Inspection & Maintenance Plan

TURBOCAM International
Route 9 / Redemption Road (Site)
Barrington, NH 03825

September 13, 2019
Revised: January 6, 2020

Prepared for: TURBOCAM International
607 Calef Highway
Barrington, NH 03825

Prepared by: Emanuel Engineering, Inc.
Bruce Scamman, PE
118 Portsmouth Avenue, Suite A202
Stratham, NH 03885
EEI Project # 19-020

Contact: TURBOCAM International
Eliot Wilkins
607 Calef Highway
Barrington, NH 03825
(603)978-5030
Eliot.Wilkins@turbocam.com

Introduction

Emanuel Engineering, Inc. has prepared the following Stormwater Management System Inspection & Maintenance Plan for **Route 9 / Redemption Road, Barrington, New Hampshire**. The intent of this plan is to provide the client, **TURBOCAM International,** with a list of procedures that document the inspection and maintenance requirements of the Stormwater Management System for this site.

The following inspection and maintenance program is necessary in order to keep the Stormwater Management System functioning properly. By following the enclosed procedures the owners and property management will be able to maintain the functional design of the Stormwater Management System and maximize its ability to remove sediment and other contaminants from site generated stormwater runoff.

Stormwater Management System Components

The Stormwater Management System has been designed to mitigate both the quantity and quality of site-generated stormwater runoff. As a result, its design included the following elements:

Non-Structural Best Management Practices (BMP's)

Non-Structural best management practices (BMP's) are designed to minimize and/or remove contaminants before they enter the stormwater collection system. Several of these BMP's have been incorporated into the Stormwater Management System including pavement sweeping, reduced use of road salt, and litter/trash removal. These types of BMP's are a highly effective initial treatment measure for reducing stormwater pollutant loading.

Closed Drainage Collection and Piping System

The closed drainage system is designed to collect and convey stormwater runoff from the paved areas and infiltrate stormwater back into the water table. Stormwater is collected by catch basins located throughout the site. Key catch basins are designed with deep sumps to provide storage areas for sediment and control sediment outflow.

Source Control & Maintenance

The following are the areas to be accomplished and maintained because this site is considered a "High Load Area" from the maintenance and repair of vehicles on site. This plan is to provide to **TURBOCAM International** with an outline of best management practices (BMPs) and operations that are prohibited on site. Descriptions and maintenance requirements of BMPs and operations in this section were taken from the *New Hampshire Stormwater Manual, Volume 2* dated December 2008 (http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-08-20b.pdf). A log is attached at the end of this document for the owner or designee to confirm that best management practices are occurring on-site.

Street Sweeping

Street sweeping is a pollution prevention practice that removes sediment, debris and trash that accumulates along streets and roads from winter sanding practices and everyday use. Street sweeping is often performed to improve aesthetics and to reduce the export of sand to the drainage network and receiving waters. In addition to sediment, debris and trash, other pollutants that may be minimized through street sweeping include some nutrients, oxygen-demanding substances and trace metals.

Maintenance - At a minimum, street sweeping should be performed once annually for traditional pavement, preferably as soon as possible after the snow melts to reduce the amount of sand, grit, and debris and associated pollutants from winter sanding from entering surface waters.

Snow & Ice Management

To address the concerns associated with the application of chlorides and other deicing materials, NHDES recommends the development of a Road Salt and Deicing Minimization Plan when a development will create one acre or more of pavement, including parking lots and roadways. The plan should address the policies that the development will keep in place to minimize salt and other deicer use after the project has been completed. A component of the plan should include tracking the use of salt and other deicers for each storm event and compiling salt use data annually. See below for deicing application rate guidelines.

New Hampshire does not yet have salt reduction guidance, but recommends following the guidelines available in reference cited below.
Minnesota Snow and Ice Control handbook, available at:
http://www.mnltap.umn.edu/publications/handbooks/documents/snice_2012_wb.pdf

Deicing Application Rate Guidelines

24' of pavement (typical two-lane road)

These rates are not fixed values, but rather the low end of a range to be selected and adjusted by an agency according to its local conditions and experience.

