

Connecticut Botanical Society

P.O. Box 9004, New Haven, CT 06532

September 15, 2020

Eversource
48 Tolland Stage Road
Tolland, CT 06084
Attn: Robert D. Deptula, Supervisor
Environmental Land Use Permitting

RE: *CBS Recommendations for Electrical Utility Right-of-Way Vegetation Management*

Dear Mr. Deptula:

The Connecticut Botanical Society recognizes you and your colleagues at Eversource for working to safely and sustainably power Connecticut's homes and businesses. As your allies and neighbors, we feel the responsibility to offer our collective ecological expertise in the form of the attached Recommendations for Electrical Utility Right-of-Way (ROW) Vegetation Management. These are recommendations to help Eversource to safely deliver power statewide in compliance with relevant codes, while better protecting the important natural communities of powerline ROWs.

Our recommendations are the result of nearly a year of work by our ROW subcommittee. In addition to our own experience and expertise, they incorporate contributions by scientists from Connecticut College, the University of Connecticut, the Connecticut Agricultural Experiment Station, and the Connecticut Invasive Plant Working Group (CIPWG), who share concerns about ROW management. Particularly valuable are the new Best Management Practices for preventing invasive plant spread from construction and maintenance sites, issued in March 2020 by the CT Invasive Plant Council (<https://cipwg.uconn.edu/>).

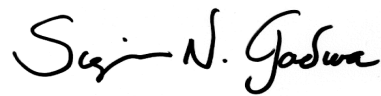
We have worked hard to develop guidelines that are a win-win for Eversource and ROW natural communities because we understand that sustainable solutions require genuine partnership. We also understand that as more research is done, and as experiences of contractors and landowners are shared, these recommendations can be further fleshed out. Of particular need is research for effective and cost-effective management for rare species and priority invasive species.

By implementing our recommendations for fostering stable, tree- and invasive-resistant ROW plant communities, Eversource may also reduce its labor and expenditures. This is an opportunity for Eversource to strengthen its public image as a utility provider invested in stewarding Connecticut's natural resources, with an active role in environmental conservation within our communities. These ROW Management Recommendations offer ecologically sound and cost-effective advice that will help preserve the biodiversity of our state.

Sincerely,



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Recommendations for Electrical Utility Right-of-Way Vegetation Management

Introduction

The mission of the Connecticut Botanical Society (CBS) is to increase knowledge of the state's flora, accumulate a permanent botanical record, and promote conservation and public awareness of the state's rich natural heritage. To that end, the CBS Ecology and Conservation Committee focuses on education of citizens, public officials and organizations about plant conservation, rare plant populations and critical habitats.

The attached Recommendations for Electrical Utility Right-of-Way (ROW) Vegetation Management were developed by the CBS Ecology and Conservation Committee to address recent changes in Eversource's management of powerline ROWs to comply with updated safety and reliability codes. Here, we propose guidelines to ensure the ecological integrity of ROWs and still manage for safe electricity delivery. The recommendations are intended for Eversource, where practicable, and for the property owner whose land is affected by a powerline ROW easement. While some recommendations may not be feasible for implementation on a broad scale by Eversource, we encourage landowners concerned about the ecological integrity of the powerline ROWs on their properties to be proactive in obtaining inventories of species and natural communities in ROWs on their property and consider conducting their own preemptive vegetation management.

The CBS Ecology and Conservation Committee has gained an understanding of the vegetation and soils in ROW stretches in the state by means of literature reviews, professional fieldwork, and botanical field trips led by the CBS. The foundation for the following recommendations is pioneering work on stable shrub communities in ROWs by Connecticut ecologists such as Bill Niering and Frank Egler. Much of the information presented here is based on extensive research conducted in a section of ROW in Glastonbury. We encourage ROW managers to refer to this study for more detail on the effects of gravel and different approaches to vegetation management: <https://caryaecological.com/publications/>.

For decades, management of powerline ROWs, based on selective removal of tall-growing trees, provided conditions that supported thriving shrub and herbaceous communities, including critical habitats for rare and endangered species. Recent changes to ROW management by Eversource involve a much more aggressive approach to vegetation control, including extensive brush mowing and elimination of all woody species that can grow taller than 15 feet under the wire and taller than 25 feet in the buffer zone alongside the wires (extending 100 feet from the wire or to the limit of the ROW easement, whichever is less). This approach has resulted in damage to shrub communities and the complete elimination of formerly allowed ecologically important tree species such as eastern red cedar, crab apple and flowering dogwood in the "under wire" zone, and eastern red cedar in the "border zone."

