12 inches per hour. When flows become concentrated over one section of the sand filter rather than dispersed. (Consider 4-8 hour drawdown tests). | Flow and percolation of water through sand filter is uniform and dispersed across the entire filter area. No leaks in the cleanouts or underdrains. |  |  |
| Above ground (open sand filter) | Erosion Damage to Slopes | Erosion over 2 inches deep where cause of damage is prevalent or potential for continued erosion is evident. | Slopes stabilized using proper erosion control measures. |  |  |
| Above ground (open sand filter) | Rock Pad  Missing or Out of Place | Soil beneath the rock is visible. | Rock pad replaced or rebuilt to design specifications. |  |  |
| Above ground (open sand filter) | Flow Spreader | Flow spreader uneven or clogged so that flows are not uniformly distributed across sand filter. Rills and gullies on the surface of the filter can indicate improper function of the inlet flow spreader. | Spreader leveled and cleaned so that flows are spread evenly over sand filter. |  |  |
| Above ground (open sand filter) | Damaged Pipes | Any part of the piping that is crushed or deformed more than 20 percent or any other failure to the piping. | Pipe repaired or replaced. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #14 – Maintenance Checklist for Sand Filters (below ground/enclosed):

| **Drainage System Feature** | **Defect or**  **Problem** | **Conditions to Check For** | **Results Expected When Maintenance is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Below Ground Vault | Sediment and Silt Accumulation on Top Layer | Sediment and silt depth exceeds one- half inch. | No sediment deposits on grass layer of sand filter that would impede permeability of the filter section. Silt scraped off during dry periods using steel rakes or other devices. Surface layer of the media striated. |  |  |
| Below Ground Vault | Sediment Accumulation in Presettling Portion of Vault | Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6 inches. | No sediment deposits in first chamber of vault. |  |  |
| Below Ground Vault | Trash/Debris Accumulation | Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non- floatables. | No trash or debris present. Any trash and debris removed from vault and inlet/outlet piping. |  |  |
| Below Ground Vault | Sediment in Drain Pipes/Cleanouts | When drain pipes, cleanouts become full with sediment and/or debris. | No sediment or debris present. Any sediment and debris removed from cleanouts and/or drainpipes. |  |  |
| Below Ground Vault | Clogged Sand Filter Media | Drawdown of water through the sand filter media takes longer than 24-hours, and/or flow through the overflow pipes occurs frequently, and/or hydraulic conductivity is less than 1 inch per hour. | Sand filter infiltrates as designed. Top several inches of sand are scraped. May require replacement of entire sand filter depth depending on extent of plugging and influent suspended solids loads (a sieve analysis is helpful to determine if the lower sand has too high a proportion of fine material). *Other options include removal of thatch, aerating the filter surface, tilling the filter surface, replacing the top 4 inches of filter media, and inspecting geotextiles for clogging.* |  |  |
| Below Ground Vault | Short Circuiting | Drawdown greater than 12 inches per hour. When seepage/flow occurs along the vault walls and corners. Sand eroding near inflow area. (Consider 4-8 hour drawdown tests.) | Sand filter media section re-laid and compacted along perimeter of vault to form a semi-seal. Erosion protection added to dissipate force of incoming flow and curtail erosion. No leaks in the cleanouts or underdrains. |  |  |
| Below Ground Vault | Damaged Pipes | Inlet or outlet piping damaged or broken and in need of repair. | Pipe repaired and/or replaced. |  |  |
| Below Ground Vault | Flow Spreader | Flow spreader uneven or clogged so that flows are not uniformly distributed across sand filter. | Spreader leveled and cleaned so that flows are spread evenly over sand filter. |  |  |
| Below Ground Vault | Ventilation | Ventilation area blocked or plugged. | Blocking material removed or cleared from ventilation area. A specified percentage of the vault surface area must provide ventilation to the vault interior (see design specifications). |  |  |
| Below Ground Vault | Access Cover Damaged/Not Working | Cover cannot be opened, corrosion/deformation of cover. Maintenance person cannot remove cover using normal lifting pressure. | Cover repaired to proper working specifications or replaced. |  |  |
| Below Ground Vault | Vault Structure Damaged; Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. | Vault replaced or repairs made so that vault meets design specifications and is structurally sound. |  |  |
| Below Ground Vault | Vault Structure Damaged; Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Vault repaired so that no cracks exist wider than one-fourth inch at the joint of the inlet/outlet pipe. |  |  |
| Below Ground Vault | Baffles/Internal Walls | Baffles or walls corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person. | Baffles repaired or replaced to specifications. |  |  |
| Below Ground Vault | Access Ladder | Damaged ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned. | Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

A below ground enclosed sand filter is a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.

# #15 – Maintenance Checklist for Manufactured Media Filters.

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Media filter vault | Sediment Accumulation on Top of Filter Cartridges | Sediment accumulation exceeds 0.25 inches on top of cartridges. | No sediment deposits on top of cartridges. Sediment on cartridges likely indicates that cartridges are plugged and require maintenance. |  |  |
| Media filter vault | Sediment Accumulation in Vault | Sediment accumulation in vault exceeds 6 inches. Look for other indicators of clogged cartridges or overflow. | No sediment accumulation in vault. *Sediment in vault should be removed. Cartridges should be checked and replaced or serviced as needed.* |  |  |
| Media filter vault | Trash and Floatable Debris Accumulation | Trash and floatable debris accumulation in vault. | No trash or other floatable debris in filter vault. |  |  |
| Media filter vault | Filter Cartridges Submerged | Filter vault does not drain within 24 hours following storm. Look for evidence of submergence due to backwater or excessive hydrocarbon loading. | Filter media checked and replaced if needed. *If cartridges are plugged with oil additional treatment or source control BMP may be needed.* |  |  |
| Forebay | Sediment Accumulation | Sediment accumulation exceeds 6 inches or one-third of the available sump. | Sediment accumulation less than 6 inches. |  |  |
| Forebay | Trash and Floatable Debris Accumulation | Trash and/or floatable debris accumulation. | No trash or other floatable debris accumulation in forebay. Trash and/or floatable debris should be removed during inspections. *Significant oil accumulation may indicate the need for additional treatment or source control*. |  |  |
| Drain Pipes/ Cleanouts | Sediment in Drain Pipes/Cleanouts | Accumulated sediment that exceeds 20 percent of the diameter. | No sediment or debris in drainpipes or cleanouts. Sediment and debris removed. |  |  |
| Below ground vault | Access cover Damaged/ Not working | One maintenance person cannot remove lid after applying 80 pounds of lift, corrosion of deformation of cover. | Cover repaired to proper working specifications or replaced. |  |  |
| Below ground vault | Damaged Pipes | Any part of the pipes are crushed or damaged due to corrosion and/or settlement. | Pipe repaired or replaced. |  |  |
| Below ground vault | Vault Structure Has Cracks in Wall, Bottom, and Damage to Frame and/or Top Slab. | Cracks wider than one-half inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. | Vault repaired or replaced so that vaults meets design specifications and is structurally sound. |  |  |
| Below ground vault | Vault Structure has Cracks in Wall, Bottom, and Damage to Frame and/or Top Slab. | Cracks wider than 0.5 inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Vault repaired so that no cracks exist wider than 0.25 inch at the joint of inlet/outlet pipe. |  |  |
| Below ground vault | Baffles | Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person. | Baffles repaired or replaced to design specifications. |  |  |
| Below ground vault | Ladder Rungs Unsafe | Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks. Ladder must be fixed or secured immediately. | Ladder meets design standards and allows maintenance persons safe access. |  |  |
| Below Ground Cartridge Type | Media | Drawdown of water through the media takes longer than 1 hour, and/or overflow occurs frequently. | Media cartridges replaced. |  |  |
| Below Ground Cartridge Type | Short Circuiting | Flows do not properly enter filter cartridges. | Filter cartridges replaced. |  |  |

Also check Department of Ecology website and manufacturer guidelines for updates to O&M requirements.

If you are unsure whether a problem exists, contact a professional engineer.

A vault is a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.

# #16 – Maintenance Checklist for Baffle Oil/Water Separators (American Petroleum Institute [API] Type):

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Effluent Water Quality | Inspection of Discharge Water for Obvious Signs of Poor Water Quality | Floating oil in excess of 1 inch in first chamber, any oil in other chambers or effluent, or other contaminants of any type in any chamber. | No contaminants present other than a surface oil film. Effluent discharge from vault should be clear without thick visible sheen. |  |  |
| Structure | Sediment Accumulation | Sediment depth in bottom of vault exceeds 6 inches in depth. | No sediment deposits on vault bottom that would impede flow through the vault and reduce separation efficiency. |  |  |
| General | Trash and Debris Accumulation | Trash and debris accumulation in vault, or pipe inlet/outlet, floatables and non-floatables. | Trash and debris removed from vault, and inlet/outlet piping. |  |  |
| General | Oil Accumulation | Oil accumulations that exceed 1 inch, at the surface of the water or 6 inches of sludge in the sump. | No visible oil depth on water. *Extract oil/sludge from vault by vactoring.*  *Disposal in accordance with state and local rules and regulations.* |  |  |
| Structure | Damaged Pipes | Inlet or outlet piping damaged or broken and in need of repair. | Pipe repaired or replaced. |  |  |
| Structure | Access Cover Damaged/Not Working | Cover cannot be opened, corrosion/deformation of cover. | Cover repaired to proper working specifications or replaced. |  |  |
| Structure | Vault Structure Damage Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab | Maintenance person judges that structure is unsound. | Vault replaced or repairs made so that vault meets design specifications and is structurally sound. |  |  |
| Structure | Vault Structure Damage Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Vault repaired so that no cracks exist wider than one-fourth inch at the joint of the inlet/outlet pipe. |  |  |
| Structure | Baffles | Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person. | Baffles repaired or replaced to specifications. |  |  |
| Structure | Access Ladder Damaged | Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned. | Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

An oil/water separator vault is a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.