			Lbs/ two-lane mile			
Pavement Temp. (°F) and Trend (↑↓)	Weather Condition	Maintenance Actions	Salt Prewetted/ Pretreated With Salt Brine	Salt Prewetted/ Pretreated With Other Blends	Dry Salt*	Winter Sand (abrasives)
>30° ↑	Snow	Plow, treat intersections only	80 (40/lane mile)	70	100*	Not recommended
	Frz. rain	Apply chemical	80 – 160	70 – 140	100 – 200*	Not recommended
30° ↓	Snow	Plow & apply chemical	80 – 160	70 – 140	100 – 200*	Not recommended
	Frz. rain	Apply chemical	150 – 200	130 – 180	180 – 240*	Not recommended
25 - 30° ↑	Snow	Plow & apply chemical	120 – 160	100 – 140	150 – 200*	Not recommended
	Frz. rain	Apply chemical	150 – 200	130 – 180	180 – 240*	Not recommended
25 - 30° ↓	Snow	Plow & apply chemical	120 – 160	100 – 140	150 – 200*	Not recommended
	Frz. rain	Apply chemical	160 – 240	140 – 210	200 – 300*	400
20 - 25° ↑	Snow or frz. rain	Plow & apply chemical	160 – 240	140 – 210	200 – 300*	400
20 - 25° ↓	Snow	Plow & apply chemical	200 – 280	175 – 250	250 – 350*	Not recommended
	Frz. rain	Apply chemical	240 – 320	210 – 280	300 – 400*	400
15 - 20° ↑	Snow	Plow & apply chemical	200 – 280	175 – 250	250 – 350*	Not recommended
	Frz. rain	Apply chemical	240 – 320	210 – 280	300 – 400*	400
15 - 20° ↓	Snow or Frz. rain	Plow & apply chemical	240 – 320	210 – 280	300 – 400*	500 for frz. rain
0 to 15° ↑↓	Snow	Plow, treat with blends, sand hazardous areas	Not recommended	300 – 400	Not recommended	500 – 750 spot treat as needed
< 0°	Snow	Plow, treat with blends, sand hazardous areas	Not recommended	400 – 600**	Not recommended	500 – 750 spot treat as needed

*Dry salt is not recommended. It is likely to blow off the road before it melts ice.

**A blend of 6 – 8 gal/ton $MgCl_2$ or $CaCl_2$ added to NaCl can melt ice as low as -10°.

Bioretention System (Bioswale, Bioswale Forebay, & Bioswale-ISR System)

A bioretention system is a type of filtration BMP designed to collect and filter moderate amounts of stormwater runoff using conditioned planting soil beds, gravel beds and vegetation within shallow depressions. The bioretention system may be designed with an underdrain, to collect treated water and convey it to discharge, or it may be designed to infiltrate the treated water directly to the subsoil. Bioretention cells are capable of reducing sediment, nutrients, oil and grease, and trace metals.

Maintenance -

- Systems should be inspected at least twice annually, and following any rainfall event exceeding 2.5 inches in a 24 hour period, with maintenance or rehabilitation conducted as warranted by such inspection.
- Pretreatment measures should be inspected at least twice annually, and cleaned of accumulated sediment as warranted by inspection, but no less than once annually.
- Trash and debris should be removed at each inspection.
- At least once annually, system should be inspected for drawdown time. If bioretention system does not drain within 72-hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore filtration function or infiltration function (as applicable), including but not limited to removal of accumulated sediments or reconstruction of the filter media.
- Vegetation should be inspected at least annually, and maintained in healthy condition, including pruning, removal and replacement of dead or diseased vegetation, and removal of invasive species.

See "Checklist for Inspection of Bioswales", and "Inspection and Maintenance of Guidance for Bioswales" located at the end of this document.

Conveyance Swales

Conveyance swales are stabilized channels designed to convey runoff at non-erosive velocities. They may be stabilized using vegetation, riprap, or a combination, or with an alternative lining designed to accommodate design flows while protecting the integrity of the sides and bottom of the channel. Conveyance channels may provide incidental water quality benefits, but are not specifically designed to provide treatment.

Maintenance -

- Grassed channels should be inspected periodically (at least annually) for sediment accumulation, erosion, and condition of surface lining (vegetation or riprap). Repairs, including stone or vegetation replacement, should be made based on this inspection.
- Remove sediment and debris annually, or more frequently as warranted by inspection.
- Mow vegetated channels based on frequency specified by design. Mowing at least once per year is required to control establishment of woody vegetation. It is recommended to cut grass no shorter than 4 inches.