Eversource's current vegetation management strategy entails the removal of such species. However, the Electrical Reliability Standard, established by the North American Electrical Reliability Corporation

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(NERC), that addresses vegetation management and tree trimming in ROWs, FAC-003-2 (https://www.nerc.com/pa/Stand/Project%20200707%20Transmission%20Vegetation%20Management/FAC-003-2_TR_December_17_2010.pdf) does not dictate removal of any particular tree species. Instead, it states: "In the long run, cultural control is the most desirable method where it is applicable. A cultural control known as cover-type conversion provides a competitive advantage to short-growing, early successional plants, allowing them to thrive and eventually outcompete unwanted tree species for sunlight, essential elements and water. The early successional plant community is relatively stable, tree-resistant and reduces the amount of work, including herbicide application, with each successive treatment." The CBS encourages Eversource and landowners to manage such species in a reasonable fashion that does not necessarily require their complete elimination.

In recent years, Eversource also began building thick gravel roads and large gravel work pads throughout the ROW system to accommodate work cranes and other heavy equipment to replace structures and to comply with National Electrical Safety Code (NESC) standards. This extensive gravel has disrupted functioning ecosystems and threatens rare and endangered plant communities and the faunal species that rely on them. Graveled areas are commonly colonized by invasive species such as common mugwort (*Artemisia vulgaris*).

In granting Eversource permission to conduct the work to comply with NESC codes without a Certificate of Compatibility and Public Need (Petition 1293, March 2017), the Connecticut Siting Council (CSC) established conditions (https://www.ct.gov/csc/lib/csc/pending_petitions/2_petitions_1201through1300/pe1293-dcltr.pdf). Item 7 on page 4 of this document states that [Eversource plans to] "use existing access, where possible, retain work pads unless the property owner requests removal, and remove matting from wetland areas after construction..." The CBS recommends the use of timber matting wherever possible and encourages landowners to request removal of work pads to prevent permanent impairment to native communities and establishment of noxious invasive plants.

Per Petition 1293, landowners are provided a brief (30 day) comment period by the CSC before Eversource maintenance work may proceed. We encourage landowners to gather data on the natural resources (*e.g.*, plant community, birds, turtles) in their stretch of ROW well before the 30-day notice is served by Eversource. Such information would prove helpful in working with Eversource and the CSC to establish conservation measures and reduce adverse impacts of ROW maintenance activities.

Connecticut Botanical Society, Ecology & Conservation Committee

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**Connecticut Botanical Society
Ecology & Conservation Committee**

Recommendations for Electrical Utility Right-of-Way (ROW) Vegetation Management

These guidelines set forth a general framework for ROW vegetation management that aims to protect biodiversity. ROW segments with unique native ecological resources or invasive species challenges may need site-specific plans.

Goals:

1. Minimize tree seedling establishment by fostering conditions that do not favor establishment of tall-growing trees and undesirable woody colonizers.
2. Preserve Critical Habitats¹, populations of uncommon/rare plants and key habitats for fauna.
3. Promote establishment of pollinator and wildlife plants, herbaceous and woody.
4. Reduce the extent of invasive plant infestations in ROWs with ecologically strategic approaches.

General Vegetation Management

- Minimize damage to dense, native, shading shrubs and ground cover, which naturally limit colonization by trees and invasive species. Thick, tall stands of native herbs are important for pollinators and wildlife. Shrub thickets provide wildlife cover, fruits and seeds, as well as insect gleaned areas. Shrubs are also valuable nectar/pollen sources, e.g. blueberry, huckleberry, sweet pepperbush maleberry, mountain laurel, sheep laurel, viburnums, rhododendrons, and chokeberries.
- Selectively remove tall-growing tree species, in a framework of Integrated Vegetation Management as described in Dreyer and Niering (1986), Johnstone (1990), and Russell *et al.* (2018).
- For species that do re-sprout, consider treating freshly cut stems immediately with herbicide, or, alternatively, cutting and return the following year, preferably in early summer, to spray the re-sprouts. This reduces the amount of herbicide needed.
- Know which tree species are killed by cutting alone (*e.g.*, most conifers) and do not require herbicide use.
- Use a selective herbicide such as triclopyr², which does not harm sedges and grasses, rather than a broad-spectrum herbicide such as glyphosate.
- Ensure that field crews are able to identify native shrubs (*e.g.*, hazelnut, witch hazel, high bush blueberry) to prevent accidental spraying with herbicide and take care to minimize overspray.
- Where mowing is needed, *e.g.* for access, mow high to avoid damage to low-growing patches of huckleberries and blueberries, herbivorous insects, herptiles and other wildlife.