# #17 – Maintenance Checklist for Coalescing Plate Oil/Water Separators:

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Effluent Water Quality | Inspection of Discharge Water for Obvious Signs of Poor Water Quality | Floating oil in excess of 1 inch in first chamber, any oil in other chambers or effluent, or other contaminants of any type in any chamber. | No contaminants present other than surface oil film. Effluent discharge from vault should be clear with no thick visible sheen. |  |  |
| Structure | Sediment Accumulation | Sediment depth in bottom of vault exceeds 6 inches in depth and/or visible signs of sediment on plates. | No sediment deposits on vault bottom and plate media, which would impede flow through the vault and reduce separation efficiency. |  |  |
| General | Trash and Debris Accumulation | Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non- floatables. | Trash and debris removed from vault, and inlet/outlet piping. |  |  |
| General | Oil Accumulation | Oil accumulation that exceeds 1 inch at the water surface. | No visible oil depth on water and coalescing plates clear of oil. *Oil is extracted from vault using vactoring methods. Dispose of in accordance with state and local rules and regulations.*  *Coalescing plates are cleaned by thoroughly rinsing and flushing. Direct wash-down effluent to the sanitary sewer system where permitted. Should be no visible oil depth on water.* |  |  |
| Structure | Damaged Coalescing Plates | Plate media broken, deformed, cracked and/or showing signs of failure. | A portion of the media pack or the entire plate pack is replaced depending on severity of failure. |  |  |
| Structure | Damaged Pipes | Inlet or outlet piping damaged or broken and in need of repair. | Pipe repaired and or replaced. |  |  |
| Structure | Baffles | Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person. | Baffles repaired or replaced to specifications. |  |  |
| Structure | Vault Structure Damage – Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. | Vault replaced or repairs made so that vault meets design specifications and is structurally sound. |  |  |
| Structure | Vault Structure Damage – Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Vault repaired so that no cracks exist wider than one-fourth inch at the joint of the inlet/outlet pipe. |  |  |
| Structure | Access Ladder Damaged | Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned. | Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

An oil/water separator vault is a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.

# #18 – Maintenance Checklist for Treatment Wetlands:

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Trash and Debris | Any trash and debris accumulations which exceed five cubic feet per 1,000 square feet. If there is less than the threshold, remove all trash and debris as part of the next scheduled maintenance. | Trash and debris cleared from site. |  |  |
| General | Poisonous Vegetation and Noxious Weeds | Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined in the [Thurston County Noxious](http://piercecountyweedboard.wsu.edu/weedlist.html)  [Weeds List.](http://piercecountyweedboard.wsu.edu/weedlist.html) (Apply requirements of adopted integrated vegetation management (IVM) policies for the use of herbicides.) | No danger of poisonous vegetation where maintenance personnel or the public might have contact. (*Coordinate with Thurston County Noxious Weed Coordinator.) Complete eradication of noxious weeds may not be possible, however compliance with state or local eradication policies are required.* |  |  |
| General | Oil Sheen on Water | Prevalent and visible oil sheen. | Oil removed from water using oil- absorbent pads or vactor truck. Source of oil located and corrected. *If chronic low levels of oil persist, plant emergent wetland plants such as Juncus effusus (soft rush) which can assist filtering small concentrations of oil.* |  |  |
| General | Inlet/Outlet Pipe | Inlet/Outlet pipe clogged with sediment and/or debris material or damaged. | No clogging or blockage in the inlet and outlet piping. |  |  |
| General | Rodent Holes | If the facility is constructed with a dam or berm, look for rodent holes or any evidence of water piping through the dam or berm. | Rodents removed and dam or berm repaired. *(Coordinate with Thurston County; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)* |  |  |
| General | Beaver Dams | Beaver dam results in an adverse change in the functioning of the facility. | Facility is fully functioning. *Evaluate using beaver deceiver and leveler devices. If beaver removal is necessary, contact WDFW Region 6 to coordinate with a Nuisance Wildlife Control Operator.* |  |  |
| General | Tree Growth and Hazard Trees | Tree growth that impedes maintenance access. | Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., firewood or construction). |  |  |
| General | Tree Growth and Hazard Trees | If dead, diseased, or dying trees are identified, use a certified Arborist to determine the health of tree and whether removal is required. | Hazard trees removed. |  |  |
| General | Liner | Liner is visible and has more than three one-fourth inch holes in it. | Liner is repaired or replaced. Liner is fully covered. |  |  |
| Forebay | Sediment Accumulation | Sediment accumulation in forebay exceeds the design depth of the sediment zone plus 6 inches. | Accumulated sediment is removed from forebay bottom to the design depth of the sediment zone. |  |  |
| Side Slopes of Wetland | Erosion | Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. | Slopes stabilized using appropriate erosion control measure(s) such as rock reinforcement, planting of grass, or additional compaction. |  |  |
| Side Slopes of Wetland | Erosion | Any erosion observed on a compacted berm embankment. | *If erosion is occurring on compacted berms a professional engineer should be consulted to resolve source of erosion.* |  |  |
| Wetland Cell | Wetland Vegetation | 20 percent or more of the constructed wetland area has dead or dying vegetation, as measured by stem counts relative to the design plant coverage. | Plants in wetland cell surviving and not interfering with wetland function. Dead or dying vegetation is replaced by like species, unless recommended otherwise by the Wetlands Consultant and approved by the county. (*Watering, physical support, mulching, and weed removal may be required on a regular basis especially during the first 3 years.)* |  |  |
| Wetland Cell | Wetland Vegetation | Percent vegetated cover of constructed wetland bottom area, excluding exotic and invasive species, is less than 50 percent after 2 years. | Exotic/invasive species removed. Additional plantings may be required. |  |  |
| Wetland Cell | Wetland Vegetation | Decaying vegetation produces foul odors. | Decaying vegetation is removed, preferably in late summer. |  |  |
| Wetland Cell | Wetland Vegetation | Wetland vegetation is blocking flow paths causing flow back-up and flooding. | Areas of blocking vegetation are cut back sufficient to allow design flows and prevent flooding. |  |  |
| Wetland Cell | Wetland Vegetation | Water quality monitoring indicates that wetland vegetation is contributing phosphorus and metals to downstream waters rather than sequestering them. | Water quality monitoring indicates improved water quality.  To maximize removal of wetland pollutants, wetland vegetation must be periodically harvested, particularly with respect to phosphorus and metals removal. Harvesting should occur by mid-summer before plants begin to transfer phosphorus from the  aboveground foliage to subsurface roots, or begin to lose metals that desorb during plant die off. Every 3 to 5 years the entire plant mass including roots should be harvested because the below ground biomass constitutes a significant reservoir (as much as half) of the nutrients and metals that are removed from stormwater by plants. |  |  |
| Wetland Cell | Sediment Accumulation | Sediment accumulation inhibits growth of wetland plants or reduces wetland volume (greater than 1 feet of sediment accumulation). | Wetland dredged to remove sediment accumulation. |  |  |
| Wetland Berms (Dikes) | Settlements | Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works. | Dike restored to the design elevation. *A professional engineer should be consulted to determine the source of the settlement.* |  |  |
| Wetland Berms (Dikes) | Piping | Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. | Piping eliminated. Erosion potential eliminated*. (Recommend a geotechnical engineer be called in to inspect and evaluate condition and recommend repairs.)* |  |  |
| Wetland Berms Over 4 ft in height (Dikes) | Tree Growth | Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm. | Trees on berms removed.  *If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.* |  |  |
| Emergency Overflow/ Spillway | Obstruction | Tree growth or other blockage on emergency spillways may cause failure of the berm due to uncontrolled overtopping. | Obstruction on emergency spillway removed. *A professional engineer should be consulted for proper berm/spillway restoration.* |  |  |
| Emergency Overflow/ Spillway | Rock Missing | Only one layer of rock exists above native soil in an area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. | Rocks and pad depth are restored to design standards. (Riprap on inside slopes need not be replaced.) |  |  |
| Emergency Overflow/ Spillway | Erosion | Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.  Any erosion observed on a compacted berm embankment. | Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.  *If erosion is occurring on compacted berms a professional engineer should be consulted to resolve source of erosion.* |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #19 – Maintenance Checklist for Fencing/Shrubbery Screen/Other Landscaping:

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Missing or Broken Parts/Dead Shrubbery | Any defect in the fence or screen that permits easy entry to a facility. | Fence is mended or shrubs replaced to form a solid barrier to entry. |  |  |
| General | Erosion | Erosion has resulted in an opening under a fence that allows entry by people or pets. | Soil under fence replaced so that no opening exceeds 4 inches in height. |  |  |
| General | Unruly Vegetation | Shrubbery is growing out of control or is infested with weeds. See also Thurston County Noxious weeds list. | Shrubbery is trimmed and weeded to provide appealing aesthetics. Do not use chemicals to control weeds. |  |  |
| Fences | Damaged Parts | Posts out of plumb more than 6 inches. | Posts plumb to within 1.5 inches of plumb. |  |  |
| Fences | Damaged Parts | Top rails bent more than 6 inches. | Top rail free of bends greater than 1 inch. |  |  |
| Fences | Damaged Parts | Any part of fence (including posts, top rails, and fabric) more than 1 foot out of design alignment. | Fence is aligned and meets design standards. |  |  |
| Fences | Damaged Parts | Missing or loose tension wire. | Tension wire in place and holding fabric. |  |  |
| Fences | Damaged Parts | Missing or loose barbed wire that is sagging more than 2.5 inches between posts. | Barbed wire in place with less than three-fourth inch sag between posts. |  |  |
| Fences | Damaged Parts | Extension arm missing, broken, or bent out of shape more than 1.5 inches. | Extension arm in place with no bends larger than three-fourth inch. |  |  |
| Fences | Deteriorated Paint or Protective Coating | Part or parts that have a rusting or scaling condition that has affected structural adequacy. | Structurally adequate posts or parts with a uniform protective coating. |  |  |
| Fences | Openings in Fabric | Openings in fabric are such that an 8- inch diameter ball could fit through. | No openings in fabric. |  |  |

# #20 – Maintenance Checklist for Grounds (Landscaping):

| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Weeds (nonpoisonous) | Weeds growing in more than 20 percent of the landscaped area (trees and shrubs only). See also Thurston County Noxious weeds list. | Weeds present in less than five percent of the landscaped area. |  |  |
| General | Insect Hazard | Any presence of poison ivy or other poisonous vegetation or insect nests. | No poisonous vegetation or insect nests present in landscaped area. |  |  |
| General | Trash or Litter | See Detention Ponds (Checklist #1). | See Detention Ponds (Checklist #1). |  |  |
| General | Erosion of Ground Surface | Noticeable rills are seen in landscaped areas. | Causes of erosion are identified and steps taken to slow down/spread out the water. Eroded areas are filled, contoured, and seeded. |  |  |
| Trees and shrubs | Damage | Limbs or parts of trees or shrubs that are split or broken which affect more than 25 percent of the total foliage of the tree or shrub. | Trim trees/shrubs to restore shape. Replace trees/shrubs with severe damage. |  |  |
| Trees and shrubs | Damage | Trees or shrubs that have been blown down or knocked over. | Tree replanted, inspected for injury to stem or roots. Replace if severely damaged. |  |  |
| Trees and shrubs | Damage | Trees or shrubs which are not adequately supported or are leaning over, causing exposure of the roots. | Stakes and rubber-coated ties placed around young trees/shrubs for support. |  |  |

# #21 – Maintenance Checklist for Gates:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| General | Damaged or Missing Components | Gate is broken, jammed, or missing. | Pond has a functioning gate to allow entry of people and maintenance equipment such as mowers and backhoe. If a lock is used, make sure the county field staff have a key. |  |  |
| General | Damaged or Missing Components | Broken or missing hinges such that gate cannot be easily opened and closed by one maintenance person. | Hinges intact and lubed. Gate is working freely. |  |  |
| General | Damaged or Missing Components | Gate is out of plumb more than 6 inches and more than 1 foot out of design alignment. | Gate is aligned and vertical. |  |  |
| General | Damaged or Missing Components | Missing stretcher bands, and ties. | Stretcher bar, bands, and ties in place. |  |  |

# #22 – Maintenance Checklist for Conveyance Systems (Pipes and Ditches):

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Pipes | Sediment & Debris | Accumulated sediment that exceeds 20 percent of the diameter of the pipe. | Pipe cleaned of all sediment and debris. |  |  |
| Pipes | Vegetation | Vegetation that reduces free movement of water though pipes. | Vegetation does not impeded free movement of water through pipes. *Prohibit use of sand and sealant application and protect from construction runoff.* |  |  |
| Pipes | Damaged (Rusted, Bent or Crushed) | Protective coating is damaged: rust is causing more than 50 percent deterioration to any part of pipe. | Pipe repaired or replaced. |  |  |
| Pipes | Damaged (Rusted, Bent or Crushed) | Any dent that significantly impedes flow (i.e. decreases the cross section area of pipe by more than 20 percent). | Pipe repaired or replaced. |  |  |
| Pipes | Damaged (Rusted, Bent or Crushed) | Pipe has major cracks or tears allowing groundwater leakage. | Pipe repaired or replaced. |  |  |
| Open Ditches | Trash & Debris | Dumping of yard wastes such as grass clippings and branches. Unsightly accumulation of non-degradable materials such as glass, plastic, metal, foam, and coated paper. | No trash or debris present. Trash and debris removed and disposed of as prescribed by the County. |  |  |
| Open Ditches | Sediment Buildup | Accumulated sediment that exceeds 20 percent of the design depth. | Ditch cleaned of all sediment and debris so that it matches design. |  |  |
| Open Ditches | Vegetation | Vegetation (e.g. weedy shrubs or saplings) that reduces free movements of water through ditches. | Water flows freely though ditches. Grassy vegetation should be left alone. |  |  |
| Open Ditches | Erosion Damage to Slopes | Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. | No erosion damage present. Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. |  |  |
| Open Ditches | Erosion Damage to Slopes | Any erosion observed on a compacted berm embankment. | *If erosion is occurring on compacted berms a professional engineer should be consulted to resolve source of erosion.* |  |  |
| Open Ditches | Rock Lining Out of Place or Missing (If Applicable) | Native soil is exposed beneath the rock lining. | Rocks replaced to design standards. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #23 – Maintenance Checklist for Media Filter Drain.

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| No Vegetation Zone adjacent to pavement | Erosion, Scour, or Vehicular Damage | No vegetation zone uneven or clogged so that flows are not uniformly distributed. | Area leveled and cleaned so that flows are spread evenly. |  |  |
| No Vegetation | Sediment | Flows no longer sheet flowing off of | No sediment accumulation on pavement |  |  |
| Zone adjacent | Accumulation | roadway. Sediment accumulation on | edge that impedes sheet flow. Sediment |  |  |
| to pavement | on Edge of | pavement edge exceeds top of | deposits removed such that flows can |  |  |
| Pavement | pavement elevation. | sheet flow off of roadway. |  |  |
| Vegetated Filter | Sediment Accumulation on Grass | Sediment depth exceeds 2 inches. | Sediment deposits removed, slope is re- leveled so that flows pass evenly through Ecology Embankment. |  |  |
| Vegetated Filter | Excessive Vegetation or Undesirable Species | When the grass becomes excessively tall; when nuisance weeds and other vegetation starts to take over or shades out desirable vegetation growth characteristics. See also Thurston County Noxious weeds list. | Grass mowed and nuisance vegetation controlled such that flow not impeded. *Grass should be mowed to a height that encourages dense even herbaceous growth.* |  |  |
| Vegetated Filter | Erosion, Scour, or Vehicular Damage | Eroded or scoured areas due to flow channelization, high flows or vehicular damage. | No eroded or scoured areas. *For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with suitable topsoil. The grass will creep in over the rock in time. If bare areas are large, generally greater than 12 inches wide, the filter strip should be re-graded and re-seeded. For smaller bare areas, overseed when bare spots are evident.* |  |  |
| Media Bed | Erosion, Scour, or Vehicular Damage | Eroded or scoured areas due to flow channelization, high flows or vehicular damage. | No eroded or scoured areas. *For ruts or areas less than 12 inches wide, repair the damaged area by filling with suitable media. If bare areas are large, generally greater than 12 inches wide, the media bed should be re-graded.* |  |  |
| Media Bed | Sediment Accumulation on Media Bed | Sediment depth inhibits free infiltration of water. | Sediment accumulation does not impeded infiltration. Sediment deposits removed and slope is re-leveled so that flows pass freely through Media Bed. |  |  |
| Underdrains | Sediment | Depth of sediment within perforated pipe exceeds one-half inch. | Depth of sediment within perforated pipe does not exceed one-half inch. Flush underdrains through access ports and collect flushed sediment. |  |  |
| General | Trash and Debris Accumulation | Any trash and debris accumulations which exceed one cubic foot per 1,000 square feet. If there is less than the threshold, remove all trash and debris as part of the next scheduled maintenance. | No trash or debris present. Remove trash and debris from media filter. |  |  |
| General | Flows are Bypassing Ecology Embankment | Evidence of significant flows downslope (rills, sediment, vegetation damage, etc.) of media filter drain. | Facility functions as designed. Sediment deposits removed and slope is re- leveled so that flows pass evenly through media filter drain. If media filter drain is completely clogged, it may require a more extensive repair or replacement. |  |  |
| General | Media Filter Drain Mix Replacement | Water is seen on surface of the media filter drain mix from storms that are less than the 91st percentile 24-hour rain event (approx 1.25” in 24 hours).  Maintenance also needed on a 10-year cycle and during a preservation project. | No water ponded on surface after design storm. *Excavate and replace all of the media filter drain mix contained within the media filter drain.* |  |  |

See also the latest version of the WSDOT Highway Runoff Manual for additional maintenance information.

If you are unsure whether a problem exists, contact a professional engineer.