Outlet Protection

Outlet protection is typically provided at stormwater discharge conduits from structural best management practices to reduce the velocity of concentrated stormwater flows to prevent scour and minimize the potential for downstream erosion. Outlet protection is also provided where conduits discharge runoff into an in-ground stormwater management practice (e.g., pond or swale) to prevent scour where flow enters the BMP.

Maintenance - Inspect the outlet protection annually for damage and deterioration. Repair damages immediately.

Manicured Landscaped Areas – Litter Control

Landscaped areas tend to filter debris and contaminates that may block drainage systems and pollute the surface and ground waters.

Maintenance -

- Litter control and lawn maintenance involves removing litter such as trash, leaves, lawn clippings, pet wastes, oil and chemicals from streets, parking lots, and lawns before materials are transported into surface water.
- Litter control should be implemented as part of the daily grounds maintenance program.

Manicured Landscaped Areas – Fertilizer Management

Fertilizer management involves controlling the rate, timing, and method of fertilizer application so that the nutrients are taken up by the plants, thereby reducing the chance of polluting the surface and ground waters. Fertilizer management can be effective in reducing the amounts of phosphorus and nitrogen in runoff from landscape areas, particularly lawns. Soil tests should be conducted to determine fertilizer application rates.

Maintenance

- Have the soil tested by your landscaper or local Soil Conservation Service for nutrient requirements and follow the recommendations.
- Do not apply fertilizer to frozen ground.
- Clean up any fertilizer spills
- Do not allow fertilizer to be broadcast into water bodies.
- When fertilizing a lawn, water thoroughly, but do not create a situation where water runs off the surface of the lawn.

Catch Basin Cleaning

Catch basins collect stormwater, primarily from parking lots. The stormwater often contains sediment and contaminants. The catch basin sumps trap sediment, trace metals, nutrients, and hydrocarbons.

Maintenance -

- Remove leaves and debris from catch basin grates on an as-needed basis.
- Sumps should be cleaned on an annual basis to protect water quality. Catch basin debris shall be disposed of at a solid waste disposal site.

PreTX Pretreatment (Pretreatment Catch Basins)

Routine annual inspection and period maintenance is required for the effective operation of PreTX pretreatment catch basins.

The following maintenance items are required as needed for the PreTX pretreatment catch basins. The PreTX pretreatment catch basins (PT1, PT2, and PT3) are located upstream of the bioswale-ISR systems (BR1 and BR2). The PreTX catch basins are located prior to discharge to the bioswale-ISR systems and provide pretreatment for sediment, trash, and debris. The PreTX catch basins are deep sumps with a combination of baffle, weir, and screened grate to provide rigorous pretreatment intended to minimize maintenance within the bioswale-ISR systems. Overflow structures drain to the subsurface infiltration system located below the parking area. Maintenance elements included removal of trash and debris, sediment, periodic inspection of invasive species, and verification of proper infiltration and time to drain.

Subsurface Infiltration System

The subsurface infiltration system (SI1) is to be inspected at the center drywell with access via a solid manhole cover. Inspection access is located within the roadway in the event that inspections indicated failure to drain as designed.

See the "Checklist for Inspection of Catch Basins and Infiltration System", and "Inspection and Maintenance for Catch Basins and Roadway Infiltration" located at the end of this document.

Culverts, Drainage Pipes, and Roof Drains

Culverts, drainage pipes, and roof drains convey stormwater away from buildings, walkways, and parking areas.

Maintenance – Culverts, drainage pipes, and roof drains should be inspected semi-annually, or more often as needed, for accumulation of debris and structural integrity. Leaves and other debris should be removed from the inlet and outlet to insure the functionality of drainage structures. Debris shall be disposed of on the site where it will not concentrate back at the drainage structures or at a solid waste disposal facility.

Temporary Sediment Trap

A sediment trap is a small, temporary ponding area to intercept sediment-laden runoff from small disturbed areas. Intercepted runoff is retained long enough to allow for settling of the coarser sediment particles. A sediment trap is usually installed in a drainage swale or channel, at a storm drain or culvert inlet, or other points of discharge from a disturbed area.

