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NH-1443

STORMWATER MANAGEMENT/BMP OPERATION & MAINTENANCE PLAN

Proper construction, inspections, maintenance and repair are key elements in maintaining a successful stormwater management program on a developed property. Routine inspections ensure permit compliance and reduce the potential for deterioration of infrastructure or reduced water quality.

For the purpose of this Stormwater Management Program, a significant rainfall event is considered an event of three (3) inches in a 24-hour period or 0.5 inches in a one-hour period. During construction, inspections should be conducted every two weeks or after a 0.25" rainfall event in a 24-hour period per the EPA NPDES Phase II SWPPP, until the entire disturbed area is fully restabilized. Upon full stabilization of the project and filing of an NOI, inspections need only be conducted after a significant rainfall event as described above or as described in the maintenance guidelines below.

1. During construction activities of 7B Emery Lane, Stratham, NH 03885 with a phone # of (603) 772-9400, or its heirs and/or assigns, shall be responsible for inspections and maintenance activities. Upon municipal acceptance of the public roadway, the Bending Brook Homeowners' Association shall be responsible for ongoing inspection and maintenance of BMP drainage structures and treatment areas. The individual homeowner's will have joint and several liability for maintenance, if the homeowner's association is dissolved. Easements are provided in the event the owners do not adequately maintain these structures the HOA or agents of the municipality may enter the parcel for any required maintenance and invoice the lot owners for the work.

Documentation:

A maintenance log will be kept (i.e. report) summarizing inspections, maintenance, and any corrective actions taken. The log will include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task (see Stormwater Construction Site Inspection Report attached). If a maintenance task requires the clean-out of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. During inspections, photographs of each BMP shall be taken and kept with the inspection logs.

BMP Maintenance Guidelines

The following provides a list of recommendations and guidelines for managing the Stormwater facilities. The cited areas, facilities, and measures will be inspected and the identified deficiencies will be corrected. Clean-out must include the removal and legal disposal of any accumulated sediments and debris. The numbered drainage features below correspond to the specific numbered drainage feature locations on the attached plan.

DURING CONSTRUCTION:

1. STABILIZED CONSTRUCTION ENTRANCE

A temporary gravel construction entrance provides an area where mud can be dislodged from tires before the vehicle leaves the construction site to reduce the amount of mud and sediment transported

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onto paved municipal and state roads. The stone size for the pad should be between 1 and 2-inch coarse aggregate, and the pad itself constructed to a minimum length of 50' for the full width of the access road. The aggregate should be placed at least six inches thick. A plan view and profile are shown on Sheet E1 - Sediment and Erosion Control Detail Plan.

1a. ENVIRONMENTAL DUST CONTROL

Dust will be controlled on the site by the use of multiple Best Management Practices. Mulching and temporary seeding will be the first line of protection to be utilized where problems occur. If dust problems are not solved by these applications, the use of water and calcium chloride can be applied. Calcium chloride will be applied at a rate that will keep the surface moist but not cause pollution.

1b. TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES

Function – Temporary erosion and sediment control devices are utilized during construction period to divert, store and filter stormwater from non-stabilized surfaces. These devices include, but are not limited to: silt fences, hay bales, filters, sediment traps, stone check dams, mulch and erosion control blankets.

Maintenance – Temporary erosion and sediment control devices shall be inspected and maintained on a weekly basis and following a significant storm event (>0.5-inch rain event) throughout the construction period to ensure that they still have integrity and are not allowing sediment to pass. Sediment build-up in swales will be removed if it is deeper than six inches. Sediment is to be removed from sumps in the catch basin semi-annually. Refer to the Site Plan drawings for the maintenance of temporary erosion and sediment control devices.

ONGOING POST-CONSTRUCTION (Note inspections shall require photographs of each BMP):

2. Culverts:

Inspect culverts 2 times per year (preferably in spring and fall) to ensure that the culverts are working in their intended fashion and that they are free of debris. Remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit and to repair any erosion damage at the culvert's inlet and outlet.

3. Stormwater Infiltration/Filtration Facilities:

Inspect all upstream pre-treatment measures for sediment and floatables accumulation. Remove and dispose of sediments or debris as needed (see details below).

