MAINTENANCE PLAN OF STORMWATER MANAGEMENT FACILITIES
FOR:
The Maine Woods
Bangor, Maine

Land Owner: **Team Properties, LLC**
1411 Essex Street
Bangor, Maine 04401

Project Developer: **Team Properties, LLC**

Responsible Party: **Team Properties, LLC**

Plan Prepared by: **Plymouth Engineering, Inc.**
8 Main Street Unit C
Newport, Maine 04953
Tel: 207-257-2071 Email: scott@plymouthengineering.com

List of Stormwater Measures:
Vegetated Areas
Conveyance & Distribution System (Stormwater Channels & Culverts)
Under Drain Soil Filters
Level Spreader
Wet Pond

Introduction:
The **Responsible Party** of the project shall be responsible for the maintenance of all stormwater management measures/features, the establishment of any contract services required to implement the program, and the keeping of records and maintenance log book. In no way shall this document be construed to mean that the Responsible Party themselves are necessarily qualified to perform any of these duties. Records of all inspections and maintenance work accomplished must be kept on file and retained for a minimum 5-year time span. The maintenance log book will be made available to the MeDEP upon request. At a minimum, the appropriate and relevant activities for each of the stormwater management features will be performed on the prescribed schedule.

Inspection & Maintenance Tasks:
NOTE: The following instructions are excerpts from the Maine Department of Environmental Protection's *Stormwater Management for Maine, Volume III BMPs Technical Design Manual*, latest edition.

Vegetated Areas:

1. Inspect vegetated areas for vigorous growth. Re-seed areas of sparse growth, as needed.
2. Inspect all vegetated areas, especially sloped areas and embankments for signs of erosion. Erosion rills need to be repaired so as not to promote channelized flow and continued damage.
3. Fertilization of vegetated areas is not recommended for maintaining water quality.

Conveyance & Distribution Systems: (Stormwater Channels & Culverts, etc.)

1. **Mowing:** Grass should not be trimmed extremely short, as this will reduce the filtering effect of the swale (MPCA, 1989). The cut vegetation should be removed to prevent the decaying organic litter from adding pollutants to the discharge from the swale. The mowed height of the grass should be 2-4 inches taller than the maximum flow depth of the design water quality storm. A minimum mow height of 6 inches is generally recommended (Galli, 1993).
2. **Routine Maintenance and Inspection:** The area should be inspected for failures following heavy rainfall and repaired as necessary for newly formed channels or gullies, reseeding/ sodding of bare spots, removal of trash, leaves and/or accumulated sediments, the control of woody or other undesirable vegetation and to check the condition and integrity of the check dams.
3. **Aeration:** The buffer strip may require periodic mechanical aeration to restore infiltration capacity. This aeration must be done during a time when the area can be reseeded and mulched prior to any significant rainfall.
4. **Erosion:** It is important to install erosion and sediment control measures to stabilize this area as soon as possible and to retain any organic matter in the bottom of the trench.
5. **Fertilization:** Routine fertilization and/or use of pesticides is strongly discouraged. If complete re-seeding is necessary, half the original recommended rate of fertilizer should be applied with a full rate of seed.
6. **Sediment Removal:** The level of sediment deposition in the channel should be monitored regularly, and removed from grassed channels before permanent damage is done to the grassed vegetation, or if infiltration times are longer than 12 hours. Sediment should be removed from riprap channels when it reduces the capacity of the channel.
7. **Catch Basins**: All catch basins, and any other field inlets throughout the collection system, need to be inspected on a monthly basis to assure that the inlet entry point is clear of debris and will allow the intended water entry. At that time, these will be cleared, if necessary on a yearly basis or when sediment reaches two thirds of total volume. Catch basins need to be vacuumed and cleaned of all accumulated sediment. This work must be done by a vacuum truck under contract. The removed material must be disposed of in accordance with the Maine Solid Waste Disposal Rules.

Roadways & Parking Surfaces:

Paved surfaces shall be swept or vacuumed at least twice annually in the Spring to remove all Winter sand, and periodically during the year on an as-needed basis to minimize transportation of sediment during rainfall events.

Grassed Underdrained Soil Filter BMP

The basin should be inspected semi-annually and following major storm events. Debris and sediment buildup should be removed from the forebay and basin as needed. Any bare area or erosion rills should be repaired with new filter media, seeded and mulched.

- Maintenance Agreement: A legal entity should be established with responsibility for inspecting and maintaining any underdrained filter. The legal agreement establishing the entity should list specific maintenance responsibilities (including

timetables) and provide for the funding to cover long-term inspection and maintenance.

- Drainage: The filter should within 24 to 48 hours following a one-inch storm or greater. If the system drains too fast, an orifice may need to be added on the underdrain outlet or may need to be modified if already present.
- Sediment Removal: Sediment and plant debris should be removed from the pretreatment structure at least annually.
- Mowing: If mowing is desired, only hand-held string trimmers or push-mowers are allowed on the filter (no tractor) and the grass bed should be mowed no more than 2 times per growing season to maintain grass heights of no less than 6 inches.
- Fertilization: Fertilization of the underdrained filter area should be avoided unless absolutely necessary to establish vegetation.
- Harvesting and Weeding: Harvesting and pruning of excessive growth should be done occasionally. Weeding to control unwanted or invasive plants may also be necessary.
- Grass cover: Maintaining a healthy cover of grass will minimize clogging with fine sediments. If ponding exceeds 48 hours, the top of the filter bed should be rototilled to reestablish the soil's filtration capacity.
- Soil Filter Replacement: The top several inches of the filter can be replaced with fresh material if water is ponding for more than 72 hours, or the basin can be rototilled, seeded and mulched. Once the filter is mature, adding new material (a 1-inch to 2-inch cover of mature compost) can compensate for subsidence.