Maintenance –

- Sediment traps should be inspected at least weekly during construction and after every storm (or daily during prolonged rainfall periods), to insure that they are functioning properly and are not damaged. Repairs should be made immediately.
- Sediment should be removed and the trap restored to original capacity when sediment has accumulated to 50% of the original volume.
- The materials removed from the trap should be properly disposed of and stabilized.
- Sediment trap outlets should be examined at the time of inspection for any damage, and repaired immediately if any such damage is observed.
- Geotextile fabric or stone used around a pipe-outlet riser should be checked periodically and replaced when the material has become clogged with sediment.

Invasive Species

Should any invasive species grow in the stormwater management practices, refer to the "Control of Invasive Plants" document provided after the Maintenance Logs of this document.

General Cleanup

Upon completion of the project, the contractor shall remove all temporary stormwater erosion control structures (i.e., temporary stone check dams, silt fence, etc.). Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform with the existing grade, prepared, and seeded. Culverts and catch basins shall be cleaned, removing any sediment that may have accumulated during construction.

Inspection & Maintenance Log

The following pages contain an Inspection & Maintenance Log and blank copy of the Stormwater Management System's Inspection & Maintenance Log. These forms are provided to **TURBOCAM International** with the inspection and maintenance of the **Route 9 / Redemption Road, Barrington, New Hampshire** Stormwater Management System.

Proper inspection, maintenance, and repair are key elements in maintaining a successful stormwater management program on a developed property. Programs should be implemented at all of the owner's properties to ensure permit compliance and the highest quality of stormwater discharge. Routine inspection can also reduce the potential for deterioration of infrastructure or a catastrophic event, like a breach of detention pond.

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. It is anticipated that a short, intense event is likely to have a higher potential of erosion for the site than a longer, high volume event.

Applicant	Date
Town Planner	Date
Town Manager	Date

FILE: P:\2019 JOBS\19-020 CFA TurboCam - Civil Rt. 9\Documents\Permits\Alteration of Terrain\AoT Permit 01-07-20\Backup\19. Stormwater Maintenance Plan 01-07-20.doc

Stormwater Management System Inspection & Maintenance Log

TURBOCAM International at Route 9 / Redemption Road, Barrington, NH 03825

BMP/System Component	Date Inspected	Inspector	Cleaning/Repair Needed (*List Items/Comments)*	Date of Cleaning/Repair	Performed By

INSPECTION AND MAINTENANCE GUIDANCE FOR CATCH BASINS AND ROADWAY INFILTRATION

Routine annual inspection and period maintenance is required for the effective operation of pretreatment catch basins and infiltration systems. Deep sump catch basins provide pretreatment for the removal of sediment and debris prior to infiltration within the roadway stone reservoir. The following guidance is provided for corrective action and maintenance should a catch basin or infiltration system function inadequately. The Responsible Parties must maintain the catch basins and infiltration system in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for catch basins and infiltration system, along with a suggested frequency for each activity. Individual catch basins and infiltration systems may have more, or less, frequent maintenance needs, depending upon a variety of factors including: the occurrence of large storm events; overly wet or dry (i.e., drought) regional hydrologic conditions; and any changes or redevelopment in the upstream land use.

Activity	**Frequency**
Check to insure the catch basin or infiltration system drain completely after storm events	Annual Inspection
Check inlets and outlets for debris and high efficiency	
Check to see that the catch basin or infiltration system is draining completely within 48 hours after a rain event	
Check to see that the catch basin or infiltration system does not contain more than 6 inches accumulated materials in which case cleaning is required	
Check to see that the catch basin or infiltration system is not full of trash, debris, and floatables	
Inspect inlets and outlets to ensure good condition and no evidence of deterioration	
Repair or replace any damaged structural parts, inlets, outlets, grates	
If inspections indicate failure to drain within 72 hours then additional inspections of infiltration system may be warranted.	As Needed
Clean out inspection and cleaning of infiltration system can be conducted by vactor truck for removal of accumulated sediment and debris.	
This process is to be repeated until infiltration and proper drainage has been restored.	

CHECKLIST FOR INSPECTION OF CATCH BASINS AND INFILTRATION SYSTEM

Regular inspection and maintenance should **not** be necessary for the effective operation of infiltration system. The following guidance is provided for corrective action and maintenance should a infiltration system function inadequately.