# #24 – Maintenance Checklist for Vortechs Stormwater Treatment System

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| General | Sediment Accumulation | Sediment depth is within 6 inches of dry weather water surface elevation. | Accumulated sediment should be removed. |  |  |
| General | Trash and Debris Accumulation | Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non-floatables. | Trash and debris removed from vault, and inlet/outlet piping. |  |  |
| General | Oil Accumulation | Oil accumulation that exceeds 1 inch at the water surface. | Oil is extracted from vault using vactoring methods. Coalescing plates are cleaned by thoroughly rinsing and flushing. Should be no visible oil depth on water. |  |  |
| Structure | Damaged Pipes | Inlet or outlet piping damaged or broken and in need of repair. | Pipe repaired and or replaced. |  |  |
| Structure | Baffles | Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person. | Baffles repaired or replaced to specifications. |  |  |
| Structure | Vault Structure Damage – Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. | Vault replaced or repairs made so that vault meets design specifications and is structurally sound. |  |  |
| Structure | Vault Structure Damage – Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Vault repaired so that no cracks exist wider than one-fourth inch at the joint of the inlet/outlet pipe. |  |  |

Designers must also review the most current manufacturer guidelines for any updates or additions to the following O&M requirements.

If you are unsure whether a problem exists, contact a professional engineer.

A vault is a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.

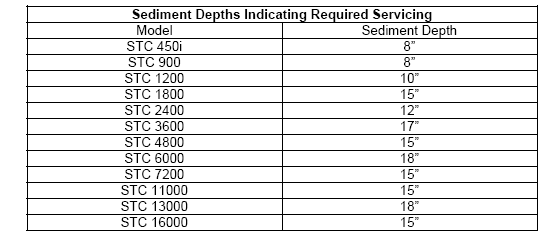
# #25 – Maintenance Checklist for Stormceptor System.

| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Settling chamber | Excessive Sediment Accumulation | Capacities vary depending on model number1. | Sediments removed. |  |  |
| Settling chamber | Trash and Floatable Debris Accumulation | Excessive trash and floatable debris accumulation. | Minimal trash or other floatable debris. |  |  |
| Settling chamber | Excessive Oil Accumulation | Oil exceeds 6 inches in depth or evidence of a spill. | Oil cleaned out. |  |  |
| Manhole Cover | Cover Damaged/ Not Working | One maintenance person cannot remove lid after applying 80 pounds of lift, corrosion of deformation of cover. | Cover repaired to proper working specifications or replaced. |  |  |
| Disk Insert | Disk Insert Inlet/ Outlet Obstructed | Inlet or outlet piping obstructed. | Disk insert inlet/outlet free from obstructions. |  |  |
| Structure | Structure has Cracks in wall, Bottom, and Damage to Frame and/or Top Slab | Cracks wider than one-half inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. | Vault repaired or replaced so that vaults meets design specifications and is structurally sound. |  |  |
| Structure | Structure has Cracks at the Joint of any Inlet/ Outlet Pipe | Cracks wider than one-half inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Vault repaired so that no cracks exist wider than one-fourth inch at the joint of inlet/outlet pipe. |  |  |

**Designers must also review the most current manufacturer guidelines for any updates or additions to the following O&M requirements.**

If you are unsure whether a problem exists, contact a professional engineer or the manufacturer’s representative.

1model number and sediment depth capacities:



# #26 – Maintenance Checklist for Filterra.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| Inlet | Excessive Sediment or Trash Accumulation | Accumulated sediments or trash impair free flow of water into Filterra system. | Inlet free of obstructions and allows free distributed flow of water into Filterra system. Sediments and/or trash removed. |  |  |
| Mulch Cover | Trash and Floatable Debris Accumulation | Excessive trash and/or debris accumulation. | Minimal trash or other debris on mulch cover. Trash and debris removed and mulch cover raked level. |  |  |
| Mulch Cover | Ponding of Water on Mulch Cover | Ponding in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils. | Stormwater drains freely and evenly through mulch cover. *Recommend contact manufacturer and replace mulch or soil if necessary.* |  |  |
| Vegetation | Plants not Growing or in Poor Condition | Soil/ mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants. | Plants healthy and pest free. *Contact manufacturer for advice.* |  |  |
| Vegetation | Excessive Plant Growth | Excessive plant growth inhibits facility function or becomes a hazard for pedestrian and vehicular circulation and safety. | Plants trimmed/pruned in accordance with manufacturer’s recommendations to maintain appropriate plant density and aesthetics. Appropriate plants are present. |  |  |
| Structure | Structure has Cracks in Wall, Bottom, and Damage to Frame and/or Top Slab | Cracks wider than one-half inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the structure is not structurally sound. | Structure sealed and structurally sound. |  |  |
| Structure | Structure has Cracks at the Joint of any Inlet/ Outlet Pipe | Cracks wider than one-half inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Structure repaired so that no cracks exist wider than one-fourth inch at the joint of inlet/outlet pipe. |  |  |

Designers must also review the most current manufacturer guidelines for any updates or additions to the following O&M requirements.

If you are unsure whether a problem exists, contact a professional engineer or the manufacturer’s representative.

# #27 – Maintenance Checklist for CDS Media Filtration System (MFS) ®.

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Media filter vault | Sediment Accumulation on Top of Filter Cartridges | Sediment accumulation exceeds one- half inch on top of cartridges. | Minimal sediment deposits on top of cartridges. Excess sediment on cartridges likely indicates that cartridges are plugged and require maintenance. |  |  |
| Media filter vault | Sediment Accumulation in Vault | Sediment accumulation in vault exceeds 6 inches. | Sediment in vault removed. |  |  |
| Media filter vault | Trash and Floatable Debris Accumulation | Excessive trash and floatable debris accumulation in vault. | Minimal trash or other floatable debris in filter vault. |  |  |
| Media filter cartridges | Filter Cartridges Full | Filter cartridge media appears dark. Check should be performed on a dry day. Requires entry to vault1. | Filter media checked and replaced if needed. If cartridges are plugged with oil, additional treatment or source control BMP may be needed. |  |  |
| Media filter cartridges | Filter Cartridges Full | Area around cartridges has standing water and cartridges are submerged 24 hours after a storm. | Filter media checked and replaced if needed. If cartridges are plugged with oil, additional treatment or source control BMP may be needed. |  |  |
| Media filter cartridges | Filter Cartridges Full | Water flowing over the head control box during light storm events and more than 1 inch of floatables has accumulated in the cartridge vent pipe. | Filter media checked and replaced if needed. If cartridges are plugged with oil, additional treatment or source control BMP may be needed. |  |  |
| Access Cover | Access Cover Damaged/ Not Working | One maintenance person cannot remove lid after applying 80 pounds of lift, corrosion of deformation of cover. | Cover repaired to proper working specifications or replaced. |  |  |
| Collector manifold | Damaged Piping | Any part of the pipes are crushed or damaged due to corrosion and/or settlement. | Pipe repaired or replaced. |  |  |
| Vault | Vault Structure has Cracks in Wall, Bottom, and Damage to Frame and/or Top Slab | Cracks wider than one-half inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. | Vault repaired or replaced so that vault meets design specifications and is structurally sound. |  |  |
| Vault | Structure has Cracks at the Joint of any Inlet/ Outlet Pipe | Cracks wider than one-half inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Vault repaired so that no cracks exist at the joint of inlet/outlet pipe. |  |  |
| Baffles | Baffles | Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person. | Baffles repaired or replaced to design specifications. |  |  |
| Access Ladder | Ladder Rungs Unsafe | Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks. Ladder must be fixed or secured immediately. | Ladder meets design standards and allows maintenance persons safe access. |  |  |

**Designers must also review the most current manufacturer guidelines for any updates or additions to the following O&M requirements.**

If you are unsure whether a problem exists, contact a professional engineer.

1Comments:

1. CDS MFS system vault is a confined space. Visual inspections should be performed aboveground. If entry is required it should be performed by qualified personnel.
2. Default maintenance is annual.
3. Configuration options include precast or cast in place concrete vaults or precast manhole structures.

# #28 – Maintenance Checklist for Aqua Shield Aqua-Swirl.

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Sediment Storage area | Excessive Sediment Accumulation | Sediment accumulation within 36 inches of water surface. | Sediment removed. |  |  |
| Aqua Swirl Chamber | Trash and Floatable Debris Accumulation | Excessive trash and floatable debris accumulation swirl chamber. | Minimal trash or other floatable debris. |  |  |
| Manhole Cover | Cover Damaged/ Not Working | One maintenance person cannot remove lid after applying 80 pounds of lift, corrosion of deformation of cover. | Cover repaired to proper working specifications or replaced. |  |  |
| Structure | Vault Structure has Cracks in Wall, Bottom, and Damage to Frame and/or Top Slab | Cracks wider than one-half inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. | Vault repaired or replaced so that vault meets design specifications and is structurally sound. |  |  |
| Structure | Vault Structure has Cracks at the Joint of any Inlet/ Outlet Pipe | Cracks wider than one-half inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Vault repaired so that no cracks exist wider than one-fourth inch at the joint of inlet/outlet pipe. |  |  |
| Baffles | Baffles | Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person. | Baffles repaired or replaced to design specifications. |  |  |

**Designers must also review the most current manufacturer guidelines for any updates or additions to the following O&M requirements.**

If you are unsure whether a problem exists, contact a professional engineer or the manufacturer’s representative.