Wet Pond

Maintenance: The wet pond should be inspected after every major storm to ensure proper functioning. Thereafter, the basin should be inspected at least once every six months. Inspections should include verification that the pond is slowly emptying through the gravel filter for a short time (12-24 hours) after a storm. It is important to design flow structures that can be easily inspected for debris blockage.

- Maintenance Agreement: A legal agreement should list specific maintenance responsibilities, establish the responsible party, and provide for the funding to cover long-term inspection and maintenance.
- Inlets and Outlets: The inlet and outlet of the pond should be checked periodically to ensure that flow structures are not blocked by debris. All ditches or pipes connecting ponds in series should be checked for debris that may obstruct flow.
- Gravel Trench: The gravel trench should be clear of clogging material (e.g., decaying leaves) so that discharge through the trench is not impeded. The top several inches of the gravel in the outlet trench should be replaced with fresh material when water ponds above the permanent pool for more than 72 hours. The sediments removed from the wet pond should be disposed of in accordance with application regulations.
- Embankments: Wet ponds should be inspected annually for erosion, side slopes destabilization, embankment settling or other signs of structural failure. Corrective actions should be taken immediately upon identification of a problem.

Task Frequency:

Table 11-1 Long-Term Inspection & Maintenance Plan				
	Spring	Fall or Yearly	After a Major Storm	Every 2-5 Years
Vegetated Areas				
Inspect all slopes and embankments	X		X	
Replant bare areas or areas with sparse growth	X		X	
Armor areas with rill erosion with an appropriate lining or divert the erosive flows to on-site areas able to withstand concentrated flows. See Appendix A(5) of Rule.	X		X	
Stormwater Channels				
Inspect ditches, swales and other open stormwater channels	X	X	X	
Remove any obstructions and accumulated sediments or debris	X	X		
Control vegetated growth and woody vegetation		X		
Repair any erosion of the ditch lining		X		
Mow vegetated ditches		X		
Remove woody vegetation growing through riprap		X		
Repair any slumping side slopes		X		
Replace riprap where underlying filter fabric or underdrain gravel is showing or where stones have dislodge		X		
Culverts				
Remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit	X	X	X	
Repair any erosion damage at the culvert's inlet and outlet	X	X	X	
Catch Basin Systems				
Remove and legally dispose of accumulated sediments and debris from the bottom of the basin, inlet grates, inflow channels to the basin, and pipes between basins.	X			
Remove floating debris and floating oils (using oil absorptive pads) from any trap designed for such	X			
Roadways and Parking Surfaces				
Clear accumulated winter sand in parking lots and along roadways	X			
Sweep pavement to remove sediment	X			
Grade road shoulders and remove excess sand either manually or by a front-end loader	X			
Grade gravel roads and gravel shoulders	X			
Clean-out the sediment within water bars or open-top culverts	X			
Ensure that stormwater is not impeded by accumulations of material or false ditches in the shoulder	X			

Table 11-1
Long-Term Inspection & Maintenance Plan

	Spring	Fall or Yearly	After a Major Storm	Every 2-5 Years
Buffers				
Inspect treatment buffers for evidence of erosion, concentrated flow, or encroachment by development		X		
Manage the buffer's vegetation with the requirements in any deed restrictions		X		
Mow vegetation in non-wooded buffers no shorter than six inches and less than three times per year		X		
Repair any sign of erosion within a buffer		X		
Inspect and repair down-slope of all spreaders and turn-outs for erosion		X		
Install more level spreaders, or ditch turn-outs if needed for a better distribution of flow		X		
Clean-out any accumulation of sediment within the spreader bays or turnout pools		X		
Stormwater Detention and Retention Facilities				
Inspect the embankments for settlement, slope erosion, internal piping, and downstream swamping. A professional engineer must review these immediately.		X	X	
Mow the embankment to control woody vegetation		X		
Inspect the outlet control structure for broken seals, obstructed orifices, and plugged trash racks		X	X	
Remove and dispose of sediments and debris within the control structure		X		
Repair any damage to trash racks or debris guards		X		
Mow vegetated spillways to control woody vegetation and replace any dislodged stone in riprap spillways		X		
Remove and dispose of accumulated sediments within the impoundment and forebay				X
Runoff Filtration Facilities				
Inspect and clean-out any pre-treatment measures that collect sediment and hydrocarbons entering an infiltration measure	X	X		
Provide for the removal and disposal of accumulated sediments within the filtration area				X
Renew the filter media if it fails to drain within 72 hours after a rainfall of one-inch or more				X
Till and replant the soil of vegetated filtration basins				X
Reconstruct rock-lined basins or stone-filled trenches by removing the stones, replacing new underlying filter fabric, and tilling or removing the underlying soil				X

Maintenance Log Sheet

BMP's	Date Inspected	Repairs Needed?	Date Repaired
Example	5/11/17	Y	5/15/17
1. Vegetated Areas			
2. Stormwater Channels			
3. Culverts			
4. Roadways and Parking Surfaces			
5. Stormwater Detention & Retention			
6. Runoff Filtration Facilities			
7. Catchbasins			

Detailed Repair Notes:

BMP Type	Date	Description of Repair Made
2	5/15/17	Sodded over eroded section (Example)