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- Where broad-leaved herbs with high pollinator/seed value are abundant but interspersed with tree saplings, mow early in season to avoid impacts to the herb layer. Most of the later-flowering species will still bloom, though stature will be lower.
- Some areas may benefit by periodic mowing, such as rare plant communities and pollinator meadows.
 - Where mowing is needed for access, manage these linear swaths as pollinator meadows and/or low shrub communities.
 - Know the other conservation-concern species and critical habitat assemblages at sites. For example, small-scale localized mowing may be acceptable in known New England cottontail-occupied stretches.
- Do not deposit/spray wood chips in ROWs.
 - Wood chips smother native plant communities and important ground covers, such as dewberries, clubmosses (princess pine, running pine) and wintergreens. Phyto-toxic phenolic compounds leach from thick layers of wood chips.
 - Nutrient enrichment from chips disrupts microbial soil communities, and pollutes wetlands and waterbodies. Nutrients foster establishment of tree saplings and invasives after the wood chips have broken down.
 - In ROW's with naturally acidic, nutrient-poor soil, a chip-free environment will help maintain these conditions, which are not conducive to tree seed germination and will minimize creation of seed beds for undesirable woody species.
- Private land owners may consider allowing eastern red cedar and low densities of oak saplings to remain by coppicing (Logan 2019), not allowing height to exceed the maximum height limit within the four-year vegetation management rotation.

Management recommendations to help achieve goals:

Rare Plants and Plant Communities³

- Conduct comprehensive *de novo* surveys⁴ for rare plants and plant communities before work proceeds. It is recommended that such surveys be conducted as soon as possible. Once Eversource gives its required 30 day notice of work, there is not sufficient time to conduct such a survey.
- If *de novo* surveys are not possible, use Critical Habitat as a surrogate, and plan damage avoidance as appropriate.
- Landowners can request Natural Diversity Database (NDDDB) information about their property from the CT Department of Environmental Protection (CTDEEP), and may conduct surveys to share with Eversource for planning appropriately. Eversource should inform landowners of vegetation height limits, should they wish to manage vegetation themselves in certain areas to avoid damage to rare or noteworthy plants and communities.

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Work Pad Issues

- To support equipment during utility pole replacement by Eversource, timber matting is always preferable to gravel work pads, to protect native vegetation and ecological communities in CT DEEP Critical Habitats.
- Where gravel is required, reduce final footprint of gravel pads to not larger than 50' × 50' and road width to not wider than 13' where gravel is necessary. If the power is turned off during pole replacement, work pads can be smaller, as less equipment is needed.
- Stockpile topsoil from the site and use it to top dress road shoulders and work pads (which are usually a mix of stone dust and gravel known as "stone process").
- Use imported topsoil or topdressing only if absolutely necessary.
 - Source material should have been inspected for two growing seasons to insure it is invasive free.
 - Topdressing material should be suitable for proposed planting materials (ideally as prescribed in a written restoration plan).
- Reseed with native warm season grass or cool season grass, or custom mix, as appropriate, based on substrate characteristics (ideally, as set forth in a written restoration planting plan).
- Invasives will still arrive on equipment, work boots and tires. Monitor graveled areas and treat invasives, including mugwort and black swallowwort, for two years. Follow-up control will take little time, if source material really was invasive-free.
- Follow the Best Management Practices issued by the Connecticut Invasive Plant Council (2020) to minimize export of seeds and/or rhizomes of mugwort, Japanese knotweed, Phragmites, and Japanese stiltgrass.
- Landowners and town governments should be aware that they may request removal of work pads. In granting Eversource permission to conduct utility work to comply with new safety codes per Petition 1293 (https://www.ct.gov/csc/lib/csc/pending_petitions/2_petitions_1201through1300/pe1293-dcltr.pdf), the Connecticut Siting Council recognized that Eversource planned to leave work pads in upland areas "unless the property owner requests removal." Eversource is required to share sub-petitions for ROW work under Petition 1293 with those entities.