Location:
Inspector:
Date: Time: Site Conditions:
Date Since Last Rain Event:

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1. Complete drainage of catch basin or infiltration system within 48 hours after rain event	**S**	**U**	
2. Sediment accumulation on catch basin or infiltration system, 6" or less	**S**	**U**	
3. Clogging of catch basin or infiltration system surface	**S**	**U**	
4. Catch basin and infiltration system clear of debris	**S**	**U**	
5. Catch basin or infiltration system chamber empty of trash, debris, and floatables	**S**	**U**	
6. Clogging of inlet/outlet structures	**S**	**U**	
7. Cracking, spalling, or deterioration of concrete	**S**	**U**	
8. Inspection of cleanouts for infiltration system as needed if failure to drain	**S**	**U**	
9. Animal burrows	**S**	**U**	
10. Undesirable vegetation	**S**	**U**	
11. Undesirable odors	**S**	**U**	
12. Complaints from residents	**S**	**U**	
13. Public hazards noted	**S**	**U**	

Corrective Action Needed	Due Date
1.	
2.	
3.	

INSPECTION AND MAINTENANCE GUIDANCE FOR BIOSWALES

Maintenance of bioswales can typically be performed as part of standard landscaping. Regular inspection and maintenance is critical to the effective operation of bioswales to insure they remain clear of leaves and debris and free draining. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (i.e., drought), regional hydrologic conditions, and the upstream land use.

INSPECTION ACTIVITIES

The most common maintenance activity is the removal of leaves from the system and bypass structure. Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Mulch and/or vegetation coverage is integral to the performance of the system, including infiltration rate and nutrient uptake. Vegetation care is important to system productivity and health.

ACTIVITY	FREQUENCY
A record should be kept of the time for the system to drain completely after a storm event. The system should drain completely within 72 hours.	After every major storm in the first few months, then annually
Check to insure the filter surface remains well draining after storm events. **Remedy**: If filter bed is clogged, draining poorly, or standing water covers more than 15% of the surface 48 hours after a precipitation event, then remove top few inches of discolored material. Till or rake remaining material as needed.	
Check inlets and outlets for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet and overflow if obstructed.	
Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
Check to insure the filter bed does not contain more than 2 inches accumulated material **Remedy:** Remove sediment as necessary. If 2 inches or more of filter bed has been removed, replace media with either mulch or a (50% sand, 20% woodchips, 20% compost, 10% soil) mixture.	
During extended periods without rainfall, inspect plants for signs of distress. **Remedy:** Plants should be watered until established (typical only for first few months) or as needed thereafter.	
Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets, outlets, sidewalls.	Annually
Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
Check for dead or dying plants, and general long term plant health. **Remedy:** This vegetation should be cut and removed from the system. If woody vegetation is present, care should be taken to remove dead or decaying plant material. Separation of herbaceous vegetation rootstock should occur when over-crowding is observed.	As needed

CHECKLIST FOR INSPECTION OF BIOSWALES

Location: Inspector:
Date: Time: Site Conditions:
Date Since Last Rain Event:

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1. Initial Inspection After Planting and Mulching			
Plants are stable, roots not exposed	**S**	**U**	
Surface is at design level, typically 4" below overpass	**S**	**U**	
Overflow bypass / inlet (if available) is functional	**S**	**U**	
2. Debris Cleanup (1 time a year)			
Litter, leaves, and dead vegetation removed from the system	**S**	**U**	
Prune perennial vegetation	**S**	**U**	
3. Standing Water (1 time a year & after large storm events during first year)			
No evidence of standing water after 72 hours	**S**	**U**	
4. Short Circuiting & Erosion (1 time a year)			
No evidence of animal burrows or other holes	**S**	**U**	
No evidence of erosion	**S**	**U**	
5. Drought Conditions (as needed)			
Water plants as needed	**S**	**U**	
Dead or dying plants	**S**	**U**	
6. Overflow Bypass / Inlet Inspection (1 time a year & after large storm events during first year)			
No evidence of blockage or accumulated leaves	**S**	**U**	
Good condition, no need for repair	**S**	**U**	
7. Vegetation Coverage (1 time a year)			
50% coverage established throughout system by first year	**S**	**U**	
Robust coverage by year 2 or later	**S**	**U**	
8. Mulch Depth (if applicable) (1 time a year)			
Mulch at original design depth after tilling or replacement	**S**	**U**	
9. Vegetation Health (1 time a year)			
Dead or decaying plants removed from the system	**S**	**U**	

Corrective Action Needed	Due Date
1.	
2.	
3.	