# #29 – Maintenance Checklist for Bioretention (Cells, Swales, and Planter Boxes):

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| General | Trash | Trash and debris present. | No trash and debris present. |  |  |
| Concrete Sidewalls | Cracks or Failure in Concrete Planter Reservoir | Cracks wider than 0.5 inch or maintenance/inspection personnel determine that the planter is not structurally sound. | Concrete repaired or replaced. |  |  |
| Rockery Sidewalls | Instable Rockery | Rock walls are insecure. | Rockery sidewalls are stable (may require consultation with professional engineer, particularly for walls 4 feet or greater in height). |  |  |
| Earthen Side Slopes and Berms | Failure in Earthen Reservoir (Embankments, Dikes, Berms, and Side Slopes) | Erosion (gullies/rills) greater than 2 inches around inlets, outlet, and along side slopes. | Source of erosion eliminated and damaged area stabilized (regrade, rock, vegetation, erosion control blanket). For deep channels or cuts (over 3 inches in ponding depth), temporary erosion control measures are in place until permanent repairs can be made. |  |  |
| Earthen Side Slopes and Berms | Failure in Earthen Reservoir (Embankments, Dikes, Berms, and Side Slopes) | Erosion of sides causes slope to become a hazard. | The hazard is eliminated and slopes are stabilized. |  |  |
| Earthen Side Slopes and Berms | Failure in Earthen Reservoir Embankments, Dikes, Berms, and Side Slopes) | Settlement greater than 3 inches (relative to undisturbed sections of berm). | The design height is restored with additional mulch. |  |  |
| Earthen Side Slopes and Berms | Failure in Earthen Reservoir (Embankments, Dikes, Berms, and Side Slopes) | Downstream face of berm or embankment wet, seeps or leaks evident. | Holes are plugged and berm is compacted. May require consultation with professional engineer, particularly for larger berms. |  |  |
| Earthen Side Slopes and Berms | Failure in Earthen Reservoir (Embankments, Dikes, Berms, and Side Slopes) | Any evidence of rodent holes or water piping around holes if facility acts as dam or berm. | Rodents (see “Pests: Insects/Rodents”) removed or destroyed and berm repaired/ compacted. |  |  |
| Ponding Area | Sediment or Debris Accumulation | Accumulation of sediment or debris to extent that infiltration rate is reduced (see “Ponded water”) or surface storage capacity significantly impacted. | Sediment cleaned out to restore facility shape and depth. Damaged vegetation is replaced and mulched. Source of sediment identified and controlled (if feasible). |  |  |
| Ponding Area | Leaf Accumulation | Accumulated leaves in facility. | No leaves clogging outlet structure or impeding water flow. |  |  |
| Ponding Area | Basin Inlet via Surface Flow | Soil is exposed or signs of erosion are visible. | Erosion sources repaired and controlled. |  |  |
| Curb Cut Inlet | Sediment or Debris Accumulation | Sediment, vegetation, or debris partially or fully blocking inlet structure. | Curb cut is clear of debris. Source of the blockage is identified and action is taken to prevent future blockages. |  |  |
| Splash Block Inlet | Water Not Properly Directed to Facility | Water is not being directed properly to the facility and away from the inlet structure. | Blocks are reconfigured to direct water to facility and away from structure. |  |  |
| Splash Block Inlet | Erosion | Water disrupts soil media. | Splash block is reconfigure/repaired. |  |  |
| Inlet/outlet pipe | Damaged Pipe | Pipe is damaged. | Pipe is repaired/replaced. No cracks more than 0.25 inched wide at the joint of inlet/outlet pipes exist. |  |  |
| Inlet/outlet pipe | Clogged Pipe | Pipe is clogged. | Pipe is clear of roots or debris. Source of the blockage is identified and action is taken to prevent future blockages. |  |  |
| Inlets/outlet and access pathways | Blocked Access | Maintain access for inspections. | Vegetation is cleared within 1 foot of inlets and outlets. Access pathways are maintained. |  |  |
| Ponding Area | Erosion | Water disrupts soil media. | No eroded or scoured areas in bioretention area. Cause of erosion or scour addressed. A cover of rock or cobbles or other erosion protection measure maintained (e.g., matting) to protect the ground where concentrated water enters or exits the facility (e.g., a pipe, curb cut or swale). |  |  |
| Trash Rack | Trash or Debris Accumulation | Trash or debris present on trash rack. | No trash or debris on trash rack. Clean and dispose trash. |  |  |
| Trash Rack | Damaged Trash Rack | Bar screen damaged or missing. | Barrier repaired or replaced to design standards. |  |  |
| Check Dams and Weirs | Sediment or Debris Accumulation | Sediment, vegetation, or debris accumulated at or blocking (or having the potential to block) check dam, weir, or orifice. | Blockage is cleared. Identify the source of the blockage and take actions to prevent future blockages. |  |  |
| Check Dams and Weirs | Erosion | Erosion and/or undercutting is present. | No eroded or undercut areas in bioretention area. Cause of erosion or undercutting addressed. Check dam or weir is repaired. |  |  |
| Check Dams and Weirs | Unlevel Top of Weir | Grade board or top of weir damaged or not level. | Weir restored to level position. |  |  |
| Flow Spreader | Sediment Accumulation | Sediment blocks 35 percent or more of ports/notches or, sediment fills 35 percent or more of sediment trap. | Sediment removed and disposed of. |  |  |
| Flow Spreader | Damaged or Unlevel Grade Board/Baffle | Grade board/baffle damaged or not level. | Board/baffle removed and reinstalled to level position. |  |  |
| Overflow/ emergency spillway | Sediment or Debris Accumulation | Overflow spillway is partially or fully plugged with sediment or debris. | No sediment or debris in overflow. |  |  |
| Overflow/ emergency spillway | Erosion | Native soil is exposed or other signs of erosion damage are present. | Erosion repaired and surface of spillway stabilized. |  |  |
| Overflow/ emergency spillway | Missing Spillway Armament | Spillway armament is missing. | Armament replaced. |  |  |
| Underdrain | Blocked Underdrain | Plant roots, sediment or debris reducing capacity of underdrain. Prolonged surface ponding (see “Bioretention Soil”). | Underdrains and orifice are free of sediment and debris. |  |  |
| Bioretention soil | Ponded Water | Excessive ponding water: Water overflows during storms smaller than the design event or ponded water remains in the basin 48 hours or longer after the end of a storm. | Cause of ponded water is identified and addressed:   1. Leaf or debris buildup is removed 2. Underdrain is clear 3. Other water inputs (e.g., groundwater, illicit connections) investigated 4. Contributing area verified   If steps #1-4 do not solve the problem, imported bioretention soil is replaced and replanted. |  |  |
| Bioretention soil | Protection of Soil | Maintenance requiring entrance into the facility footprint. | Maintenance is performed without compacting bioretention soil media. |  |  |
| Vegetation | Bottom Swale and Upland Slope Vegetation | Less than 75 percent of swale bottom is covered with healthy/ surviving vegetation. | Plants are healthy and pest free. Cause of poor vegetation growth addressed. Bioretention area is replanted as necessary to obtain 75 percent survival rate or greater. Plant selection is appropriate for site growing conditions. |  |  |
| Trees and shrubs | Causing Problems for Operation of Facility | Large trees and shrubs interfere with operation of the basin or access for maintenance. | Trees and shrubs do not hinder facility performance or maintenance activities. Prune or remove large trees and shrubs. |  |  |
| Trees and shrubs | Dead Trees and Shrubs | Standing dead vegetation is present. | Trees and shrubs do not hinder facility performance or maintenance activities. Dead vegetation is removed and cause of dead vegetation is addressed. Specific plants with high mortality rate are replaced with more appropriate species. |  |  |
| Trees and shrubs adjacent to vehicle travel areas (or areas where visibility needs to be maintained) | Safety Issues | Vegetation causes some visibility (line of sight) or driver safety issues. | Appropriate height for sight clearance is maintained. Regular pruning maintains visual sight lines for safety or clearance along a walk or drive. Tree or shrub is removed or transplanted if presenting a continual safety hazard. |  |  |
| Emergent Vegetation | Conveyance Blocked | Vegetation compromises conveyance. | Sedges and rushes are clear of dead foliage. |  |  |
| Mulch | Lack of Mulch | Bare spots (without much cover) are present or mulch covers less than 2 inches. | Facility has a maximum 3-inch layer of an appropriate type of mulch and mulch is kept away from woody stems. |  |  |
| Vegetation | Accumulation of Clippings | Grass or other vegetation clippings accumulate to 2 inches or greater in depth. | Clippings removed. |  |  |
| Noxious Weeds | Presence of Noxious Weeds | Listed noxious vegetation is present. See [Thurston County noxious weed list.](http://piercecountyweedboard.wsu.edu/) | Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. |  |  |
| Vegetation | Weeds | Weeds are present (unless on edge and providing erosion control). | Weed material removed and disposed of. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. |  |  |
| Excessive Vegetation | Adjacent Facilities Compromised | Low-lying vegetation growing beyond facility edge onto sidewalks, paths, or street edge poses pedestrian safety hazard or may clog adjacent permeable pavement surfaces due to associated leaf litter, mulch, and soil. | Vegetation does not impede function of adjacent facilities or pose as safety hazard. Groundcovers and shrubs trimmed at facility edge. Excessive leaf litter is removed. |  |  |
| Excessive Vegetation | Causes Facility to Not Function Properly | Excessive vegetation density inhibits stormwater flow beyond design ponding or becomes a hazard for pedestrian and vehicular circulation and safety. | Pruning and/or thinning vegetation maintains proper plant density and aesthetics. Plants that are weak, broken, or not true to form are removed or replaced in-kind. Appropriate plants are present. |  |  |
| Irrigation (if any) | NA | Irrigation system present. | Manufacturer’s instructions for O&M are met. |  |  |
| Plant watering | Plant Establishment | Plant establishment period (1-3 years). | Plants are watered as necessary during periods of no rain to ensure plant establishment. |  |  |
| Summer Watering (after establishment) | Drought Period | Longer term period (3+ years). | Plants are watered as necessary during drought conditions and trees are watered up to five years after planting. |  |  |
| Spill Prevention and Response | Spill Prevention | Storage or use of potential contaminants in the vicinity of facility. | Spill prevention measures are implemented whenever handling or storing potential contaminants. |  |  |
| Spill Prevention and Response | Spill Response | Any evidence of contaminants such as oil, gasoline, concrete slurries, paint, etc. | Spills are cleaned up as soon as possible to prevent contamination of stormwater. No contaminants or pollutants present. *(Coordinate source control, removal, and/or cleanup with Thurston County Water Resources 360-754-4681 and/or Dept. of Ecology Spill Response 800-424-8802.)* |  |  |
| Safety | Safety (Slopes) | Erosion of sides causes slope to exceed 1:3 or otherwise becomes a hazard. | Actions taken to eliminate the hazard. |  |  |
| Safety | Safety (Hydraulic Structures) | Hydraulic structures (pipes, culverts, vaults, etc.) become a hazard to children playing in and around the facility. | Actions taken to eliminate the hazard (such as covering and securing any openings). |  |  |
| Aesthetics | Aesthetics | Damage/vandalism/debris accumulation. | Facility restored to original aesthetic conditions. |  |  |
| Aesthetics | Edging | Grass is starting to encroach on swale. | Edging repaired. |  |  |
| Pest Control | Pests: Insects/Rodents | Pest of concern is present and impacting facility function. | Pests removed or destroyed and facility returned to original functionality. Do not use pesticides or *Bacillus thuringiensis israelensis (Bti).* |  |  |
| Pest Control | Mosquitoes | Standing water remains in the basin for more than three days following storms. | All inlets, overflows and other openings are protected with mosquito screens. No mosquito infestation present. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #30 – Maintenance Checklist for Cisterns:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| Roof | Debris Accumulation in Cistern | Debris has accumulated. | No debris in cistern. |  |  |
| Gutter | Debris Accumulation in Gutter | Debris has accumulated. | No debris in cistern or gutters. |  |  |
| Screens at the top of downspout and cistern inlet | Debris Accumulation in Cistern | Screen has deteriorated. | Screen is in place and functions as designed. |  |  |
| Screens at the top of downspout and cistern inlet | Debris Accumulation in Cistern | None. Preventative maintenance. | No debris in cistern or accumulated on screen. |  |  |
| Low flow orifice | Cistern Overflows Are Too Frequent | Debris or other obstruction of orifice. | Low flow orifice is clean. |  |  |
| Overflow pipe | Overflow Pipe | Pipe is damaged. | Overflow pipe is watertight and does not leak. Repair/replace. |  |  |
| Overflow pipe | Overflow Pipe | Pipe is clogged. | Debris removed. Overflow pipe can convey overflow to point of discharge. |  |  |
| Cistern | Accumulated Debris And/or Sediment | More than 6 inches of accumulation in bottom of cistern. | Accumulated debris and/or sediment removed. |  |  |
| Training and Documentation | NA | Training / written guidance is required for proper O&M. | Property owners and tenants are provided with proper training and a copy of the Maintenance and Source Control Manual. |  |  |
| Access and Safety | NA | Access to cistern required for maintenance or cleaning. | Any opening that could allow the entry of people is marked: “DANGER— CONFINED SPACE”. |  |  |
| Pest Control | Mosquito Infestation | Standing water remains for more than three days following storms. | All inlets, overflows, and other openings are protected with mosquito screens. No mosquito infestation present. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #31 – Maintenance Checklist for Vegetated Roof:

| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Soil / Growth Medium | Water is Not Infiltrating Properly | Water does not permeate growth media (runs off soil surface). | Facility infiltrates as designed. Aerate or replace media until stormwater infiltrates freely through growth media. |  |  |
| Soil / Growth Medium | Water is Not Infiltrating Properly | Growth medium thickness is less than design thickness (due to erosion and plant uptake). | Facility infiltrates as designed. Supplement growth medium to design thickness. |  |  |
| Soil / Growth Medium | Water is Not Infiltrating Properly | Fallen leaves or debris are present. | No leaves or debris present. |  |  |
| Soil / Growth Medium | Erosion/Scouring | Areas of potential erosion are visible. | Steps taken to repair or prevent erosion. Fill, hand tamp, or lightly compact, and stabilize with additional soil substrate/growth medium and additional plants. |  |  |
| Erosion Control Measures | Erosion/Scouring | Mat or other erosion control is damaged or depleted during plant establishment period. | Erosion control measures repaired/replaced until 90 percent vegetation coverage attained. Avoid application of mulch on extensive vegetated roofs. |  |  |
| System Structural Components | Deteriorating Flashing, Gravel Stops, Utilities, or Other Structures on Roof | Flashing, utilities or other structures on roof are deteriorating (can serve as source of metal pollution in vegetated roof runoff). | Structural components inspected for deterioration or failure. Repair/replace as necessary. |  |  |
| Roof Drain | Sediment, Vegetation, or Debris Accumulation | Sediment, vegetation, or debris blocks 20 percent or more of inlet structure. | Blockages cleared. Problems that led to blockage identified and corrected. |  |  |
| Roof Drain | Damaged Inlet Pipe | Inlet pipe is in poor condition. | Repaired/replaced. |  |  |
| Roof Drain | Clogged Inlet Pipe | Pipe is clogged. | Roots or debris removed. |  |  |
| Vegetation | Plant Coverage | Healthy vegetative coverage falls below 90 percent (unless design specifications stipulate less than 90 percent coverage). | Bare areas planted with vegetation If necessary, install erosion control  measures until percent coverage goal is  attained. |  |  |
| Vegetation (sedums) | NA | Extensive roof with low density sedum population. | Sedums are mulch mowed, creating cuttings from existing plants to encourage colonization. |  |  |
| Vegetation | Presence of Noxious Weeds | Listed noxious vegetation is present. See [Thurston County](http://piercecountyweedboard.wsu.edu/)  [noxious weed list.](http://piercecountyweedboard.wsu.edu/) | No danger of poisonous vegetation where maintenance personnel or the public might normally be. Noxious and nuisance vegetation removed according to applicable regulations. By law, class A & B noxious weeds must be removed, bagged, and disposed as garbage immediately. Reasonable attempts must be made to remove and dispose of class C noxious weeds. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. *(Coordinate with Thurston County.) Complete eradication of noxious weeds may not be possible.*  *Compliance with state or local eradication policies required.* |  |  |
| Vegetation | Presence of Weeds | Weeds are present. | Weed material removed and disposed of, with roots manually removed with pincer-type weeding tools, flame weeders, or hot water weeders as appropriate. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. |  |  |
| Vegetation (extensive vegetated roof) | Under Fertilization | Poor plant establishment and possible nutrient deficiency in growth medium. | Organic debris allowed to replenish and maintain long-term nutrient balance and growth medium structure. Conduct annual soil test 2-3 weeks prior to the spring growth flush to assess need for fertilizer. Utilize test results to adjust fertilizer type and quantity appropriately. Minimum amount slow-release fertilizer necessary to achieve successful plant establishment is applied. Apply fertilizer only after acquiring required approval from facility owner and operator. Note that extensive vegetated roofs are designed to require zero to minimal fertilization after establishment (excess fertilization can contribute to nutrient export). |  |  |
| Vegetation (intensive vegetated roof) | Under Fertilization | Fertilization may be necessary during establishment period or for plant health and survivability after establishment. | Annual soil test conducted 2-3 weeks prior to the spring growth flush to assess need for fertilizer. Utilize test results to adjust fertilizer type and quantity appropriately. Apply minimum amount slow-release fertilizer necessary to achieve successful plant establishment.  Apply fertilizer only after acquiring required approval from facility owner and operator. Intensive vegetated roofs may require more fertilization than extensive vegetated roofs. |  |  |
| Vegetation (trees and shrubs on an intensive vegetated roof) | NA | Pruning as needed. | All pruning of mature trees performed by or under the direct guidance of an ISA certified arborist. |  |  |
| Irrigation system (if any) | NA | Irrigation system is not working or routine maintenance is needed. | Manufacturer’s instructions for O&M have been followed. |  |  |
| Vegetation (extensive vegetated roof) | NA | Summer watering – Plant establishment period (1-2 years). | Watered weekly during periods of no rain to ensure plant establishment (30 to 50 gallons per 100 square feet). |  |  |
| Vegetation (extensive vegetated roof) | NA | Summer watering – Longer term period (2+ years). | Watered during drought conditions or more often if necessary to maintain plant cover (30 to 50 gallons per 100 square feet). |  |  |
| Vegetation (intensive vegetated roof) | NA | Plant establishment period (1-2 years). | Watered deeply, but infrequently, so that the top 6 to 12 inches of the root zone is moist. Use soaker hoses or spot water with a shower type wand when irrigation system not present. |  |  |
| Vegetation (intensive vegetated roof) | NA | Longer term period (2+ years). | Watered during drought conditions or more often if necessary to maintain plant cover. |  |  |
| Spill Prevention and Response | NA | Storage or use of potential contaminants in the vicinity of facility. | Spill prevention measures exercised whenever handling or storing potential contaminants. |  |  |
| Spill Prevention and Response | Release of Pollutants. | Any evidence of contaminants such as oil, gasoline, concrete slurries, paint, etc. | Spills are cleaned up as soon as possible to prevent contamination of stormwater. No contaminants or pollutants present. *(Coordinate source control, removal, and/or cleanup with Thurston County Water Resources 360-754-4681 and/or Dept. of Ecology Spill Response 800- 424-8802.)* |  |  |
| Training and Documentation | NA | Training / written guidance is required for proper O&M. | Property owners and tenants provided with proper training and a copy of the Maintenance and Source Control Manual. |  |  |
| Safety | NA | Insufficient egress /ingress routes and fall protection. | Egress and ingress routes maintained to design standards and fire codes. Ensure appropriate fall protection. |  |  |
| Aesthetics | Poor Aesthetics | Damage/vandalism/debris accumulation. | Facility restored to original aesthetic conditions. |  |  |
| Pest Control | Mosquitoes | Standing water remains for more than three days following storms. | Standing water removed. Cause of the standing water identified, and appropriate actions taken to address the problem (e.g., aerate or replace medium, unplug drainage). |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #32 – Maintenance Checklist for Permeable Pavement:

| **Drainage**  **System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Facility – General Requirements | Unstable Adjacent Area | Runoff from adjacent pervious areas deposits soil, mulch, or sediment on paving. | No deposited soil or other materials on permeable pavement or other adjacent surfacing. All exposed soils that may erode to pavement surface mulched and/or planted. |  |  |
| Facility – General Requirements | Wearing Course Covered by Adjacent Vegetation | Vegetation growing beyond facility edge onto sidewalks, paths, and street edge. | Vegetation does not impede function of adjacent facilities or pose as safety hazard. Groundcovers and shrubs trimmed to avoid overreaching the sidewalks, paths and street edge. |  |  |
| Porous asphalt or pervious cement concrete | NA | None. Maintenance to prevent clogging with fine sediment. | Conventional street sweepers equipped with vacuums, water, and brushes or pressure washer used to restore permeability. Vacuum or pressure wash the pavement two to three times annually. |  |  |
| Porous asphalt or pervious cement concrete | NA | None. Maintenance to prevent clogging with fine sediment. | Use of sand and sealant application prohibited. Protect from construction runoff. |  |  |
| Porous asphalt or pervious cement concrete | Cracks | Major cracks or trip hazards. | Potholes or small cracks filled with patching mixes. Large cracks and settlement addressed by cutting and replacing the pavement section. |  |  |
| Porous asphalt or pervious cement concrete | NA | Utility cuts. | Any damage or change due to utility cuts replaced in kind. |  |  |
| All Pavement Types | Leaf and Debris Accumulation | Fallen leaves or debris. | Removed/disposed. |  |  |
| Interlocking concrete paver blocks | Missing or Damaged Paver Block | Interlocking paver block missing or damaged. | Individual damaged paver blocks removed and replaced or repaired per manufacturer’s recommendations. |  |  |
| Interlocking concrete paver blocks | Settlement | Settlement of surface. When deviation from original grade impedes function. | Original grade re-established. May require resetting. |  |  |
| All pavement types | All Pavement Types | Sediment or debris accumulation between paver blocks, on surface of pavement, or in grid voids. | Sediment at surface does not inhibit infiltration. Remove/dispose of sediment. |  |  |
| Interlocking concrete paver blocks | Void material is missing or low | Loss of aggregate material between paver blocks. | Refill per manufacturer’s recommendations. |  |  |
| Open-celled paving grid with gravel | Loss of Aggregate Material in Paving Grid | Loss of aggregate material in grid. | Aggregate gravel level maintained at the same level as the plastic rings or no more than 0.25 inch above the top of rings. Refill per manufacturer’s recommendations. |  |  |
| **#**Open-celled paving grid with grass | Lack of Grass Coverage | Loss of soil and/or grass material in grid. | Refill and/or replant per manufacturer’s recommendations. Growing medium restored, facility aerated and reseeded or planted, and vegetated area amended as needed. |  |  |
| Inlet/outlet pipe | Pipe is Damaged | Pipe is damaged. | Pipe is repaired/replaced. |  |  |
| Inlet/outlet pipe | Pipe is Clogged | Pipe is clogged. | Roots or debris is removed. |  |  |
| Inlet/outlet pipe | Erosion | Native soil exposed or other signs of erosion damage present. | No eroded or scoured areas  Cause of erosion or scour is addressed. |  |  |
| Underdrain pipe | Blocked Underdrain | Plant roots, sediment or debris reducing capacity of underdrain (may cause prolonged drawdown period). | Underdrains and orifice free of sediment and debris. Jet clean or rotary cut debris/roots from underdrain(s). If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly. |  |  |
| Spill Prevention and Response | NA | Storage or use of potential contaminants in the vicinity of facility. | Spill prevention measures exercised whenever handling or storing potential contaminants. |  |  |
| Spill Prevention and Response | Release of Pollutants | Any evidence of contaminants such as oil, gasoline, concrete slurries, paint, etc. | Spills are cleaned up as soon as possible to prevent contamination of stormwater. No contaminants or pollutants present. *(Coordinate source control, removal, and/or cleanup with Thurston County Water Resources 360-754-4681 and/or Dept. of Ecology Spill Response 800- 424-8802.)* |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #33 – Maintenance Checklist for Downspout, Sheet Flow, and Concentrated Dispersion Systems:

| **Drainage**  **System**  **Feature** | **Defect or Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Splash block | Water Directed Toward Building | Water is being directed towards building structure. | Water directed away from building structure. |  |  |
| Splash block | Water Causing Erosion | Water disrupts soil media. | Blocks are reconfigured/ repaired and media is restored. |  |  |
| Transition zone | Erosion | Adjacent soil erosion; uneven surface creating concentrated flow discharge; or less than 2 foot of width. | No eroded or scoured areas. Cause of erosion or scour is addressed. |  |  |
| Dispersion trench | Concentrated Flow | Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” from edge of trench; intent is to prevent erosion damage). | No debris on trench surface. Notched grade board or other distributor type is aligned to prevent erosion.  Trench is rebuilt to standards, if necessary. |  |  |
| Surface of trench | Accumulated Debris | Accumulated trash, debris, or sediment on drain rock surface impedes sheet flow from facility. | Trash or debris is removed/disposed in accordance with local solid waste requirements. |  |  |
| Surface of trench | Vegetation Impeding Flow | Vegetation/moss present on drain rock surface impedes sheet flow from facility. | Freely draining drain rock surface. |  |  |
| Pipe(s) to trench | Accumulated Debris in Drains | Accumulation of trash, debris, or sediment in roof drains, gutters, driveway drains, area drains, etc. | No trash or debris in roof drains, gutters, driveway drains, or area drains. |  |  |
| Pipe(s) to trench | Accumulated Debris in Inlet Pipe | Pipe from sump to trench or drywell has accumulated sediment or is plugged. | No sediment or debris in inlet/outlet pipe screen or inlet/outlet pipe. |  |  |
| Pipe(s) to trench | Damaged Pipes | Cracked, collapsed, broken, or misaligned drain pipes. | No cracks more than 0.25-inch wide at the joint of the inlet/outlet pipe. |  |  |
| Sump | Accumulated Sediment | Sediment in the sump. | Sump contains no sediment. |  |  |
| Access lid | Hard to Open | Cannot be easily opened. | Access lid is repaired or replaced. |  |  |
| Access lid | Buried | Buried. | Access lid functions as designed (refer to record drawings for design intent). |  |  |
| Access lid | Missing Cover | Cover missing. | Cover is replaced. |  |  |
| Rock pad | Inadequate Rock Cover | Only one layer of rock exists above native soil in area 6 square feet or larger, or any exposure of native soil. | Rock pad is repaired/replaced to meet design standards. |  |  |
| Rock pad | Erosion | Soil erosion in or adjacent to rock pad. | Rock pad is repaired/replaced to meet design standards. |  |  |
| Dispersal Area | Erosion | Erosion (gullies/ rills) greater than 2 inches deep in dispersal area. | No eroded or scoured areas. Cause of erosion or scour is addressed. |  |  |
| Dispersal Area | Accumulated Sediment | Accumulated sediment or debris to extent that blocks or channelizes flow path. | No excess sediment or debris in dispersal area. Sediment source is addressed (if feasible). |  |  |
| Ponded water | Ponded Water | Standing surface water in dispersion area remains for more than 3 days after the end of a storm event. | System freely drains and there is no standing water in dispersion area between storms. The cause of the standing water (e.g., grade depressions, compacted soil) is addressed. |  |  |
| Vegetation | Plant Survival | Dispersal area vegetation in establishment period (1-2 years, or additional 3rd year) during extreme dry weather). | Vegetation is healthy and watered weekly during periods of no rain to ensure plant establishment. |  |  |
| Vegetation | Lack of Vegetation Allowing Erosion | Poor vegetation cover such that erosion is occurring. | Vegetation is healthy and watered. No eroded or scoured areas are present. Cause of erosion or scour is addressed. Plant species are appropriate for the soil and moisture conditions. |  |  |
| Vegetation | Vegetation Blocking Flow | Vegetation inhibits dispersed flow along flow path. | Vegetation is trimmed, weeded, or replanted to restore dispersed flow path. |  |  |
| Vegetation | Presence of Noxious Weeds | Any noxious or nuisance vegetation which may constitute a hazard to county personnel or the public. | Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where county personnel or the public might normally be. |  |  |
| Pest Control | Mosquito Infestation | Standing water remains for more than three days following storms. | All inlets, overflows and other openings are protected with mosquito screens. No mosquito infestation present. |  |  |
| Rodents | Presence of Rodents | Rodent holes or mounds disturb dispersion flow paths. | Rodents removed or destroyed, holes are filled, and flow path is revegetated. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #34 – Maintenance Checklist for Rain Gardens:

| **Drainage**  **System**  **Feature** | **Defect or Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| --- | --- | --- | --- | --- | --- |
| Facility – General Requirements | Mosquitoes | Standing water remains for more than three days following storms. | All inlets, overflows and other openings are protected with mosquito screens. No mosquito infestation present. Rain garden drains freely and there is no standing water between storms. Cause of the standing water is addressed (see “Ponded water”). |  |  |
| Footprint area | Trash | Trash and debris present. | No trash or debris present. |  |  |
| Footprint area | Debris Accumulation | Accumulated leaves in facility. | No leaves clogging outlet structure or impeding water flow. |  |  |
| Earthen side slopes and berms | Erosion | Persistent soil erosion on slopes. | No eroded or scoured areas. Cause of erosion or scour is addressed. |  |  |
| Rockery sidewalls | Unstable Rockery | Rockery side walls are insecure. | Rockery sidewalls are stable (may require consultation with engineer, particularly for walls 4 feet or greater in height). |  |  |
| Rain garden bottom area | Sediment Accumulation | Visible sediment deposition in the rain garden that reduces drawdown time of water in the rain garden. | No sediment accumulation in rain garden, Source of sediment addressed. |  |  |
| Mulch | Lack of Mulch | Bare spots (without mulch cover) are present or mulch depth less than 2 inches. | Facility has a minimum 2- to 3-inch layer of an appropriate type of mulch and is kept away from woody stems. |  |  |
| Splash block inlet | Water Not Properly Directed to Rain Garden | Water is not being directed properly to the rain garden and away from the inlet structure. Water splashes adjacent buildings. | Blocks are reconfigured to direct water to rain garden and away from structure. |  |  |
| Pipe inlet/outlet | Erosion | Rock or cobble is removed or missing and concentrated flows are contacting soil. | No eroded or scoured areas. Cause of erosion or scour is addressed. Cover of rock or cobbles protects the ground where concentrated water flows into the rain garden from a pipe or swale. |  |  |
| Pipe inlet/outlet | Accumulated Debris | Accumulated leaves, sediment, debris or vegetation at curb cuts, inlet or outlet pipe. | Blockage is cleared. |  |  |
| Pipe inlet/outlet | Damaged Pipe | Pipe is damaged | Pipe is repaired/replaced. |  |  |
| Pipe inlet/outlet | Clogged Pipe | Pipe is clogged. | Pipe is clear of roots and debris. |  |  |
| Access | Blocked Access | Maintain access for inspections. | Vegetation is cleared or transplanted within 1 foot of inlets and outlets. |  |  |
| Ponded water | Ponded Water | Excessive ponding water: Ponded water remains in the rain garden more than 48 hours after the end of a storm. | Rain garden drains freely and there is no standing water in the rain garden between storms. Leaf litter/debris/sediment is removed. |  |  |
| Overflow | Blocked Overflow | Capacity reduced by sediment or debris. | No sediment or debris in overflow. |  |  |
| Vegetation | Blocking Site Distances and Sidewalks | Vegetation inhibits sight distances and sidewalks. | Sidewalks and sight distances along roadways and sidewalks are kept clear. |  |  |
| Vegetation | Vegetation Blocking Pipes | Vegetation is crowding inlets and outlets. | Inlets and outlets in the rain garden are clear of vegetation. |  |  |
| Vegetation | Unhealthy Vegetation | Yellowing: possible Nitrogen (N) deficiency  Poor growth: possible Phosphorous  (P) deficiency. Poor flowering, spotting or curled leaves, or weak roots or stems: possible Potassium  (K) deficiency. | Plants are healthy and appropriate for site conditions. |  |  |
| Vegetation | Weeds | Presence of weeds. | Weeds are removed (manual methods preferred) and mulch is applied. |  |  |
| Summer watering (years 1-3) | Plant Establishment | Tree, shrubs and groundcovers in first three years of establishment period. | Plants are watered during plant establishment period (years 1-3). |  |  |
| Summer watering (after establishment) | Drought Conditions | Vegetation requires supplemental water. | Plants are watered during drought conditions or more often if necessary during post-establishment period (after 3 years). |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

# #35 – Maintenance Checklist for Trees:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| Tree | Excess or unhealthy growth | Health of tree at risk, or tree in conflict with other infrastructure. | Tree pruned according to industry standards to promote tree health and longevity. |  |  |
| Tree | NA | Young tree (i.e., within first three years). | Tree provided with supplemental irrigation and fertilization (as needed) during first three growing seasons. |  |  |
| Tree | NA | Evidence of pest activity affecting tree health. | Pest management activities implemented to reduce or eliminate pest activity, and to restore tree health. |  |  |
| Tree | Dead or Declining | Dead, damaged or declining. | Tree is replaced per planting plan or acceptable substitute. |  |  |
| Tree | Dead or Declining | Dead, damaged or declining. | Tree is replaced per planting plan or acceptable substitute. |  |  |

# #36 – Maintenance Checklist for Downspout Full Infiltration Systems:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Drainage System Feature** | **Defect or Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance Is Performed** | **Maintenance**  **Frequency** | **Completed** |
| Rock trench/well | Inflow disruption | Accumulated trash, debris, or sediment on drain rock surface impeding sheet flow into facility. | Sheet flow re-established. Material removed and disposed of in accordance with applicable solid waste requirements. |  |  |
| Rock trench/well | Inflow disruption | Vegetation/moss present on drain rock surface impeding sheet flow into facility. | Material removed and sheet flow re- established. |  |  |
| Rock trench/well | Inflow disruption | Water ponding at surface, or standing water in subgrade observation port. | Inflow to facility is consistent and no ponding is observed. Inlet piping is clear and/or rock or sand reservoirs have been replaced. |  |  |
| Inlet/outlet pipe conveyance | Conveyance blockage | Accumulation of trash, debris, or sediment in roof drains, gutters, driveways drains, area drains, etc. | Conveyance systems are clear of debris and free-flowing. |  |  |
| Inlet/outlet pipe conveyance | Conveyance blockage | Pipes to or from sump, trench, or drywell have accumulated sediment or is plugged. | Pipe systems are clear of debris and free-flowing. |  |  |
| Inlet/outlet pipe conveyance | Conveyance damage | Pipes to or from sump, trench, or drywell is cracked, broken, or misaligned. | Pipe systems are undamaged and free- flowing. |  |  |
| Roof downspout | Splash pad malfunction | Splash pad missing or damaged. | Splash pad installed and functioning correctly |  |  |
| Storage sump | Sediment in sump | Excess sediment accumulate in sump. | Material removed and disposed of in accordance with applicable solid waste requirements. |  |  |
| Storage sump | Access lid problems | Access lid cannot be opened or is missing. | Access lid is functioning as designed. Refer to record drawings to confirm type, function, and required components. |  |  |

# #37 – Maintenance Checklist for Dead-End Sump Vaults:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Drainage System Feature** | **Defect or**  **Problem** | **Condition When Maintenance Is Needed** | **Results Expected When Maintenance is Performed** | **Maintenance**  **Frequency** | **Completed** |
| General | Trash/Debris Accumulation | Trash and debris accumulated in vault, pipe or inlet (includes floatables and non-floatables). | No trash or debris present. Any trash and debris removed from dead-end sump vault. |  |  |
| General | Sediment/ Liquid Accumulation in Vault | Sediment/liquid accumulation in vault exceeds the half the depth of the vault. | No sediment/liquid in dead-end sump vault.  *(If sediment contamination is a potential problem, sediment should be tested regularly to determine leaching potential prior to disposal.)* |  |  |
| General | Damaged Pipe | Inlet piping damaged or broken and in need of repair. | Pipe repaired and/or replaced. |  |  |
| General | Access Cover Damaged/Not Working | Cover cannot be opened or removed, by one person. Corrosion/deformation of cover. | Cover repaired to proper working specifications or replaced. |  |  |
| Vault Structure | Damage – Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab | Maintenance/inspection personnel determine that the vault is not structurally sound. | Vault replaced or repairs made so that vault meets design specifications and is structurally sound. |  |  |
| Vault Structure | Damage – Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab | Cracks wider than one-half-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks. | Vault repaired so that no cracks exist wider than one-fourth inch at the joint of the inlet/outlet pipe. |  |  |

If you are unsure whether a problem exists, contact a professional engineer.

A vault is a confined space. Visual inspections should be performed aboveground. If entry is required, it should be performed by qualified personnel.