References and Sources used to develop CBS Recommendations.

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¹ Critical Habitats in Connecticut are defined by the Connecticut Department of Environmental Protection (CTDEEP) in an on-line document written by former CT DEEP Plant Ecologist, Kenneth Metzler; the legend to the on-line map shows the larger, better known examples: https://cteco.uconn.edu/guides/resource/CT_ECO_Resource_Guide_Critical_Habitat.pdf. Examples of Critical Habitat include *Poor Fen* defined as “natural peatlands (bogs) occupying topographically defined basins; influenced by acidic ground water; on deep, poorly decomposed peats; dominated primarily by ericaceous shrubs. Subtypes include dwarf shrub, shrub thicket, saturated woodland, and other/unique”, and *Acidic Rocky Summit Outcrop* defined as “dry to xeric exposed summits, ledges, and other outcrops (gneiss, schist, granite, sandstone) with a vegetation of small trees, low shrubs, grasses and herbs. Subtypes include grassy glade/bald, pitch pine, scrub oak, and other/unique”.

ⁱⁱ Use water-soluble triethylamine (TEA) formulation of triclopyr, 7-8.8%, as Ortho Groundclear, Bayer Advanced Brush Killer Plus, & Brush-B-Gon, sold over the counter, already mixed. May be applied by property owner, no license required; also sold as Garlon A, to be applied only by licensed applicators. Use cut stump method or spray small plants with a low pressure sprayer (4% concentration).

³ A copy of Connecticut State-listed plants known in power line ROWs is available here: http://www.ctconservation.org/sites/default/files/F.%20CT%20State-listed%20plants%20known%20in%20power%20line%20ROWs_DRAFT_2020-03-11.pdf.

⁴ A list of Botanists qualified and willing to perform *de novo* (i.e., comprehensive) surveys for State-listed plants and rare plant communities/Critical Habitats in Connecticut and other useful documents can be found here, under *Additional Information offered by others*: <http://www.ctconservation.org/information-powerline-right-way-vegetation-management>.

Preventing the spread of invasive plant species:

Guidelines for Best Management Practices for movement of topsoil and gravel fill, mulch and equipment in Connecticut.

Dispersal of Invasive Plant species in Biologically Contaminated materials:

Many invasive plant species spread naturally through seed dispersal by wind, water or wildlife. However, others disseminate inadvertently through human activities such as the movement of excavated soil, sand, gravel, and mulches; or through the movement of mowing, logging, maintenance and excavation equipment from invaded sites to uninvaded sites.

Soil, sand, gravel, and mulches that are contaminated with viable seed or other propagules of invasive plant species (such as root or stem fragments from which a new plant can grow) can be considered Biologically Contaminated in that the transfer of this material to a site free of invasive plants will aid in the dispersal of the invasive species and disrupt or damage the biological diversity of the native flora and fauna.

Adverse impacts and costs associated with Invasive Plants:

Invasive plant species adversely affect native ecosystems and may cause harm to human health or economic well-being. Invasive plants adversely impact ecosystems in a variety of ways by crowding out native plants and reducing plant diversity which results in a loss of food and shelter for wildlife and alterations in nutrient and water availability. Some invasive species such as giant hogweed present health risks to people while others such as Japanese barberry create habitats that favor rodents associated with elevated levels of Lyme disease-transmitting deer ticks. Other invasive plants (including mugwort and certain species of thistle and knapweed) are problematic weeds that cause economic damage in agricultural fields and grasslands in addition to the damage they cause in native habitats.

Some invasive species can be very destructive and problematic in the built environment as well. Vines and large shrubby invasive species in particular impair sight lines on roads, climb on and obscure street signs, and overgrow utility installations and infrastructure.

General principles for pro-active control of invasive plant spread

Since many invasive species are very difficult to eradicate once introduced, the most effective management strategy is to prevent invasive plant species from spreading into new habitats. Preventing the initial spread of invasive plant species is easier and less expensive than remediating a landscape after the invasive plants become established.

Once an invasive species spreads to new habitat, early detection and rapid response is the best course of action for preventing establishment. By detecting an invasion early and reacting quickly the cost of remediation can be greatly reduced.