CONTROL OF INVASIVE PLANTS

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:

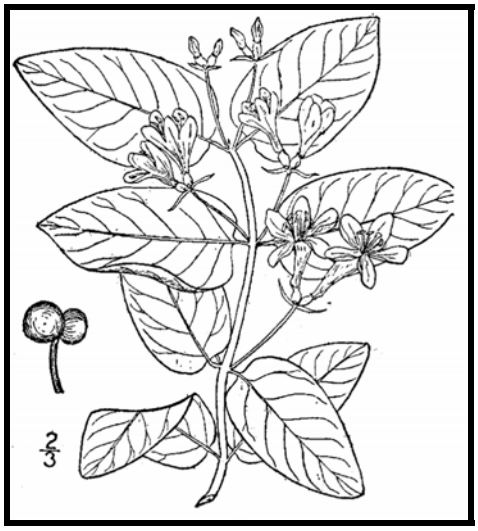
Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants,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

UNIVERSITY of NEW HAMPSHIRE COOPERATIVE EXTENSION

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.



Tatarian honeysuckle
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.

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.

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.

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.

New Hampshire Regulations

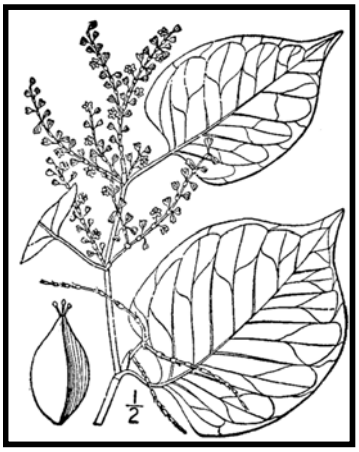
Prohibited invasive species shall only be disposed of in a manner that renders them nonliving and nonviable. (Agr. 3802.04)

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)

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.



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.

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 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.

<table>
<tr><th>Woody Plants</th><th>Method of Reproducing</th><th>Methods of Disposal</th></tr>
<tr><td rowspan="2">Norway maple
(Acer platanoides)
European barberry
(Berberis vulgaris)
Japanese barberry
(Berberis thunbergii)
autumn olive
(Elaeagnus umbellata)
burning bush
(Euonymus alatus)
Morrow's honeysuckle
(Lonicera morrowii)
Tatarian honeysuckle
(Lonicera tatarica)
showy bush honeysuckle
(Lonicera x bella)
common buckthorn
(Rhamnus cathartica)
glossy buckthorn
(Frangula alnus)</td><td rowspan="2">Fruit and Seeds
  </td><td>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
▪ Use as firewood.
▪ Make a brush pile.
▪ Chip.
▪ Burn.</td></tr>
<tr><td>After fruit/seed is ripe
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.</td></tr>
<tr><td rowspan="2">oriental bittersweet
(Celastrus orbiculatus)
multiflora rose
(Rosa multiflora)</td><td rowspan="2">Fruits, Seeds, Plant Fragments
  </td><td>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.</td></tr>
<tr><td>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.</td></tr>
</table>

Non-Woody Plants	Method of Reproducing	Methods of Disposal
garlic mustard *(Alliaria petiolata)* spotted knapweed *(Centaurea maculosa)* ▪ Sap of related knapweed can cause skin irritation and tumors. Wear gloves when handling. black swallow-wort *(Cynanchum nigrum)* ▪ May cause skin rash. Wear gloves and long sleeves when handling. pale swallow-wort *(Cynanchum rossicum)* giant hogweed *(Heracleum mantegazzianum)* ▪ Can cause major skin rash. Wear gloves and long sleeves when handling. dame's rocket *(Hesperis matronalis)* perennial pepperweed *(Lepidium latifolium)* purple loosestrife *(Lythrum salicaria)* Japanese stilt grass *(Microstegium vimineum)* mile-a-minute weed *(Polygonum perfoliatum)*	**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 (*Phragmites australis*) Japanese knotweed *(Polygonum cuspidatum)* Bohemian knotweed *(Polygonum x bohemicum)*	**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.

January 2010