Surface:

The infiltration facility will be inspected within the first three months after construction; thereafter the filter will be inspected 2 times per year to ensure that the filter is draining within 72 hours of a rain event equivalent to 1/2" or more. Failure to drain in 72 hours will require part or all of the top 3 inches of the infiltration area to be removed and replaced with new like material. Vegetated infiltration ponds or swales will be mowed at least annually or otherwise maintained to control the growth of woody vegetation and to control the accumulation of sediments in order to maintain the water quality volume.

Any

woody vegetation or accumulated sediment must be removed. The facilities will be inspected after major storms and any identified deficiencies will be corrected.

4. Pretreatment Structures

Inspect all upstream pre-treatment measures (fore bays, etc.) for sediment and floatables accumulation. Remove and dispose of sediments or debris as needed. Inspect structure on a semiannual basis by using inspection port and/or access structure. Remove sediment as needed when average depths reach 1”.

5. Drainage Swales/Stormwater Conveyances

Drainage swales will be stabilized with vegetation for long term cover as outlined below, and on Sheet E-1 using seed mixture C. As a general rule, velocities in the swale should not exceed 3.0 feet per second for a vegetated swale although velocities as high as 4.5 FPS are allowed under certain soil conditions.

Maintenance

- Inspect annually for erosion, sediment accumulation, vegetation loss and presence of invasive species.
- Perform periodic mowing; frequency depends on location and type of grass. Do not cut shorter than Water Quality Flow depth (maximum 4 inches)
- Remove debris and accumulated sediment, based on inspection.
- Repair eroded areas, remove invasive species and dead vegetation, and reseed With applicable grass mix as warranted by inspection.

6. Level Spreader – Maintenance

- Inspect at least once annually for accumulation of sediment and debris and for signs of erosion within approach channel, spreader channel or down-slope of the spreader.
- Remove debris whenever observed during inspection.
- Remove sediment when accumulation exceeds 25% of spreader channel depth.
- Mow as required by landscaping design. At a minimum, mow annually to control woody vegetation within the spreader.
- Snow should not be stored within or down-slope of the level spreader or its approach channel.
- Repair any erosion and re-grade or replace stone berm material, as warranted by inspection.
- Reconstruct the spreader if down-slope channelization indicates that the spreader is not level or that discharge has become concentrated, and corrections cannot be made through minor re-grading.

7. Vegetated Areas:

Inspect slopes and embankments early in the growing season to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows. The facilities will be inspected after major storms and any identified deficiencies will be corrected.

8. Roadways and Parking Surfaces: Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader.

9. Invasive Species:

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described on the following pages. They should be controlled as described on the following pages.

Background:

Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants, seeds, packing materials, or fresh produce. Some exotic plants become invasive and cause harm

by:

- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and
- resisting control except by hazardous chemical.

Methods for Disposing Non-Native Invasive Plants

Prepared by the Invasives Species Outreach Group, volunteers interested in helping people control invasive plants. Assistance provided by the Piscataquog Land Conservancy and the NH Invasives Species Committee. Edited by Karen Bennett, Extension Forestry Professor and Specialist.

Non-native invasive plants crowd out natives in natural and managed landscapes. They cost taxpayers billions of dollars each year from lost agricultural and forest crops, decreased biodiversity, impacts to natural resources and the environment, and the cost to control and eradicate them.

Lonicera tatarica

USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. An illustrated flora of the northern United States, Canada and the British Possessions. Vol. 3: 282.

Invasive plants grow well even in less than desirable conditions such as sandy soils along roadsides, shaded wooded areas, and in wetlands. In ideal conditions, they grow and spread even faster. There are many ways to remove these non-native invasives, but once removed, care is needed to dispose the removed plant material so the plants don't grow where disposed.

Knowing how a particular plant reproduces indicates its method of spread and helps determine

the appropriate disposal method. Most are spread by seed and are dispersed by wind, water, animals, or people. Some reproduce by vegetative means from pieces of stems or roots forming new plants. Others spread through both seed and vegetative means.

New Hampshire Regulations

Prohibited invasive species shall only be disposed of in a manner that renders them nonliving and nonviable. (Agr. 3802.04)

No person shall collect, transport, import, export, move, buy, sell, distribute, propagate or transplant any living and viable portion of any plant species, which includes all of their cultivars and varieties, listed in Table 3800.1 of the New Hampshire prohibited invasive species list. (Agr 3802.01)

Because movement and disposal of viable plant parts is restricted (see NH Regulations), viable invasive parts can't be brought to most transfer stations in the state. Check with your transfer station to see if there is an approved, designated area for invasives disposal. This fact sheet gives recommendations for rendering plant parts non-viable.