Concerns associated with movement of fill, mulch and equipment:

These **Best Management Practices (BMPs)** were developed to assist landowners, work crews and supervisors in preventing the introduction and spread of invasive plant species on disturbed and managed land. The risk of inadvertent spread of invasive species is whenever materials (e.g. soil fill, gravel, mulch) and equipment are moved and natural plant cover is disturbed or removed; circumstances which are commonly associated with residential or commercial construction projects, road work and some agricultural management activities. This movement of materials and equipment spreads not only seeds but also viable stem and root fragments that can readily sprout to invade new habitat.

Roadsides provide a desirable habitat for invasive plants due to ample sunshine, disturbed and bare soils, and moist drainage channels. If bare areas are present or if vegetation is eliminated due to herbicide treatments, it is important to reestablish desirable vegetation, such as turfgrasses or native plants, before non-native plants invade the area.

The three keys principles in preventing the inadvertent spread of invasive plant species are AVOID, MINIMIZE, and MITIGATE. Whenever possible AVOID moving invasive species into uncontaminated sites. If that is not possible MINIMIZE the movement and impact through inspection, and always follow through with MITIGATION using quick remedial action.

Best Management Practices (BMPs):**Planning Pre- and Post- Growing Season**

1. Start by hiring or appointing a competent invasive plant expert to coordinate invasive plant identification, training of work crews, pro-active site practices, species control, and follow-up monitoring.
2. Develop a plan to identify and map work areas with new and existing areas of invasive plants. Keep the entire crew engaged in the identification of new areas. It is much easier to eradicate a small, new area of invasive plants than an established, large one. Establish a schedule and prioritize your approach depending on the best time to control.

The online invasive plant mapping database, EDDMapS has a map query function (<https://www.eddmaps.org/tools/query/>) that enables the downloading of site-specific invasive plant records for each Town in Connecticut. This database can be useful (particularly for determining if uncommon invasive species are nearby), but note that it is not a substitute for onsite examination because many records are not yet posted due to time-lags in the verification process, or because there has been no reporting for most sites.

3. As needed, develop species-specific control plans that include when to use herbicides or when to mow and/ or control in the vegetative phase. Repeat control for aggressive species, especially perennials.

4. Monitor work areas after soil disturbance and/or control treatment for at least two years (Note: some species like multiflora rose, Japanese stiltgrass have very long-lived seeds and will require much longer monitoring periods). Return to re-treat, as needed.

Soil and Excavated Material from site of origin: "Top" material - topsoil, gravel, etc - is frequently contaminated with invasive plant propagules such as seeds or rhizomes (underground stems, small fragments of which can sprout). Screened topsoil may be free of larger rocks, but it contains seeds, usually from several sites where soils were excavated.

1. Minimize soil disturbance and monitor excavation sites for emerging invasive species for at least two years.
2. If possible, avoid transporting soil, fill, stone, hay, or other materials (see HANDLING EXCAVATED MATERIAL FROM BIOLOGICALLY CONTAMINATED SITES below). If moving these materials is necessary, first verify that they are free of invasive plant fragments or seeds, and monitor the site with this deposited material for emergence of invasive plants for at least two years. Respond rapidly to any invasive plants found during monitoring.
3. Stabilize disturbed soils as soon as practical with acceptable seeding and mulch.
4. Do not use excavated material elsewhere unless it is free of invasive plant fragments or seeds.
5. Wherever possible, avoid excavation in areas containing Japanese knotweed, giant knotweed, purple loosestrife, mugwort, swallowwort, and phragmites. Plants will emerge from the root fragments of these extremely difficult to control species.

INSPECTION & MONITORING:

1. Inspect sites where soil and other fill or mulch is to be introduced. Record presence of invasive species already present. Use of a mapping tool such as EDDSmaps, iMapInvasives or similar free online-tool which also has an App may be of use, but is not a substitute for field examination. Treating invaded areas before introducing new material is recommended.
2. Inspect soil and gravel fill prior to movement. Before moving soils or gravel, inspect the area of origin (including but not limited to, surrounding ditches, top soil piles, gravel/sand piles, fence rows, roads, easement, rights-of-way, working area, storage areas, and buffer zone surrounding the entire area).
3. Inspect soils and gravel fill prior to spreading on new site.
4. Monitor sites where new fill or mulch is introduced. Treat newly emerging invasive species immediately. Monitor the site for at least two years, and until a desirable cover is established

Manage existing topsoil and dead plant material to reduce contamination by invasive plants.

1. Develop topsoil management plans on all projects that include grading or earthwork, prior to soil disturbance.
2. Save local existing, invasive-free topsoil for reuse. However, if topsoil and duff are found to be contaminated with invasive plants, do not reuse this material on a new site. Instead, a mitigation plan is in order (See HANDLING EXCAVATED MATERIAL FROM BIOLOGICALLY CONTAMINATED SITES)..

3. Identify on the worksite plans, where local topsoil and dead plant material should be:
 - a. Removed or excavated
 - b. Stockpiled
 - c. Reapplied
4. When excavating local topsoil and removing duff material, minimize handling of the material to reduce soil compaction and detrimental impacts on microorganisms and soil health.
5. Stockpile clean, local topsoil and duff material in windrows no taller than ten feet for local topsoil and five feet for duff. Implement temporary erosion control measures to reduce the likelihood of invasive plant establishment and loss of material.
6. Seed local topsoil stockpiles that will remain in place for over six months with a fast-growing non-invasive (preferably native) plant species to maintain soil microorganisms. Seeding is the preferred covering for topsoil stockpiles, as opposed to impermeable barriers such as tarps or plastic sheeting, which may destroy living soil microorganisms.
7. Monitor stockpiles of topsoil and duff material regularly as they are highly susceptible to invasion by invasive plants. Determine management needs based on presence of invasive plants.

When using mulch:

1. Use weed-free mulch.
2. Apply mulch at the recommended thickness to suppress the establishment and growth of invasive plants. Ensure mulch remains on-site. Lighter mulches will blow away in areas prone to heavy wind; mulches can move if watering results in surface flow. Consider the use of Tackifiers (e.g. adhesive compounds used to increase the tack or stickiness of the surface) or biodegradable netting to stabilize mulch on erosion prone areas.
3. Supplement with additional mulch to retain thickness and effectiveness after it begins to decompose.

SOIL DISTURBANCE & STABILIZATION

1. Minimize soil disturbance whenever possible, as invasive plants readily colonize areas of disturbed soil. Monitor recent work sites for the emergence of invasive plants for a minimum of 2 years after project completion.
2. Stabilize disturbed soil as soon as possible by seeding with, and quickly establishing a dense cover of native species. A temporary cover of clean mulch or straw can be used to stabilize before native species are established. A cover of rip-rap or gravel may be appropriate on certain sites. All species listed on the Connecticut Invasive Plants Council list are considered invasive or potentially invasive; and none should be intentionally planted. It is illegal to plant those species prohibited by State statute. In addition, for the few species on the list exempted from regulation, State statutes prohibits the use of those species by State agencies or contractors.
3. Avoid using fill if possible, especially on sites that are not contaminated with invasive species. Materials such as fill, loam, mulch, straw, rip-rap, and gravel should not be brought into project areas from sites contained by invasive plants. If fill is used, monitor work sites for the emergence of invasive plants for a minimum of 2 years.

MOVEMENT & MAINTENANCE OF EQUIPMENT

1. Where invasive plants are present, mark areas where equipment should not be driven or parked to prevent the subsequent spread of invasive propagules (seeds, fragments etc) within the work area.
2. Require that undercarriages, wheel wells and parts of the equipment that come into contact with soil are cleaned prior to equipment being brought onto the site
3. When equipment needs to be moved, plan work flow so that equipment is moved from non-invaded sites to invaded sites. This is especially important during ditch cleaning and shoulder scraping.
4. Use staging areas that are free of invasive plants to avoid spreading seeds, clippings or plant fragments.
- If working in areas with invasive plants, clean all equipment, clothing, and hand tools of all visible soil and plant material before leaving the project site. Acceptable methods of cleaning include, but are not limited to:
 - Portable wash station that contains runoff from washing equipment (containment must be in compliance with wastewater discharge regulations);
 - High pressure air;
 - Brush, broom, or other hand tools (used without water).
5. If equipment will be used in invaded areas, remove above-ground invasive plant materials such as purple loosestrife, Phragmites, and Japanese knotweed prior to the start of work.
6. Excavated material taken from sites that contain invasive plants cannot be used away from the invaded site until all viable plant material is destroyed. Excavated material from areas containing invasive plants may only be reused within the *exact* limits of the invaded site. (See HANDLING EXCAVATED MATERIAL below).
7. Whenever possible, excavation should be avoided in areas containing Japanese knotweed, purple loosestrife, mugwort, swallowwort, Phragmites, and seed propagated species such as stiltgrass. If excavation does occur in these areas, the BMPs described for 'HANDLING EXCAVATED MATERIAL & INVASIVE PLANT MATERIAL' must be followed.
8. Ditched areas should be stabilized daily as part of the regular work operations. The disturbed soils and new ditch profile are to be protected as soon as possible by stone, erosion control materials or seeding and mulch from a source free of invasive plant material. Seeds of native species should be used whenever possible. Mulch may be straw or a manufactured product.