Control of invasives is beyond the scope of this fact sheet. For information about control visit www.nhinvasives.org or contact your UNH Cooperative Extension office.

How and When to Dispose of Invasives?

To prevent seed from spreading remove invasive plants before seeds are set (produced). Some plants continue to grow, flower and set seed even after pulling or cutting. Seeds can remain viable in the ground for many years. If the plant has flowers or seeds, place the flowers and seeds in a heavy plastic bag "head first" at the weeding site and transport to the disposal site. The following are general descriptions of disposal methods. See the chart for recommendations by species.

Burning: Large woody branches and trunks can be used as firewood or burned in piles. For outside burning, a written fire permit from the local forest fire warden is required unless the ground is covered in snow. Brush larger than 5 inches in diameter can't be burned. Invasive plants with easily airborne seeds like black swallow-wort with mature seed pods (indicated by their brown color) shouldn't be burned as the seeds may disperse by the hot air created by the fire.

Bagging (solarization): Use this technique with softer-tissue plants. Use heavy black or clear plastic bags (contractor grade), making sure that no parts of the plants poke through. Allow the bags to sit in the sun for several weeks and on dark pavement for the best effect.

Tarping and Drying: Pile material on a sheet of plastic

Japanese knotweed

Polygonum cuspidatum USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. An illustrated flora of the northern United States, Canada and the British Possessions. Vol. 1: 676.

and cover with a tarp, fastening the tarp to the ground and monitoring it for escapes. Let the material dry for several weeks, or until it is clearly nonviable.

Chipping: Use this method for woody plants that don't reproduce vegetatively.

Burying: This is risky, but can be done with watchful diligence. Lay thick plastic in a deep pit before placing the cut up plant material in the hole. Place the material away from the edge of the plastic

before covering it with more heavy plastic. Eliminate as much air as possible and toss in soil to weight down the material in the pit. Note that the top of the buried material should be at least three feet underground. Japanese knotweed should be at least 5 feet underground!

Drowning: Fill a large barrel with water and place soft-tissue plants in the water. Check after a few weeks and look for rotted plant material (roots, stems, leaves, flowers). Well- rotted plant material may be composted. A word of caution- seeds may still be viable after using this method. Do this before seeds are set. This method isn't used often. Be prepared for an awful stink!

Composting: Invasive plants can take root in compost. Don't compost any invasives unless you know there is no viable (living) plant material left. Use one of the above techniques (bagging, tarping, drying, chipping, or drowning) to render the plants nonviable before composting. Closely examine the plant before composting and avoid composting seeds.

Be diligent looking for seedlings for years in areas where removal and disposal took place.

Suggested Disposal Methods for Non-Native Invasive Plants

This table provides information concerning the disposal of removed invasive plant material. If the infestation is treated with herbicide and left in place, these guidelines don't apply. Don't bring invasives to a local transfer station, unless there is a designated area for their disposal, or they have been rendered non-viable. This listing includes wetland and upland plants from the New Hampshire Prohibited Invasive Species List. The disposal of aquatic plants isn't addressed.

Woody Plants	Method of Reproducing	Methods of Disposal
Norway maple (<i>Acer platanoides</i>)	Fruit and Seeds	Prior to fruit/seed ripening
European barberry (<i>Berberis vulgaris</i>)		Seedlings and small plants
Japanese barberry (<i>Berberis thunbergii</i>)		Pull or cut and leave on site with roots exposed. No special care needed.
autumn olive (<i>Elaeagnus umbellata</i>)		Larger plants
burning bush (<i>Euonymus alatus</i>)		Use as firewood.
Morrow's honeysuckle (<i>Lonicera morrowii</i>)		Make a brush pile.
Tatarian honeysuckle (<i>Lonicera tatarica</i>)		Chip.
showy bush honeysuckle (<i>Lonicera x bella</i>)		Burn.
common buckthorn (<i>Rhamnus cathartica</i>)		After fruit/seed is ripe
glossy buckthorn (<i>Frangula alnus</i>)		Don't remove from site.
		Burn.
		Make a covered brush pile.
		Chip once all fruit has dropped from branches.
		Leave resulting chips on site and monitor.