MOWING

1. Frequent mowing of areas infested with purple loosestrife, Phragmites, mugwort, and Japanese knotweed can be a viable method of suppressing the spread of these species. However, since these species can sprout from stem and root fragments, as well as from seed, it is imperative to avoid inadvertently spreading propagules when mowing.
2. Mow these areas BEFORE seed head formation.
3. Clean mowing equipment daily, and prior to transport to and from each location. This is particularly important if mowing is after seed maturation.

HANDLING EXCAVATED MATERIAL FROM BIOLOGICALLY CONTAMINATED SITES.

Excavated materials taken from infested areas should only be used onsite, unless all plant material including seed has been destroyed. Only use within exact limits of infestation.

1. Excavation should be avoided in areas containing purple loosestrife, Phragmites, mugwort, and Japanese knotweed.
2. Any excavated Biologically Contaminated material that cannot be reused within the limits of the work site must be stockpiled on an impervious surface and treated on site to destroy any viable plant material OR the material must be disposed of using a prescribed method.
3. Destroy removed plant material. Methods include:
 - Solarization: place on impervious surface and cover with clear plastic
 - Brush piles: not for plants with fruit or seed
 - Burying: minimum of 3-5 feet below grade (Note: the proper depth varies with species. Burial may not be an option for species, such as Japanese knotweed, that have robust underground storage organs).
 - Burning: have a designated burn pile for invasive plants and the proper burn permit
 - Herbicide: requires a licensed applicator (CT DEEP)
4. Whenever transporting soil or fill materials containing invasive species, cover the load during transport.

References and resources:

Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers (3rd Edition). California Invasive Plant Council. <https://www.cal-ipc.org/resources/library/publications/landmanagers/>

BEST MANAGEMENT PRACTICES FOR ROADSIDE INVASIVE PLANTS IN THE ADIRONDACK PARK. New York State Department of Transportation. <http://adkinvasives.com/wp-content/uploads/2016/01/BMPs-for-Roadside-Invasive-Plants-in-the-ADKs.pdf>

Non-native Invasive Species Best Management Practices Guidance for the U.S. Forest Service Eastern Region. United States Department of Agriculture Forest Service. August 2012
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5412628.pdf

A Land Manager's Guide to Best Management Practices (BMPs) to Prevent the Introduction and Spread of Invasive Species. The University of Georgia Center for Invasive Species and Ecosystem Health. <https://bugwoodcloud.org/mura/gist/assets/File/LMBMP.pdf>

NAISMA WEED FREE GRAVEL MINIMUM CERTIFICATION STANDARDS. NORTH AMERICAN INVASIVE SPECIES MANAGEMENT ASSOCIATION (NAISMA). 2017. <https://www.naisma.org/>

Best Practices for Controlling Invasive Plant Species. PennDOT technical information sheet #184. 2017. http://www.dot7.state.pa.us/BPR_PDF_FILES/Documents/LTAP/TechSheets/TS_184.pdf

BEST PRACTICES For Managing Invasive Species on Utility Operations: A Pocket Guide for British Columbia's Utility Workers. 2014 EDITION.

[https://bcinvasives.ca/documents/Utilities BMP FINAL WEB 05 16 2014.pdf](https://bcinvasives.ca/documents/Utilities_BMP_FINAL_WEB_05_16_2014.pdf)

BEST MANAGEMENT PRACTICES FOR ROADSIDE INVASIVE PLANTS. New Hampshire Department of Transportation (2008). <https://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/documents/BMPsforRoadsideInvasivePlants.pdf>