<p>oriental bittersweet (<i>Celastrus orbiculatus</i>) multiflora rose (<i>Rosa multiflora</i>)</p>	<p>Fruits, Seeds, Plant Fragments</p>	<p>Prior to fruit/seed ripening Seedlings and small plants Pull or cut and leave on site with roots exposed. No special care needed. Larger plants Make a brush pile. Burn.</p> <hr/> <p>After fruit/seed is ripe Don't remove from site. Burn. Make a covered brush pile. Chip – only after material has fully dried (1 year) and all fruit has dropped from branches. Leave resulting chips on site and monitor.</p>
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	Method of Reproducing	Methods of Disposal
garlic mustard (<i>Alliaria petiolata</i>) spotted knapweed (<i>Centaurea maculosa</i>) Sap of related knapweed can cause skin irritation and tumors. Wear gloves when handling. black swallow-wort (<i>Cynanchum nigrum</i>) May cause skin rash. Wear gloves and long sleeves when handling. pale swallow-wort (<i>Cynanchum rossicum</i>) giant hogweed (<i>Heracleum mantegazzianum</i>) Can cause major skin rash. Wear gloves and long sleeves when handling. dame's rocket (<i>Hesperis matronalis</i>) perennial pepperweed (<i>Lepidium latifolium</i>) purple loosestrife (<i>Lythrum salicaria</i>) Japanese stilt grass (<i>Microstegium vimineum</i>) mile-a-minute weed	Fruits and Seeds	Prior to flowering Depends on scale of infestation Small infestation Pull or cut plant and leave on site with roots exposed. Large infestation Pull or cut plant and pile. (You can pile onto or cover with plastic sheeting). Monitor. Remove any re-sprouting material.
		During and following flowering Do nothing until the following year or remove flowering heads and bag and let rot. Small infestation Pull or cut plant and leave on site with roots exposed. Large infestation Pull or cut plant and pile remaining material. (You can pile onto plastic or cover with plastic sheeting). Monitor. Remove any re-sprouting material.
common reed (<i>Phragmites australis</i>) Japanese knotweed (<i>Polygonum cuspidatum</i>) Bohemian knotweed (<i>Polygonum x bohemicum</i>)	Fruits, Seeds, Plant Fragments Primary means of spread in these species is by plant parts. Although all care should be given to preventing the dispersal of seed during control activities, the presence of seed doesn't materially influence disposal activities.	Small infestation Bag all plant material and let rot. Never pile and use resulting material as compost. Burn. Large infestation Remove material to unsuitable habitat (dry, hot and sunny or dry and shaded location) and scatter or pile. Monitor and remove any sprouting material. Pile, let dry, and burn.

In the event that invasive species are noticed growing in any of the stormwater management practices, the invasive vegetation shall be removed completely to include root matter and disposed of properly. Prior to disposal, the vegetation shall be placed on and completely cover with a plastic tarp for a period of two – three weeks until plants are completely dead. If necessary or to expedite the process, spray only the invasive vegetation and roots with a systemic nonselective herbicide after placement on the tarp (to prevent chemical migration) and then cover as described above.

Annual Report:

Description: The owner is responsible to keep an **I & M** Activity Log that documents inspection, maintenance and repairs to the storm water management system, and a **Deicing Log** to track the amount and type of deicing material applied to the site. The original owner is responsible to ensure that any subsequent owner (s) have copies of the Stormwater System Operation and Maintenance Plan & Inspection and Maintenance Manual, copies of past logs and check lists. This includes any owner association for potential condominium conversion of the property. The Annual Report will be prepared and submitted to the Town of Barrington DPW and/or NHDES AoT upon request.

STORMWATER SYSTEM OPERATION AND MAINTENANCE PLAN

Inspection & Maintenance Manual Checklist

**Bending Brook Residential Development
 Mallego Road
 Barrington, NH**

BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance / Cleanout Threshold
Pavement Sweeping	Two Times Per Year	N/A	N/A
Litter/Trash Removal	Routinely	Inspect dumpsters, outdoor waste receptacles area, and yard areas.	Parcel will be free of litter/trash.
Deicing Agents	N/A	N/A	Use salt as the primary agent for roadway safety during winter.
Closed Drainage System:			
Drainage Pipes & DMH's	1 time per 2 years	Check for sediment accumulation & clogging.	Less than 2" sediment depth
Drainage Swales	2 times per year	Check for sediment and debris accumulation buildup.	Remove sediment & debris when required.